

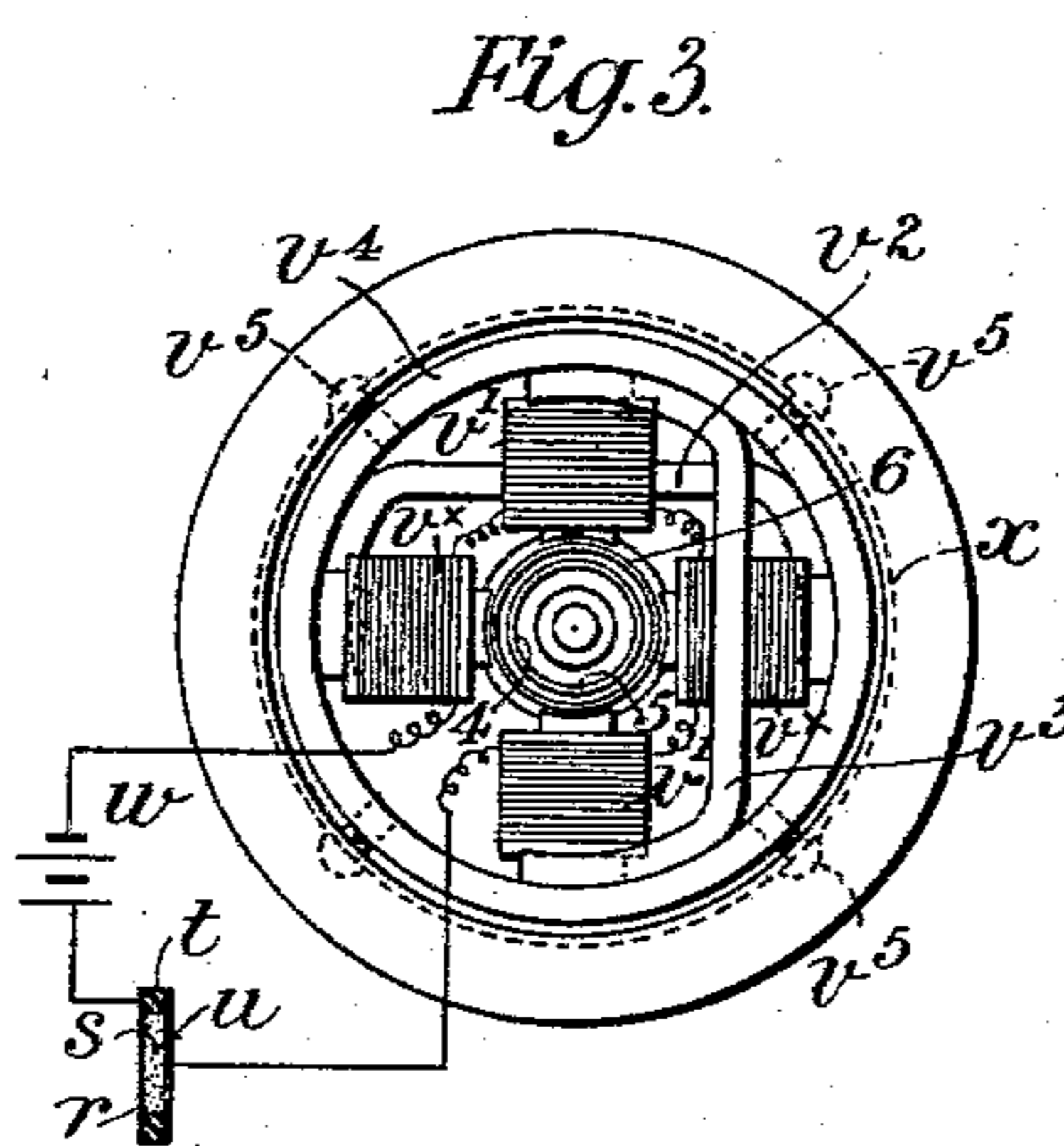
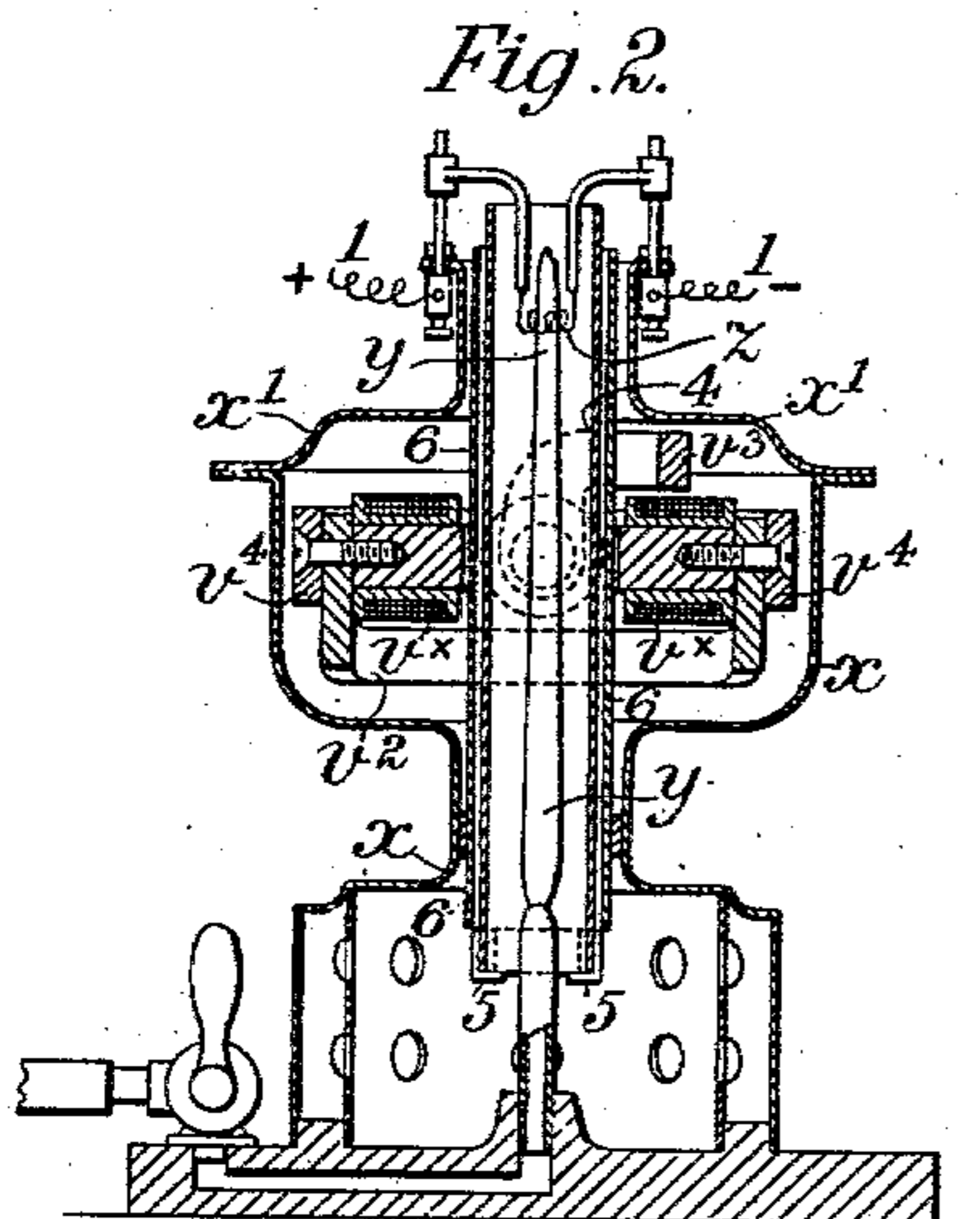
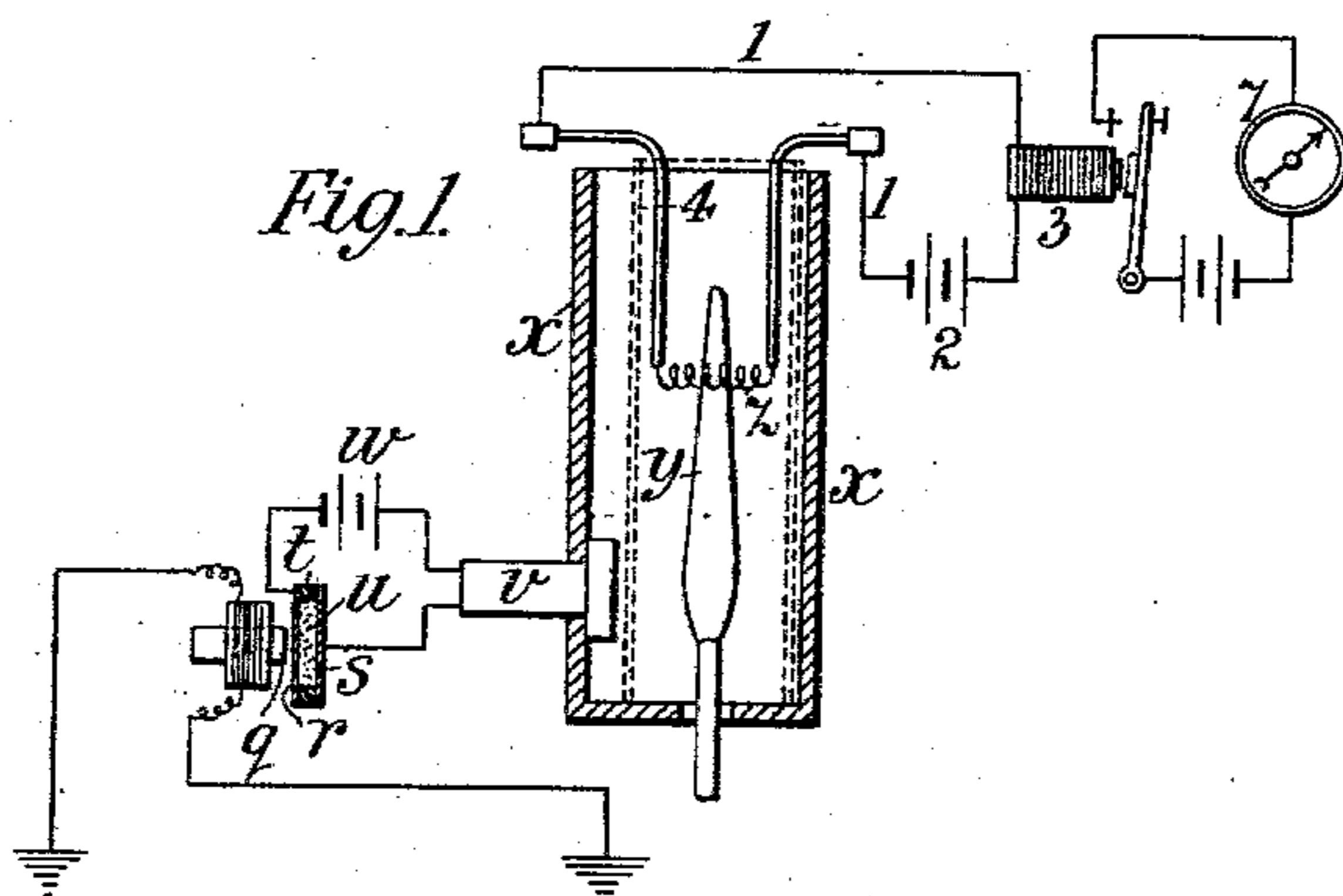
No. 744,000.

PATENTED NOV. 10, 1903.

J. T. ARMSTRONG & A. ORLING.
SYSTEM OF ELECTRIC COMMUNICATION.

APPLICATION FILED JULY 23, 1903.

NO MODEL.



WITNESSES.

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JAMES TARBOTTON ARMSTRONG AND AXEL ORLING, OF LONDON,
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SYSTEM OF ELECTRIC COMMUNICATION.

SPECIFICATION forming part of Letters Patent No. 744,000, dated November 10, 1903.

Original application filed February 5, 1902, Serial No. 92,683. Divided and this application filed July 23, 1903. Serial No. 166,733. (No model.)

To all whom it may concern:

Be it known that we, JAMES TARBOTTON ARMSTRONG, a subject of the King of England, and AXEL ORLING, a subject of the King of Sweden and Norway, both residing at London, England, have invented certain new and useful Improvements in Systems of Electric Communication; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to receiving apparatus adapted for use with systems of electric communication such as that described in our application for United States Letters Patent, Serial No. 92,683, filed February 5, 1902, and has for its object to provide means whereby signals attuned to a given pitch may be received without interference by other differently-attuned signals and means whereby a relay may be actuated by the received signals.

In carrying out our invention we employ a telephone which is actuated by the received electric impulses and whose vibrating diaphragm is caused to actuate a microphone located in a sound-proof chamber, in which is also located a sensitive flame whose well-known property is that it is shortened when the air is vibrated, such as in the case when sound is produced. Above the flame is arranged a wire, preferably of platinum, at such a height as to be within the flame when the latter is of its normal length, but outside it when the said flame is shortened in the manner described. Preferably the wire above referred to is fine, so as to cool quickly when the flame is shortened and to be heated quickly when the flame is longer. This wire forms part of a local circuit provided with a convenient source of energy and a relay, which is actuated when the electric resistance of the said wire is sufficiently lowered by a fall in its temperature, while the circuit controlled by the relay is opened when the flame again heats the said wire, whose resistance rises with its temperature, as is well known. In some cases the sensitive flame is located in an inner tuned chamber of tubular or other

suitable form, which excludes all sound-vibrations but those of a definite pitch propagated in itself by external impulses of a period equal to or in harmony with its own period. With such an arrangement the relay will only be operated by impulses of a definite pitch or in harmony therewith.

We will now more particularly describe our invention, reference being made to the accompanying diagrammatic drawings, in which—

Figure 1 shows one form of our receiving apparatus adapted to operate a relay. Fig. 2 shows a tuned receiver adapted to operate a relay in sectional elevation, and Fig. 3 is a partial plan thereof in which the cover and its supported parts are removed.

According to the arrangement shown in Fig. 1 the received impulses energize a telephone-magnet *q*, whose varying field vibrates a diaphragm *r*. This diaphragm *r* bears against carbon granules or the like *s*, contained in an insulating-holder *t*, provided with a metallic or other conducting-bottom *u*, from which electrical connection is made with a telephonic receiver *v*, having in circuit with it a local battery *w* and the first-mentioned diaphragm *r*, whose vibrations by varying the pressure upon the granules cause a fluctuating current of greater strength from the local battery to flow through the telephone *v*, whose diaphragm is vigorously vibrated and considerable sound produced. We may, however, employ any other suitable form of microphonic receiver.

When it is desired to operate a relay, the diaphragm of the telephone *v* or of two or more similar telephones arranged in circuit is or are located in a chamber *x*, in which a sensitive flame *y* is also located. Above the flame is arranged a wire *z*, preferably of platinum, at such a height as to be within the said flame when the latter is of its normal length, but outside it when the said flame is shortened in the well-known manner. Preferably the wire *z* is fine, so that it may be rapidly heated and cooled by the behavior of the flame. The wire *z* forms part of an electric circuit 1, provided with a battery 2, which actuates a relay 3 when the electric resistance of the said wire *z* is sufficiently lowered by a fall in

its temperature, the said relay-circuit being again opened when the flame again heats the wire z , whose resistance rises with its temperature, as is well known.

- 5 According to the arrangements shown in Figs. 2 and 3 and as indicated by dotted lines in Fig. 1 the sensitive flame y is located within an inner tuned chamber 4, of tubular or other
10 suitable form, which excludes all sound-vibrations but those of a definite pitch propagated by itself. Thus a relay so constructed will only be operated by transmitted impulses of a definite pitch. According to this
15 construction the tuned chamber 4 is supported by the depending legs 5 within an outer iron chamber 6, upon which the telephone-magnets $v^x v'$ act to produce sound. These magnets are of horseshoe pattern and have permanently-magnetized steel cores $V^2 V^3$,
20 upon which the coils are wound reversely, so that when a current is passing in a given direction the field of one of the magnets will be strengthened and the other weakened. The iron chamber 6 is conveniently supported by the outer chamber x , in which are
25 located the telephone-magnets $v^x v'$. These magnets are secured to a ring v^4 , which is in turn attached to the chamber x by screws v^5 . The gas-jet is located in the lower part of the
30 chamber x , where it is surrounded by double walls, which are provided with perforations so arranged as to insure a uniform supply of air to support combustion. The chamber x is provided with a cover x' , which supports
35 on insulation the relay connections l , to which is attached the variable resistance z . By means of one or more relays operated in this or any other well-known or convenient manner it is obvious that telegraphic or other
40 apparatus or mechanism 7 may be operated or controlled.

What we claim as our invention, and desire to secure by Letters Patent, is—

- 45 1. An apparatus for receiving electrical impulses consisting of a microphonic receiver having suitable ground connections and adapted to control the supply of current from a local source to one or more telephonic receivers

located within a chamber containing a sensitive flame above which is located a platinum 50 or other suitable wire forming part of a local circuit whose resistance is controlled by the length of the said flame which is regulated by the received impulses and a relay-closing device thereby operated, substantially 55 as described.

2. An apparatus for receiving electrical impulses consisting of a microphonic receiver having suitable ground connections, and adapted 60 to control the supply of current from a local source to one or more telephonic receivers located within a chamber containing an inner tuned chamber within which is a sensitive flame, above which is located a platinum 65 or other suitable wire forming part of a local circuit whose resistance is controlled by the length of the said flame which is regulated by the received impulses and a relay-closing device thereby operated substantially 70 as described.

3. An apparatus for receiving electrical impulses consisting of a microphonic receiver having suitable ground connections and adapted 75 to control the supply of current from a local source to one or more telephone-magnets located in a sound-proof chamber, whose varying fields cause the iron walls of a centrally-located chamber to vibrate and produce 80 sound, the said chamber containing an inner tuned chamber within which is a sensitive flame above which is located a platinum or other suitable wire forming part of a local circuit whose resistance is controlled by the 85 length of the said flame which is regulated by the received impulses and a relay-closing device thereby operated substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JAMES TARBOTTON ARMSTRONG.
AXEL ORLING.

Witnesses:

ALFRED NUTTING,
FREDK. L. RAND.