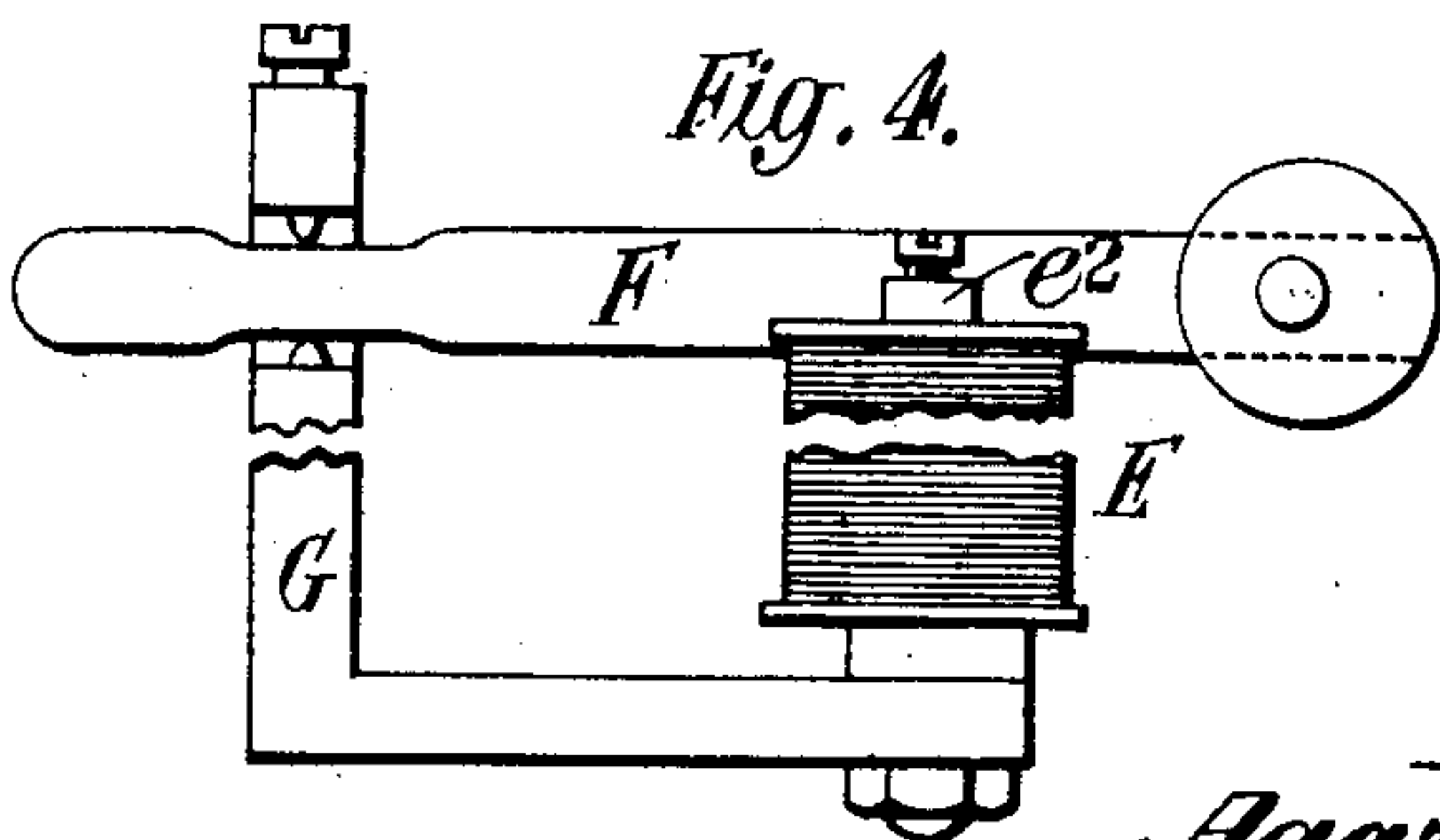
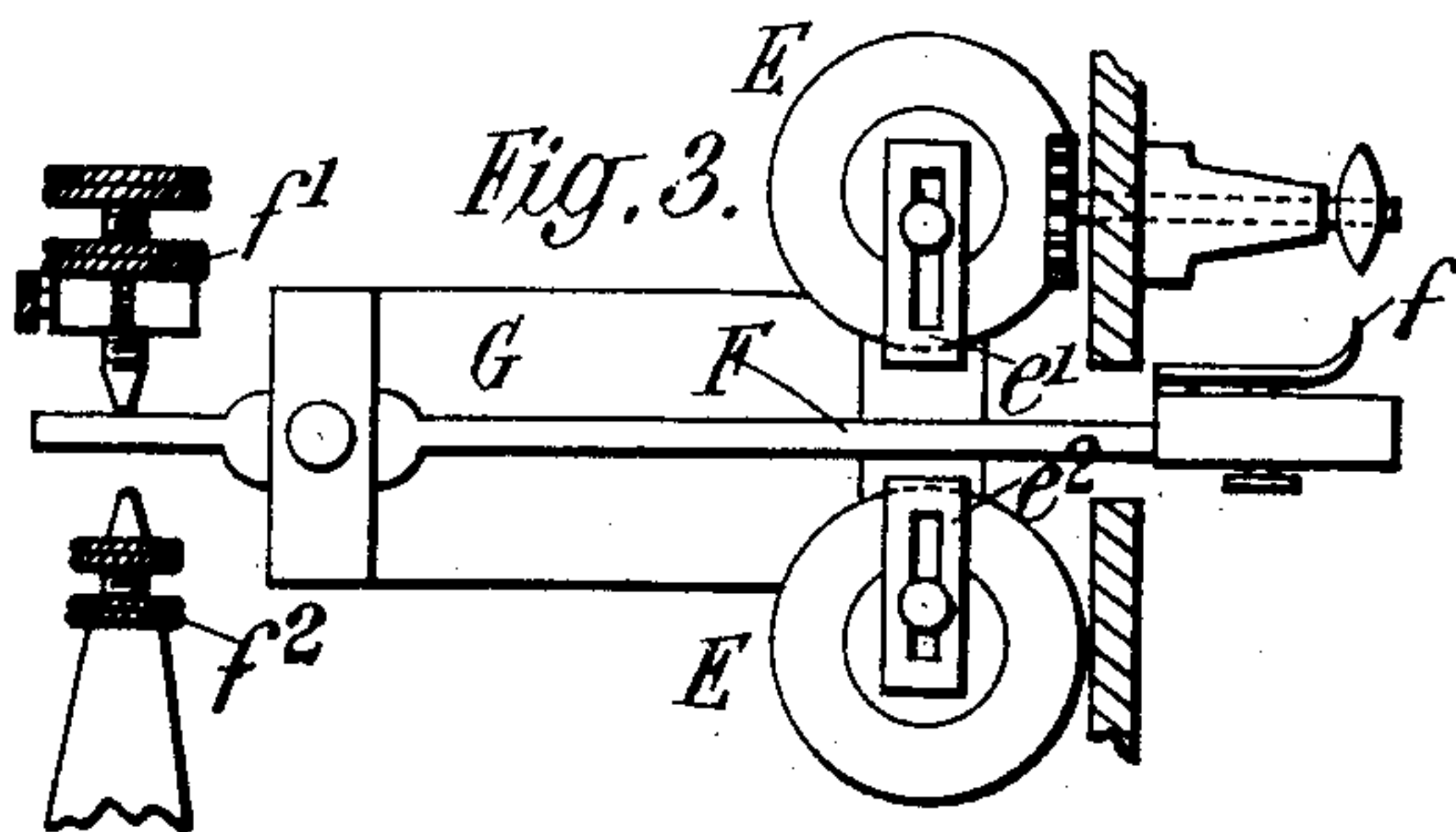
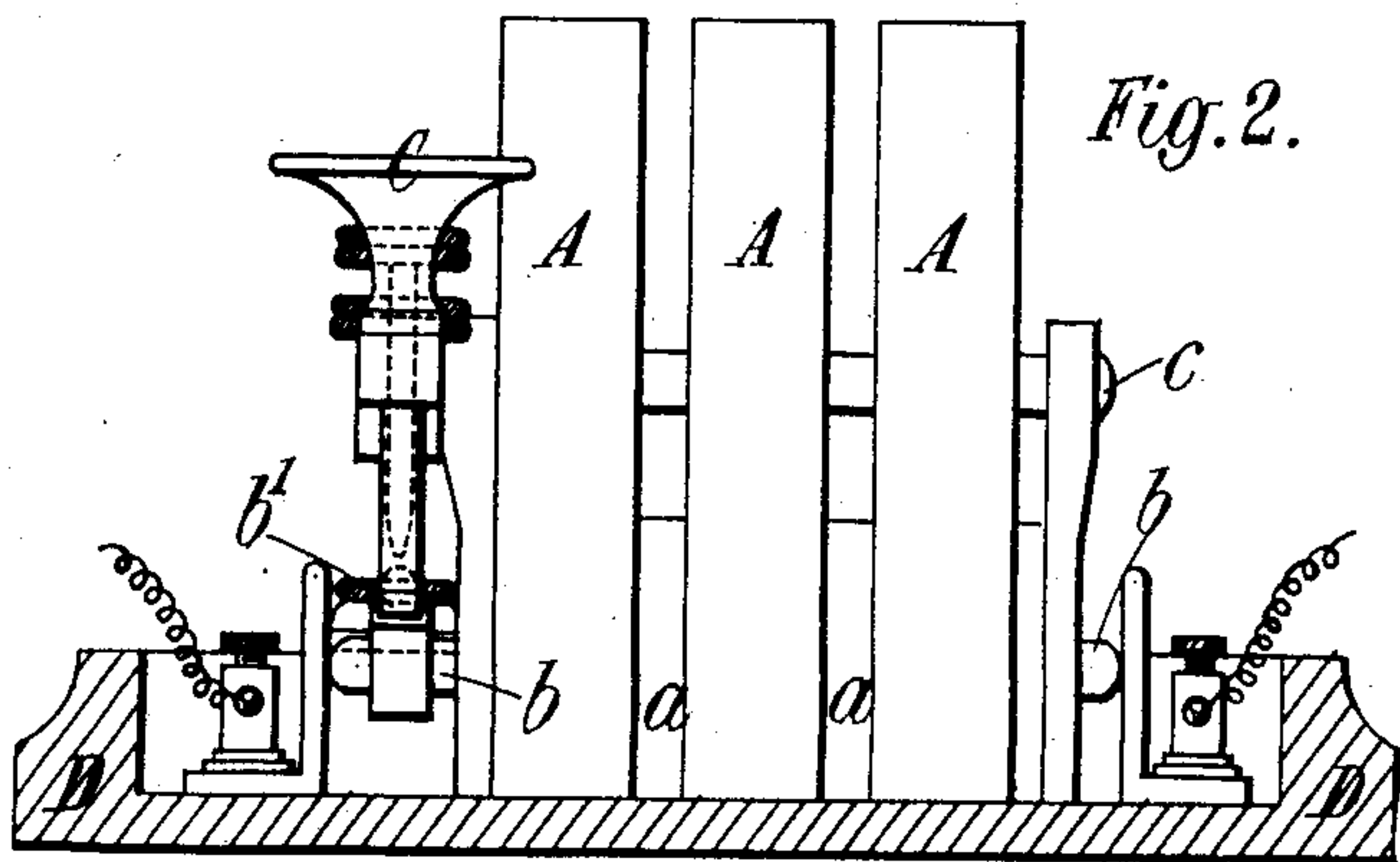
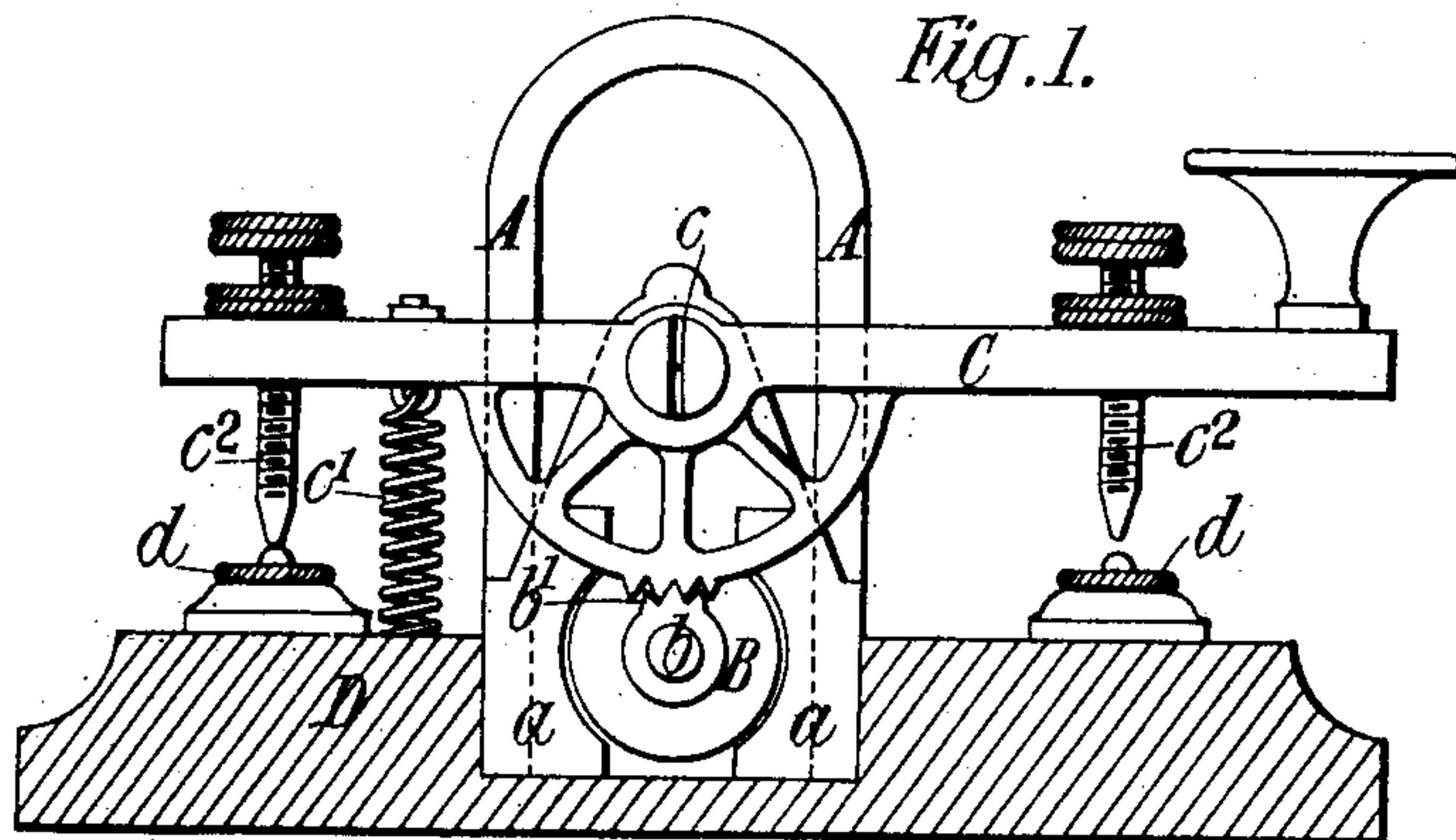


No. 753,690.

PATENTED MAR. 1, 1904.

A. FALCONE.  
ELECTRIC TELEGRAPH APPARATUS.  
APPLICATION FILED MAY 6, 1903.

NO MODEL.



Witnesses:  
James L. Norris, Jr.  
Robert Everett,

Inventor.  
Agazio Falcone.  
By James L. Norris,  
Atty



## UNITED STATES PATENT OFFICE.

AGAZIO FALCONE, OF FLORENCE, ITALY.

## ELECTRIC-TELEGRAPH APPARATUS.

SPECIFICATION forming part of Letters Patent No. 753,690, dated March 1, 1904.

Application filed May 6, 1903. Serial No. 155,902. (No model.)

*To all whom it may concern:*

Be it known that I, AGAZIO FALCONE, sergeant in the Italian Army, a subject of the King of Italy, residing at Florence, in the Kingdom of Italy, have invented certain new and useful Improvements in and Relating to Electric-Telegraph Apparatus, of which the following is a specification.

This invention relates to electric-telegraph apparatus, and has for its chief object to transmit the signals or messages by means of two alternating induction-currents, one of which is generated by the angular movement in one direction of an armature of the Siemens or other appropriate type in a magnetic field and the other of which is generated by an angular movement of the said armature in the opposite direction as it is returned to its original position. The receiver may be made on the principle of the ordinary telegraph-printing receiver, the electromagnetic part thereof being so arranged that the oscillatory tongue carrying the style will perform a printing stroke when the transmitter-key is depressed and will remain in this position until said key is liberated, whereupon said tongue will assume its original position. The duration of the transmitted signal or the length of time that the style remains in contact with the ribbon upon which it impresses the signals can thus be prolonged for a longer or shorter period, as may be required by the person working the transmitter.

In order that the said invention may be clearly understood and readily carried into practice, the same will now be described more fully with reference to the accompanying drawings, in which—

Figure 1 is a side elevation, and Fig. 2 a front elevation, of the transmitter, the base thereof being in section. Fig. 3 is a sectional side elevation, and Fig. 4 an under side plan, of the electromagnetic portion of the receiver.

The transmitter consists of an electromagnetic machine composed of one or more permanent magnets A A, connected together at their poles by suitable pole-pieces or extensions *a*, between which is situated the armature B of the aforesaid Siemens or other appropriate type. This armature is wound with

very thin insulated copper wire and its ends are mounted on a rotary spindle *b*, divided into two parts insulated from each other by ebonite or other suitable material. Connected with the said armature by means of toothed or other gearing *b'* is a Morse or similar key C, by the actuation of which angular movement is imparted to the armature in one direction when said key is depressed and in the opposite direction when said key is released and returned to its original position. This key may comprise a lever pivoted at *c* to standards carried by a wooden or other base D and provided with a spring *c'*, which tends to keep the lever in its raised position—that is to say, in the position in which it is represented in Figs. 1 and 2. The said lever has set-screws *c<sup>2</sup> c<sup>3</sup>* near its opposite ends for limiting the extent of its oscillations about its pivot, the set-screws having metallic anvils *d d* for them to impinge upon.

The receiver, Figs. 3 and 4, comprises a clockwork device similar to that used with ordinary telegraph-printing receivers for imparting movement to the tape or ribbon upon which are impressed by a style the signals received by the instrument and for distributing the printing-ink. The electromagnetic part of the receiver may be of the well-known Siemens relay type, and then comprises an electromagnet E between the two pole-pieces *e' e<sup>2</sup>* of which an oscillatory tongue F is arranged, said tongue being polarized by a permanent magnet G. The pole-pieces *e' e<sup>2</sup>* of the electromagnet are made adjustable with respect to the said tongue, and the amplitude of the oscillations of the latter is regulated by suitably arranged adjusting-screws *f' f<sup>2</sup>*.

The aforesaid electromagnet E is so wound that the pole-piece *e'* on one side of the oscillatory tongue will become of opposite polarity to that of the pole-piece *e<sup>2</sup>* on the other side of said polarized tongue when said electromagnet is excited. The said pole-pieces are preferably arranged one above the other with the tongue capable of oscillating between them in a vertical plane. Normally the said tongue lies in contact with the lower pole-piece *e<sup>2</sup>*. Upon depressing the key C of the transmitter, and thereby angularly shifting the armature



B, an electric current will be induced in the transmitter and will pass through the line-wire to the electromagnet E of the receiver, where said current will (assuming it to be in the proper direction) cause the lower pole-piece  $e^2$  to be of the same sign as that of the adjacent end of the polarized oscillatory tongue and the other pole-piece  $e'$  to be of the opposite sign. The said polarized tongue will therefore be repelled by the lower pole-piece of the electromagnet and attracted by the upper pole-piece, and will therefore approach said upper pole-piece and perform a signaling stroke. As, however, the current generated by the transmitter is instantaneous, it cannot endure for the whole time that the operator keeps the transmitter-key C depressed, but by reason of said tongue being polarized by the magnet G, as aforesaid, it remains in contact with or adjacent to the upper pole-piece  $e'$  until the operator releases the said transmitter-key and enables the armature of the transmitter to return by the reaction of the spring  $c'$  controlling the key. An electric current is then transmitted to the receiver in the reverse direction to that of the current previously transmitted, and as a consequence the polarity of the electromagnet E of the receiver is reversed and the tongue resumes its original position in contact with or adjacent to the lower pole-piece  $e^2$  of the electromagnet. The necessary length of time that the style of the receiver must remain in contact with the tape or ribbon for impressing thereon the dot-and-dash signs of the Morse alphabet is thus obtained.

Although the invention has been described in connection with telegraph apparatus for sending and receiving Morse signals, it is to be understood that the invention is not limited thereto, but is applicable to any telegraphic system in which the signaling can be effected by transmitting electric currents alternately first in one direction and then in the opposite direction.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. In electric-telegraph transmitting apparatus, the combination with a permanent magnet and an armature located between the poles of said magnet, of a Morse transmitting-key connected with said armature, and means whereby the rocking of said key about its pivot directly imparts to the armature an angular movement in opposite directions, substantially as described.

2. In electric-telegraph transmitting apparatus, the combination with a permanent magnet and an armature located between the poles of said magnet, of a toothed member on the armature, a Morse transmitting-key, and a toothed arc thereon gearing with said toothed member of the armature, substantially as and for the purpose described.

In testimony whereof I have hereunto set my hand, in presence of two subscribing witnesses, this 25th day of April, 1903.

AGAZIO FALCONE.

Witnesses:

GIUSEPPE BENAY,  
ALBERTA LEVY.