No. 631,453. Patented Aug. 22, 1899.

J. E. WRIGHT.

TELEGRAPHIC RELAY.

(Application filed Mar. 10, 1898.)

(No Model.)

Fig. 1

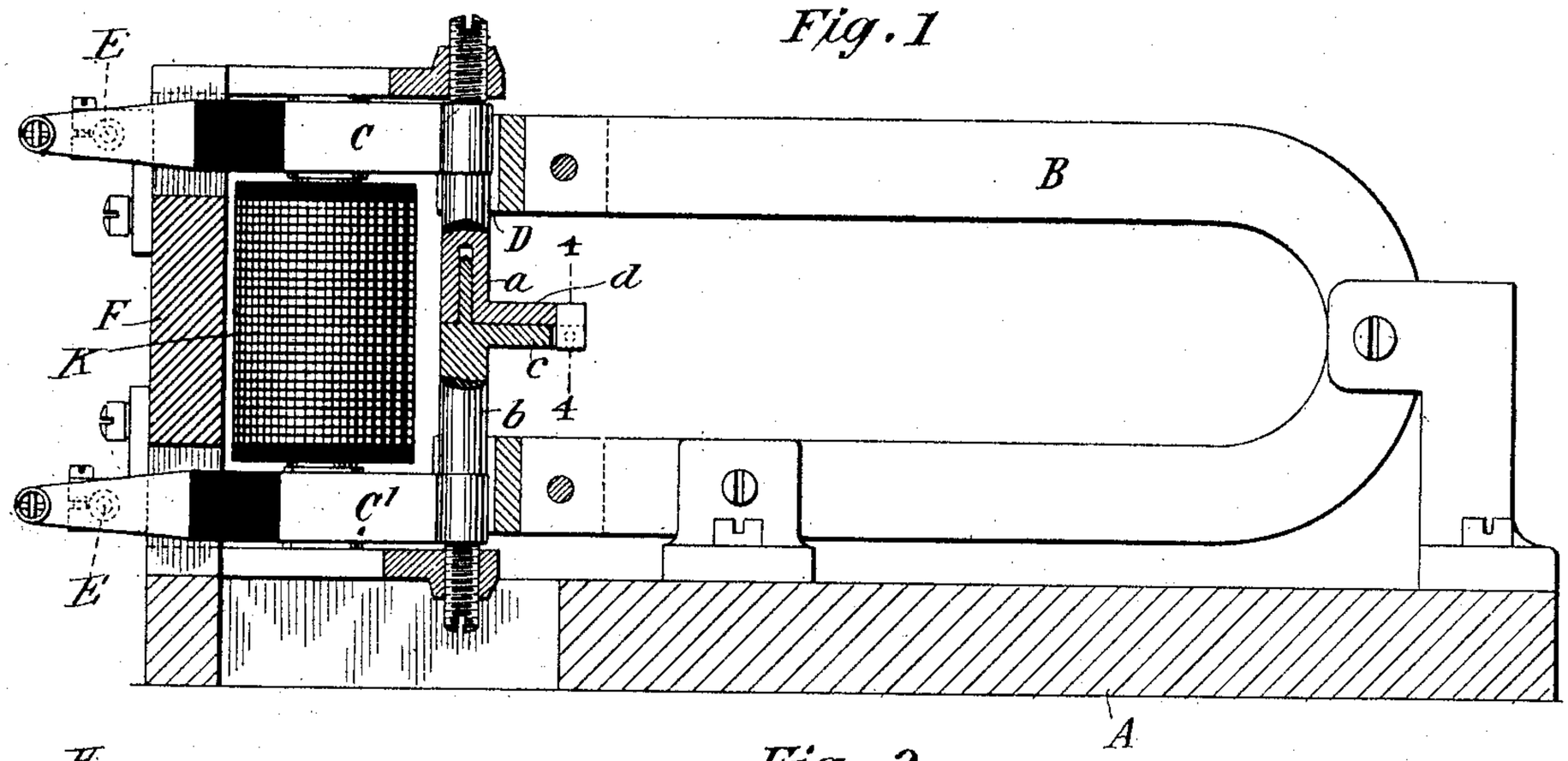

Fig. 2

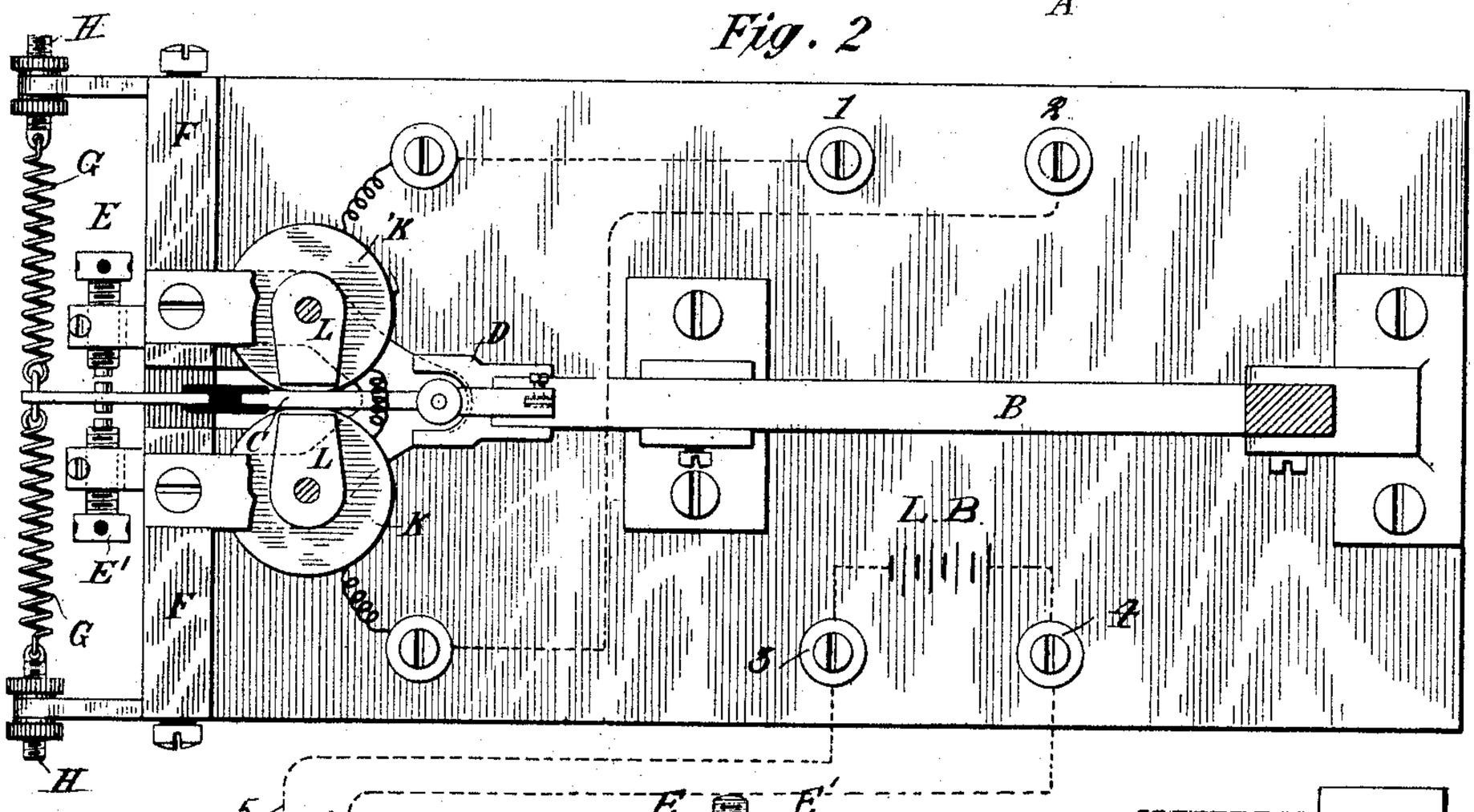

Fig. 3

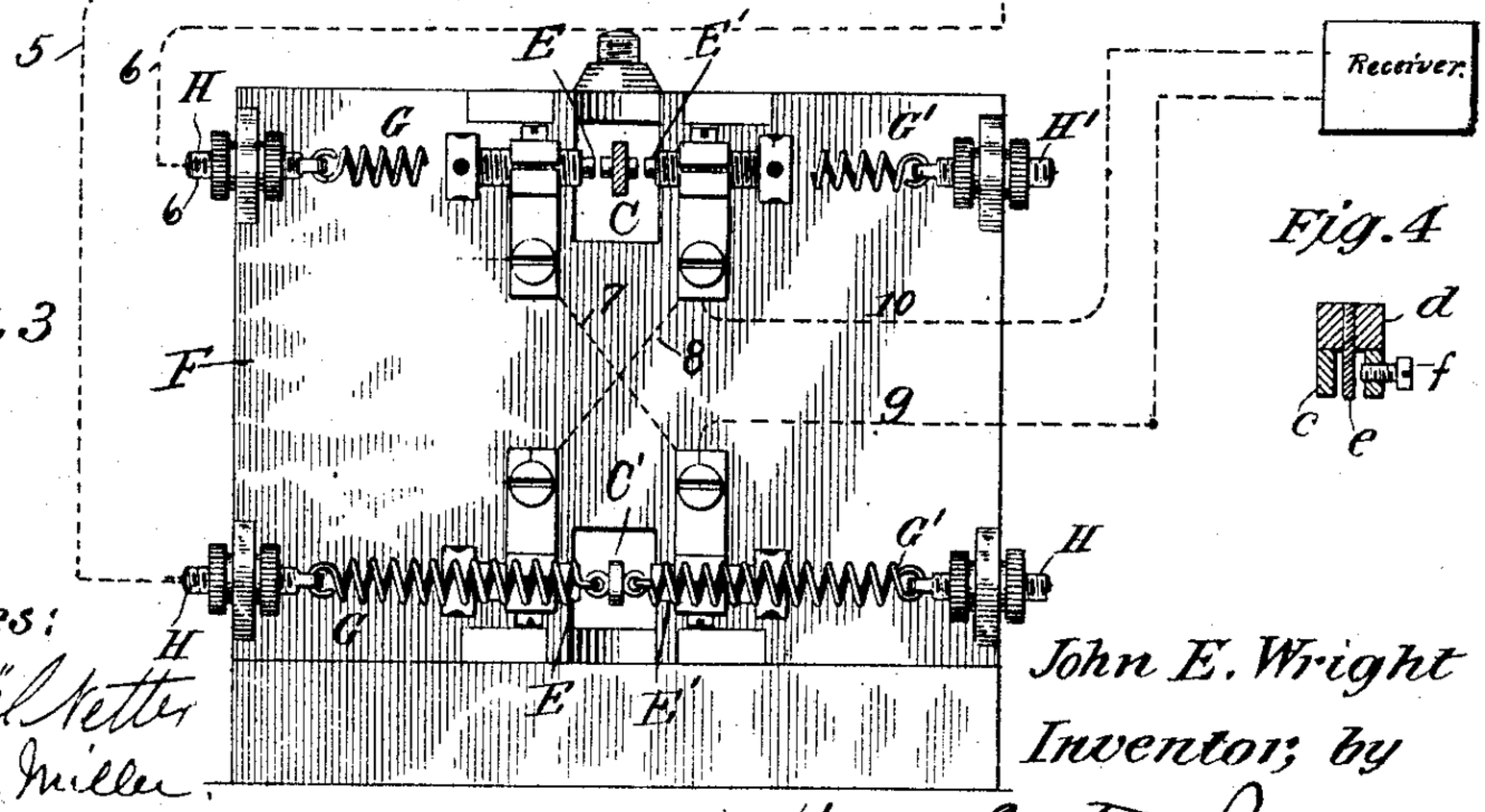

Fig. 4

Receiver.

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UNITED STATES PATENT OFFICE.

JOHN E. WRIGHT, OF NEW YORK, N. Y.

TELEGRAPHIC RELAY.

SPECIFICATION forming part of Letters Patent No. 631,453, dated August 22, 1899.

Application filed March 10, 1898. Serial No. 673,344. (No model.)

To all whom it may concern:

Be it known that I, JOHN E. WRIGHT, a citizen of the United States, residing at New York, in the county and State of New York, have invented certain new and useful Improvements in Telegraphic Relays, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

My invention is an improved polarized relay for use generally where such instruments are required, but more especially designed for a printing-telegraph circuit or other analogous system where current-impulses alternating in direction and varying in length are transmitted over a line to one or more receiving instruments.

In order to give a clear understanding of my invention, I shall first describe the construction of the instrument in a form which I have designed and adopted for practical use, and thereafter point out by reference to its mode of operation the nature and purpose of the improvements which constitute my invention.

Figure 1 is a longitudinal section of the instrument. Fig. 2 is a top plan view of the same. Fig. 3 is a front view in elevation, and Fig. 4 is a vertical section on line 4 4 of Fig. 1.

The operative portions of the instrument mounted on an insulating-base A include, among others, the following parts: B, a permanent steel magnet secured in any proper manner to the base A; C C′, two tongues or arms extending from an axis mounted vertically on pivot-pins between forked extensions D of the magnet-poles or in close proximity to said poles; E E′, adjustable contact-stops fixed to an insulating-plate F, secured at right angles to the forward end of the base A and on opposite sides of the vibrating tongues C C′, respectively; G G′, four adjustable spiral springs on opposite sides of the vibrating tongues C C′ and connected, respectively, to these tongues and to adjusting-screws H, and K an electromagnet, with polar projections L at both ends, which closely approach the tongues C C′.

The axis of vibration for the tongues C C′ is composed of two parts *a* and *b*, Fig. 1, which are capable of turning freely one in or on the other. Their relative displacement in a horizontal direction is, however, limited by some suitable device—as, for example, that illustrated in Figs. 1 and 4. In these figures the part *b* is shown as provided with a horizontally-extending arm *c*, forked at its end. A similar arm *d* extends from the part *a* and carries a tongue *e*, which projects between the forks of the arm *c*. The relative play of the tongue and forked arm is regulated by a set-screw *f*. Thus one tongue is connected to the other, but with a slight lost motion.

The rear or main portions of the tongues C C′ are of iron or steel; but the forward portions are insulated from the main portions, as shown, and are of lighter and more highly-conducting metal.

To adapt the instrument for use, the spiral springs G G′ are adjusted to bring each of the tongues C C′ as nearly as possible midway between their respective contact-stops, the lost motion being so limited that although both tongues are freely movable up to the stops on either side under the attractive influence of the magnet, yet when one tongue is in contact with a stop on one side the other tongue may not be turned so as to make contact with its stop on the opposite side.

Let it be assumed that the instrument is connected up in a circuit from a printing-telegraph transmitter the line-wires of which connect with binding-posts 1 and 2, which are connected through the coils of the magnet K. A local battery L B has its holes connected with binding-posts 3 4, from which lead wires 5 and 6 to the insulated metallic ends of the levers C and C′, respectively, through suitable connections—as, for example, the parts H G. By this means the said metallic ends become the terminals of the local battery, and if the pairs of stops E and E′ be connected across diagonally, as shown in Fig. 3, by wires 7 and 8 and one of the stops E and one of the stops E′ be connected by wires 9 and 10 to the terminals of the receiver R it is evident that an electrical impulse will be sent from the local battery L B through the receiver whenever the tongues are drawn into contact with either pair of stops E and E′ and that the direction of such impulses through the receiver will be positive or negative, according to the pair of stops engaged. By this

means the alternating impulses which are required to operate the type-wheel escapement and prolonged impulses of either direction, for operating the printing-magnet are relayed with equal certainty.

In the ordinary polarized relays the vibrating tongue or arm remains in the position to which it has been brought by a current-impulse until it is shifted by a current in the opposite direction. Two objectionable results are especially attributable to this fact. The repetition of a letter or character which involves the sending of a second impulse in the same direction after the final impulse sent to print the character to be repeated is generally precluded without special provision, for the reason that two or more successive impulses in one direction in the line produce only one impression of the printing-magnet in the local circuit. Secondly, the relay does not follow faithfully the action of the commutator or reverser of the transmitter, for as the relay-armature does not begin to move until the brushes of the commutator have come onto a contact-plate of the sending-commutator it is evident that during a certain portion of the time that a current-impulse is on the line the local circuit is receiving no current. The length of this period of no local current depends, of course, upon the time which is required for the relay-armature to swing over from one extreme position to the other. These objections are avoided in my instrument. The normal position of the armature when no current is flowing is midway between the poles, and this position it assumes instantly upon the cessation of the magnetism. Hence to repeat a letter or character it is only necessary after printing it once to momentarily break and then make the circuit, sending one or more currents in the same direction. This does not move the receiver-escapement, but energizes the printing-magnet and feed mechanisms, as is well understood. Moreover, since the armature instantly assumes a position midway between the poles on the cessation of current, it has but a very slight distance to move before closing the local circuit again, so that I have found it practicable to use a commutator or reverser with very short breaks, not more in the aggregate than one-third the circumferential length of contact, and to secure as good results as by the use of makes and breaks of equal lengths. This increases materially the practicable speed of transmission.

The purpose of connecting the two tongues in the manner described is twofold. It prevents short-circuiting by the contact of one tongue with the stop on one side and the other with the stop on the opposite side at the same time, which might easily occur in handling or adjusting the instrument were the tongues independent, while were they rigidly connected together it would be impossible to secure equally good contact between both tongues and their stops. For the purpose also of preventing short-circuiting through the spindle or armatures and cores of the magnet the current is confined to the insulated ends of the armatures or tongues. The necessity for these precautions arises from the fact that one relay may control a large number of receivers and use a comparatively heavy current.

Having now described my invention, what I claim is—

1. In a relay instrument, the combination with the magnet, and two sets of contact-stops, of two vibrating tongues or armatures, the axes of which are connected but with lost motion between them, as set forth.

2. In a polarized current-reversing relay instrument and in combination with the magnet and contact-stops the two armatures mounted on two parts of a spindle connected together with lost motion, as set forth.

3. The combination with the magnet and contact-stops of the two armatures, the spindle in two parts having projecting arms engaging with each other with a limited play or lost motion, as set forth.

4. The combination with the magnet, and contact-stops of the polarized armatures having insulated conducting ends, and the retractile springs connected to opposite sides of said ends and forming a path for the current to the same, as set forth.

5. In a telegraphic relay instrument, the combination with the electromagnet and two sets of contact-stops, of two vibratory tongues or armatures, controlled by the said electromagnet and adapted to vibrate between the said contact-stops, a local-battery circuit having its terminals in the said vibratory tongues, respectively, spring devices arranged to normally maintain the said tongues in positions midway between the stops, and a circuit including a receiving instrument having as its opposite terminals the said contact-stops, substantially as set forth.

6. In a telegraphic relay instrument, the combination with the electromagnet and the two sets of contact-stops, E, E, and E′, E′, of two vibratory tongues, controlled by the said electromagnet, and adapted to vibrate between said contact-stops, a local-battery circuit having its terminals in the said vibratory tongues, respectively, electrical connections between the diagonally opposite stops, and a circuit including a receiving instrument, having its opposite terminals connected respectively with one of each of the said pairs of stops, substantially as set forth.

In testimony whereof I have hereunto set my hand this 8th day of March, 1898.

JOHN E. WRIGHT.

Witnesses:

FRANCIS P. SMITH,

HILLARY C. MESSIMER.