R. L. DEAN.

POLARIZED RELAY.

APPLICATION FILED FEB. 6, 1908.

922,099.

Patented May 18, 1909.

2 SHEETS—SHEET 1.

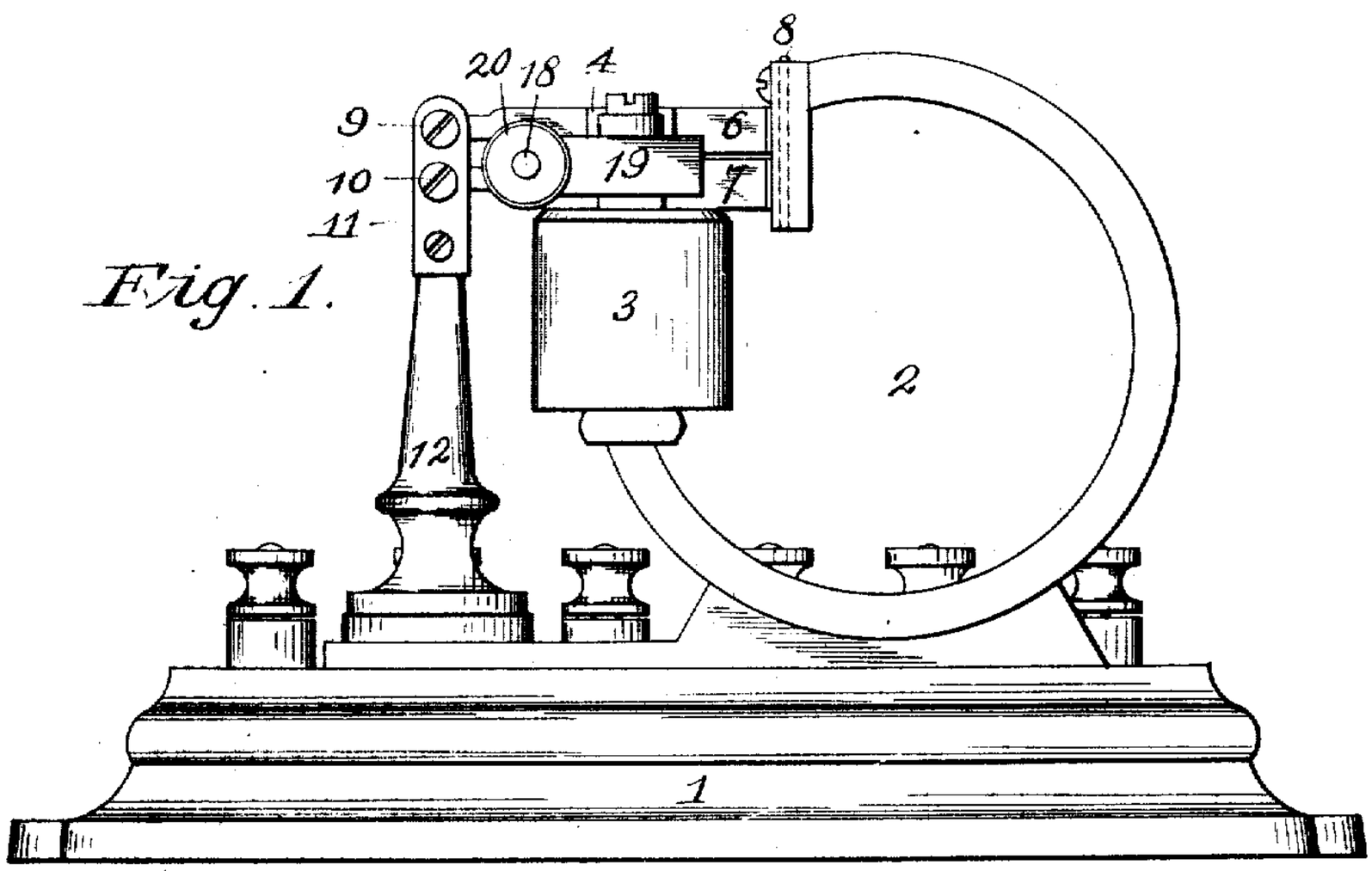

Fig. 1.

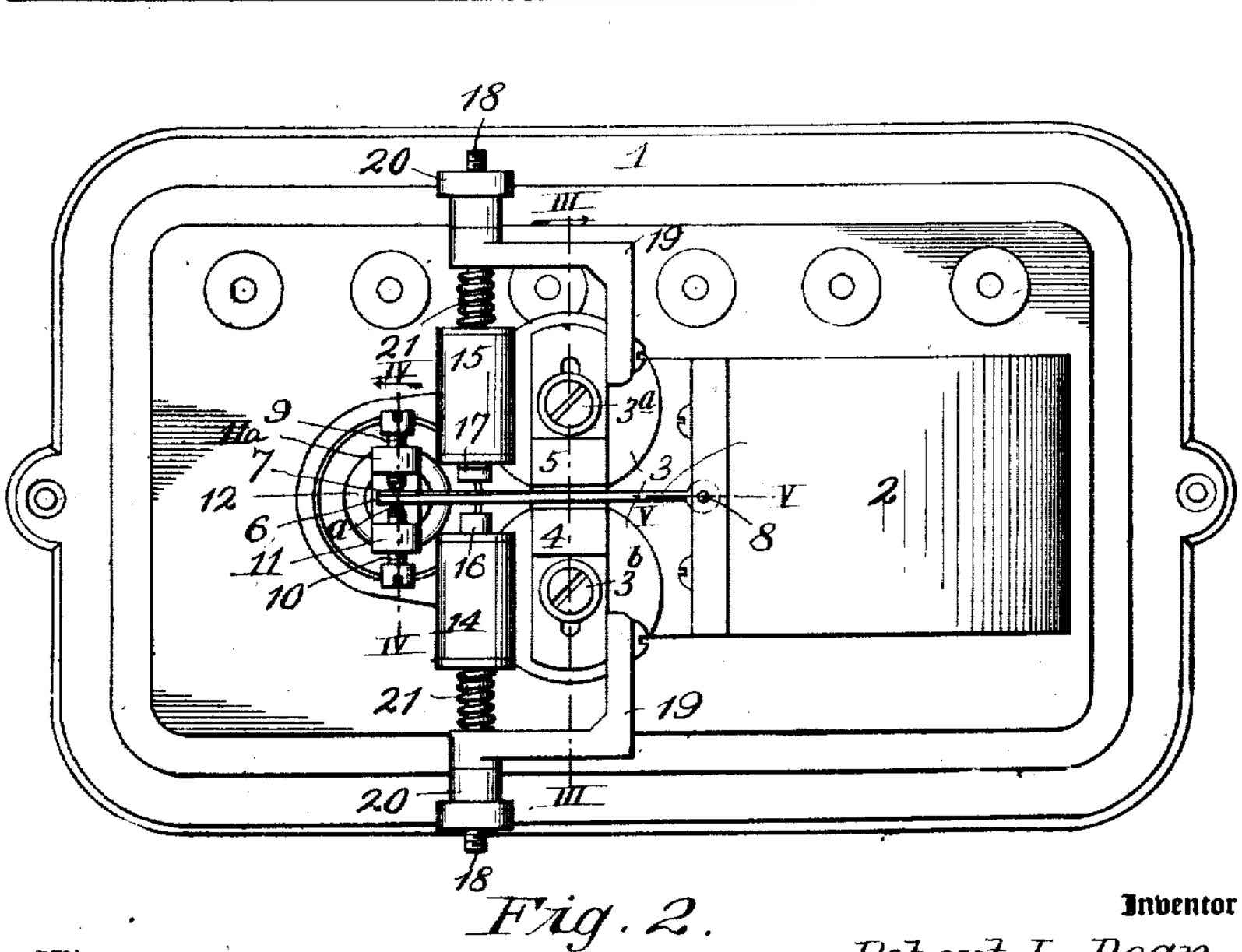

Fig. 2.

Witnesses:

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2 SHEETS—SHEET 2.

Fig. 3.

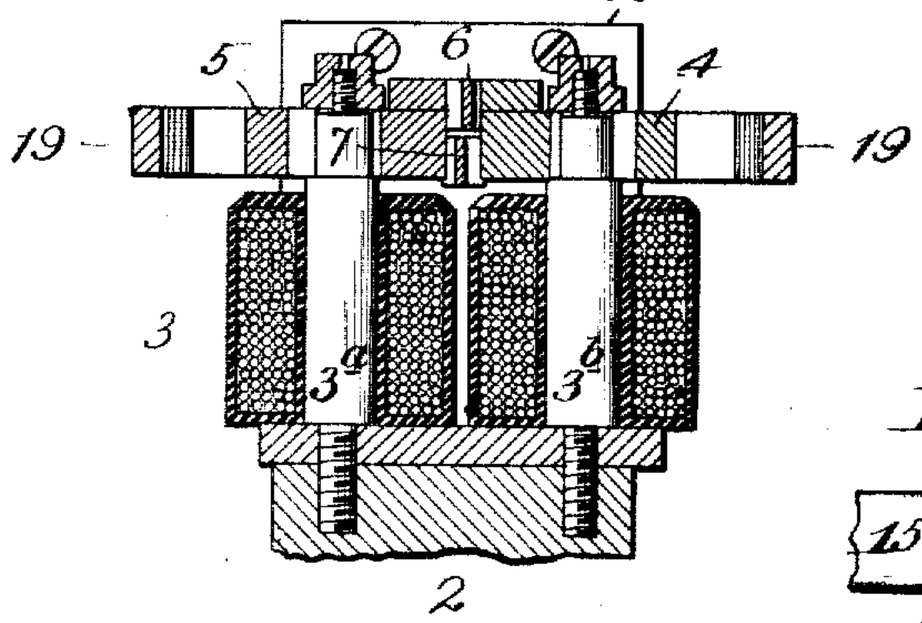


Fig. 6.

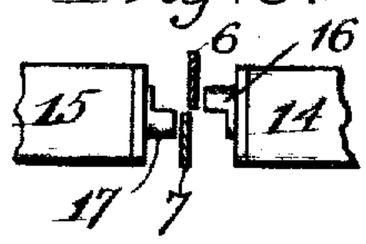


Fig. 4.

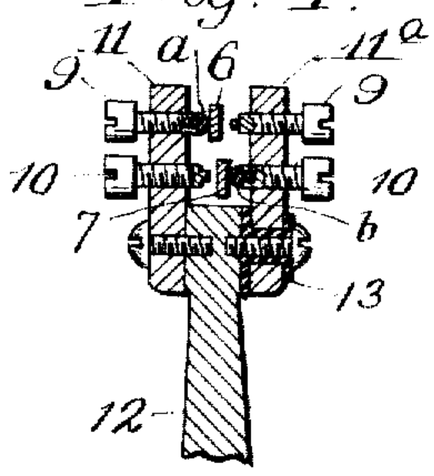
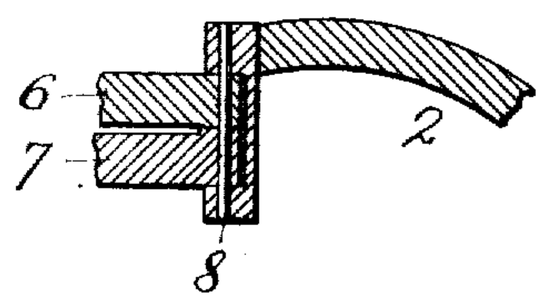


Fig. 5.



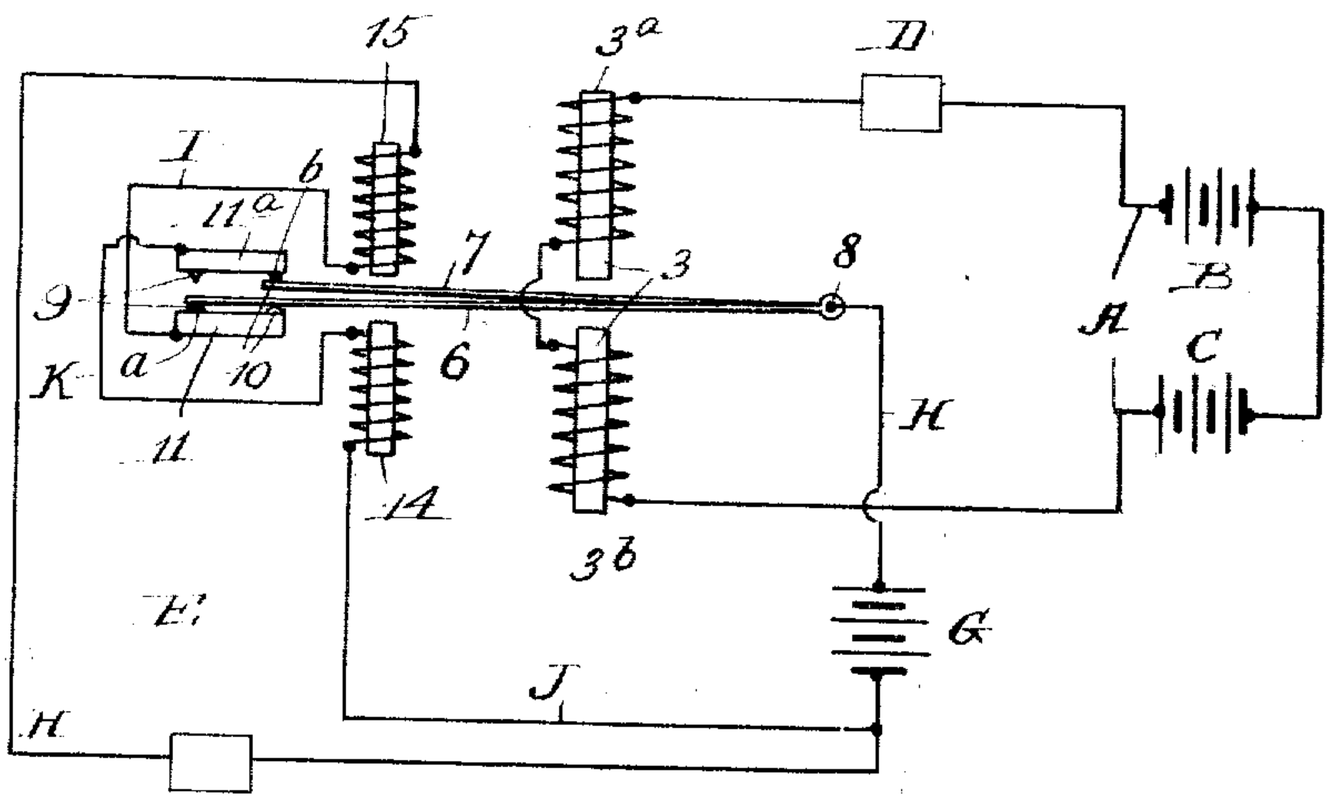


Fig. 7

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UNITED STATES PATENT OFFICE.

ROBERT L. DEAN, OF KANSAS CITY, MISSOURI, ASSIGNOR TO DEAN RAPID TELEGRAPH CO., A CORPORATION OF ARIZONA TERRITORY.

POLARIZED RELAY.

No. 922,099. Specification of Letters Patent. Patented May 18, 1909.

Application filed February 6, 1908. Serial No. 414,462.

To all whom it may concern:

Be it known that I, ROBERT L. DEAN, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Polarized Relays, of which the following is a specification.

My invention relates to an improved polarized-relay which may be employed for general purposes, but is particularly adapted for a printing-telegraph circuit or similar system where impulses varying in length and direction are transmitted over a line wire to a receiver.

In ordinary polarized-relays employing but one vibratory tongue, the latter remains in the position to which it has been last attracted with the objectionable result that it is impossible without special provision, to send two successive impulses in the same direction. In others the vibratory tongue is held midway between the poles of the electromagnet by springs, so that it may respond to successive impulses flowing in the same direction. One objection to this arrangement is that one spring will soon become weaker than the other and permit the stronger to draw the tongue closer to one pole than the other. A further objection is that the springs are comparatively slow to act, and retard the vibratory movement of the tongue to such extent as to materially reduce the capacity of the line wire, and also prevent the recording instrument of the receiver from printing clear, sharp characters. I overcome these objections by employing two tongues, two sets of contact-stops, and means for restoring the tongues to normal after being actuated by the electromagnet of the relay.

Referring now to the accompanying drawings illustrating the invention, Figure 1 represents a side elevation of a polarized-relay provided with my improvements. Fig. 2 is a plan view of the same. Fig. 3 is a broken cross-section on line III—III of Fig. 2. Fig. 4 is a broken cross-section on line IV—IV of Fig. 2. Fig. 5 is a broken detail section on line V—V of Fig. 2. Fig. 6 is a detail front elevation of the tongue-restoring magnets with the vibratory tongues in cross section. Fig. 7 shows the relay arranged in a telegraphic circuit.

1 designates an insulating base upon which is mounted a permanent magnet 2, provided at its lower end with an electromagnet 3, having adjustable polar projections 4 and 5.

6 and 7 designate two vibratory tongues arranged one above the other, and independently mounted at their rear ends upon an axis 8 secured to the upper pole of magnet 2. Tongues 6 and 7 extend between poles 4 and 5, and their free ends normally engage the diagonally-opposed insulated terminals *a b* of two sets of stops 9 and 10, respectively, carried by two arms 11, 11^a secured to the upper end of a standard 12, resting upon base 1. One of said arms is insulated from the standard by fiber 13 to prevent the current short-circuiting from one side of the stops to the other. Tongue 6 is adjusted close to pole 4 so that it will be normally attracted thereby into contact with the insulated terminal of stops 9, while tongue 7 is adjusted close to pole 5 so that the attraction thereof will normally hold the tongue in contact with the insulated terminal of stops 10, see Figs. 2, 4, and 7. The stops are adjustable in arms 11 so that the members of each set may be adjusted apart or toward each other and thus regulate the length of the tongue movements.

14 15 designate two tongue-restoring magnets arranged at opposite sides of the tongues, the former of which has a pole 16 opposite tongue 6, while the latter has a pole 17 opposite tongue 7 so that said poles will have greater attraction for their respective tongues. Magnets 14 15 are provided with threaded stems 18, which extend loosely through two brackets 19 and are engaged by nuts 20 whereby the magnets may be adjusted apart. 21 designates a pair of coil springs interposed between the brackets and the adjacent ends of the magnets, to push the latter toward the tongues when nuts 20 are loosened. By thus adjustably-mounting the magnets 14 15, the force with which their magnetic fields act upon the tongues may be regulated as desired.

In the diagram, Fig. 7, I have shown the relay arranged in a telegraphic circuit consisting of a line wire A connected at its ends to the poles of magnet 3 and two batteries B and C of opposite polarity. D designates a transmitter for controlling the electrical impulses transmitted from said batteries.

E designates a local circuit in which a receiver F is arranged. Said circuit consists of a battery G, a circuit wire H connected at

its ends to tongues 6 and 7 and to one end of magnet 15, which latter is connected at its opposite end to arm 11 through a wire I.

J designates a branch wire connected at its ends to circuit wire H and one end of magnet 14, which latter is connected at its opposite end to arm 11[a] through a circuit wire K.

Assuming now that the transmitter D is set to send a positive impulse from battery B through circuit wire A. In its passage through magnet 3 it will increase the magnetism of the positive pole 3[a] and attract tongue 6 against the uninsulated stop of set 9, thus completing a local circuit through wire K, magnet 14, wire J, battery G, and tongue 6. This local circuit will energize magnet 14 so that the latter will instantly return the tongue to the insulated member of set 9 when the transmitter interrupts the positive impulse. When a negative impulse is transmitted from battery C, the negative pole 3[b] of magnet 3 will become more highly magnetized than the opposite pole 3[a] and thus attract tongue 7 into contact with the live side of stops 10, so that a local circuit will be completed through wire I, magnet 15, circuit wire H, battery G, and tongue 7. This circuit will energize magnet 15 so that it will instantly return tongue 7 to its normal position against the insulated member of stops 10 when the negative impulse from battery C is interrupted.

Having thus described my invention, what I claim is:

1. In a relay, a pair of vibratory tongues arranged in superposed relation, a pair of contact stops for each tongue arranged one on each side of each tongue, one of the stops of each pair of stops being insulated, said insulated stops being diagonally opposed to each other, a magnet for controlling the vibratory movements of the tongues, and means for restoring the tongues to normal.

2. In a relay, a permanent magnet, having an electro-magnet at its lower end, polar projections carried by said electro-magnet, a pair of vibratory tongues arranged in superposed relation and carried by the upper end of said permanent magnet, a standard having a pair of spaced vertical arms insulated from each other, said tongues extending in the space between said arms, a pair of contact stops carried by each arm to engage said tongues, the lower stop of one pair and the upper stop of the opposite pair of stops being insulated, and means for restoring the tongues to normal.

3. In a relay, a pair of vibratory tongues arranged one above the other, a permanent magnet to the upper end of which each of said tongues is secured, an electro-magnet having polar projections on opposite sides of the tongues, two pairs of stops arranged one pair on each side of each tongue, the lower stop of one pair of stops and the upper stop of the other pair of stops diagonally opposite said lower stop being insulated, and means to restore the tongue to normal.

4. In a relay, a pair of vibratory tongues, a permanent magnet, a common axis on one end of said magnet on which each of said tongues is mounted, an electro-magnet carried by the other end of said permanent magnet and having polar projections disposed on opposite sides of said tongues, a pair of spaced insulated arms on opposite sides of the tongues, a pair of contact stops carried by each arm, and a magnet for each tongue arranged on one side thereof.

5. In a relay, a permanent magnet, having a pair of vibratory tongues arranged one above the other and supported from one end of said magnet, an electro-magnet carried by the other end of said permanent magnet and having polar projections disposed on opposite sides of the tongues, a pair of spaced insulated arms, arranged on opposite sides of the tongues, a pair of contact stops carried by each arm to engage the tongues, a lower stop of one pair thereof, and the upper stop of the other pair being insulated, and means to restore the magnets to normal.

In testimony whereof I affix my signature, in the presence of two witnesses.

ROBERT L. DEAN.

Witnesses:
F. G. FISCHER,
M. Cox.