No. 649,102. Patented May 8, 1900.

N. FLECHTENMACHER.

TELEGRAPHIC RECEIVING INSTRUMENT.

(Application filed Aug. 3, 1898.)

(No Model.) 2 Sheets—Sheet 1.

FIG. 3.

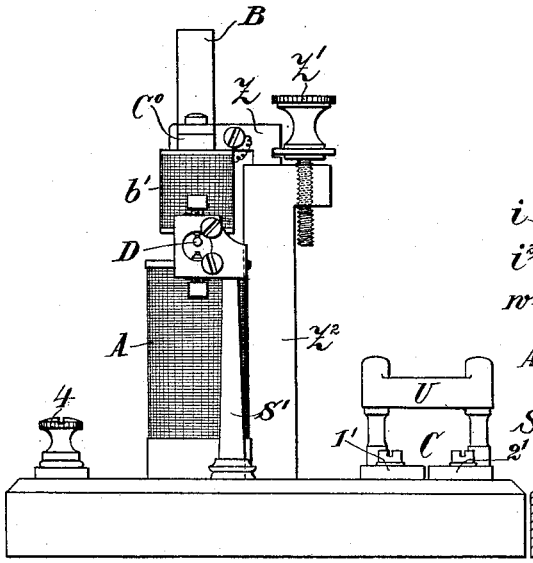

FIG. 1.

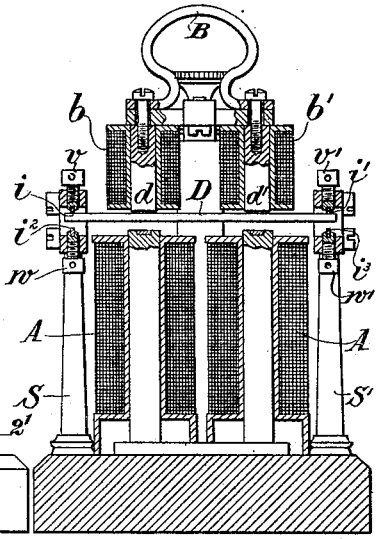

FIG. 2.

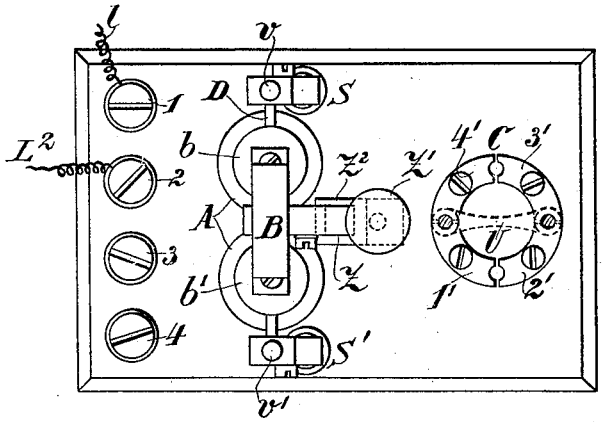

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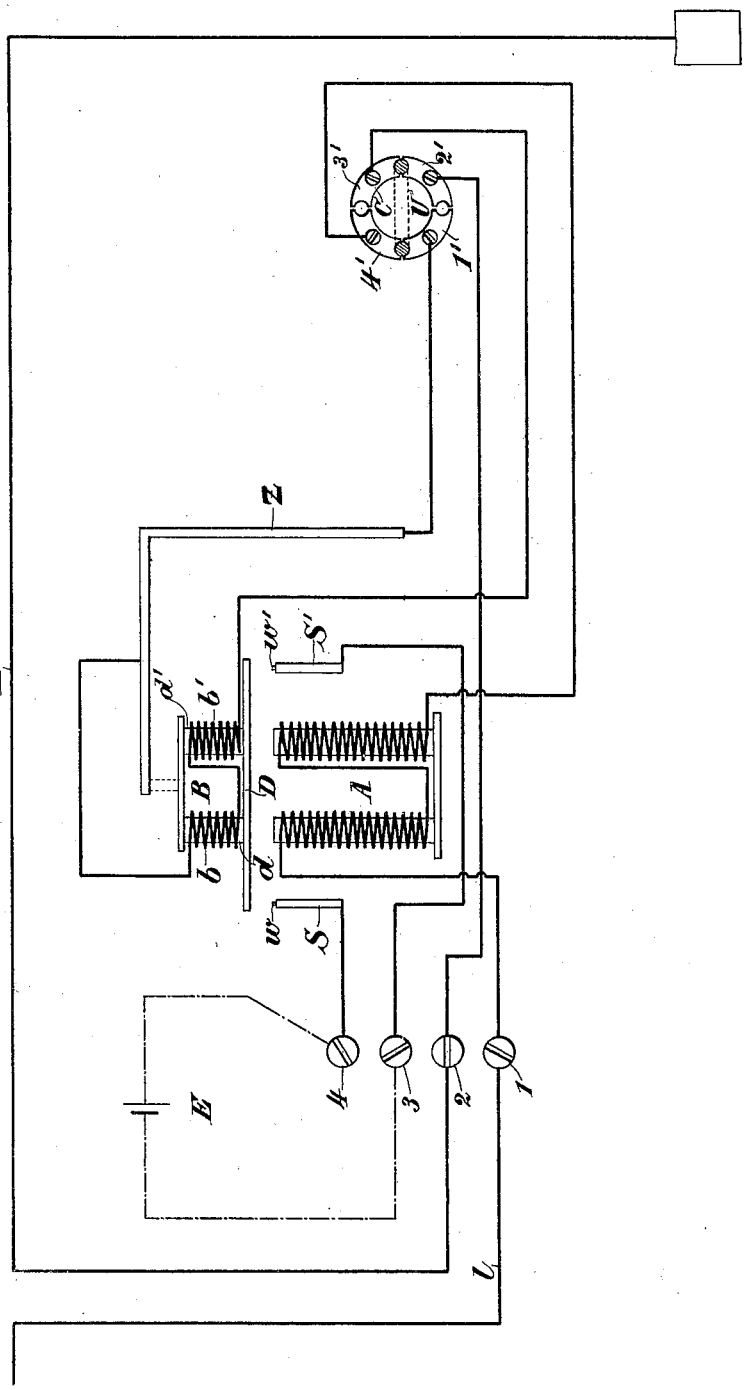
FIG - 4 -



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UNITED STATES PATENT OFFICE.

NICOLAS FLECHTENMACHER, OF BUCHAREST, ROUMANIA.

TELEGRAPHIC RECEIVING INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 649,102, dated May 8, 1900.

Application filed August 3, 1898. Serial No. 687,577. (No model.)

To all whom it may concern:

Be it known that I, NICOLAS FLECHTENMACHER, a subject of the King of Roumania, and a resident of Bucharest, Roumania, have invented certain new and useful Improvements in Telegraphic Receiving Instruments, of which the following is a specification.

This invention has for its object an improved construction of relays suitable for use in telegraphic systems and provides a special relay of great sensitiveness having a free armature between the limbs of an electromagnet and of a polarized electromagnet.

In the accompanying drawings I have illustrated, by way of example, one constructional form of my invention.

Figures 1, 2, and 3 are respectively a vertical section, a plan, and a side view of my invention. Fig. 4 is a diagrammatic view showing the circuit connections of the relay.

My invention provides a relay of such sensitiveness that it allows of the use of a line-battery of small power. The armature D of this relay is supported neither by an axle nor by a hinge or pivot nor by a spring. It is quite free, and its rising and falling movements are due exclusively to magnetic influences. This armature D is of soft iron and is placed horizontally between the pole-pieces of a double electromagnet and the pole-pieces $d\ d'$ of a species of polarized electromagnet formed by a permanent magnet B, connected to a piece of copper C^0, upon which are screwed the two pole-pieces $d\ d'$, surrounded by the coils of conducting-wires $b\ b'$.

C indicates the circular commutator, which renders possible reversals of the electric current in the coils $b\ b'$ and possesses, on the one hand, a forked insulating-bar U, having two contact-plugs thus insulated the one from the other, and, on the other hand, four contact-pieces 1′ 2′ 3′ 4′, each provided with a terminal. When no current passes through the coils of the electromagnet A and the coils $b\ b'$, the armature D is attracted by the permanent magnet B and touches the ivory points $i\ i'$ of the metallic screws $v\ v'$, fitted to the metallic supports S S′, which in addition carry the metallic screws $w\ w'$, the ends $i^2\ i^3$ of which are preferably platinized and serve to close the circuit of the local battery when the bar D touches them.

The bar D is of very small diameter, preferably about one-half millimeter, and is coated with platinum at the ends, so that its contact with the screws $w\ w'$ may be insured. A piece of metal Z, which supports the magnet B with the coils $b\ b'$, can be adjusted in height by means of a screw Z′ upon a support Z^2 to admit of the poles of the magnet B being brought nearer to or removed farther from the armature D, according as it is desired that the latter be sustained with more or less force.

1 2 3 4 represent four terminals, of which the first, 1, is connected, on the one hand, to a wire l, connected to the line-wire, and, on the other hand, to the wire of the electromagnet A, terminating at its other end at the contact-piece 4′. The second terminal is connected, on the one hand, to the contact-piece 2′ of the commutator C and, on the other hand, by the wire L^2 to the earth and the negative pole of the line-battery. One end of the wire of the coils $b\ b'$ around the magnet B is connected to the metallic piece Z, which is in connection with the contact-piece 1′ of the commutator C, and the other end of the same wire is connected to the contact-piece 3′ of this commutator, so that if by means of the yoke U the contact-piece 1′ is put into metallic contact with 4′ and that of 2′ with 3′, as shown in Figs. 2 and 4, or, again, if 3′ be so connected with 4′, and 1′ with 2′, we shall have always the wire of the coils of the electromagnet A connected in series with the wire of the coils $b\ b'$ of the magnet B. The terminals 3 and 4 are respectively connected to the supports S S′, and consequently to the screws $w\ w'$. The terminal 3 is, moreover, connected to one of the poles of the local battery E, the other pole of which may be placed in communication with the terminal 4 either through the receiver or the electric bell of the telegraph-office when messages are to be received. By means of the screws $v\ v'\ w\ w'$ we may adjust the play of the armature D and its approach toward or from the poles of the electromagnet A.

Having thus described my improved relay, let us investigate what occurs when in receiving a message a current reaches the instrument through the wire l and the terminal 1. The current passes through the coils of the

electromagnet A, the contact-pieces 4′ and 1′, (the yoke U being in the position of Figs. 2, 3, and 4,) the coils *b* and *b′* of the polarized electromagnet, the contact-pieces 3′ and 2′ to the terminal 2, wherefrom it returns through L^2 to earth. In the electromagnet A the current will always have the result of causing the excitation of its pole-pieces, and in the case now in view the current passing through the coils *b b′* of the magnet B will have a magnetizing effect—that is to say, it will augment the magnetization of the pole-pieces *d d′*, which thus exercise a more powerful attractive action upon the bar D. Nevertheless, the action of the electromagnet A upon the said bar D will overcome that which is exercised by the pole-pieces *d d′*, and consequently the bar D will be drawn toward the electromagnet A, the permanent magnet B and its coils *b b′* being proportioned so that the magnetic field of the polarized electromagnet B *b b′ d d′* constantly remains smaller and weaker than that of the electromagnet A. When the relay is used with strong currents, the yoke U of the commutator will be placed in the above-specified position; but if the current be very weak then in order to increase the sensitiveness of the relay the yoke U of the commutator is placed so as to connect through its contacts the contact-piece 1′ with that 2′, and 3′ with 4′. In this case the current coming from the line and going through the electromagnet A in the same way as above described will pass through the contact-pieces 4′ and 3′, the coils *b b′* of the magnet B, the piece Z, the contact-pieces 1′ and 2′, the terminal 2, and by way of the line L^2 to earth. In this case the effect on the electromagnet A will be the same as before; but in the pole-pieces *d d′* of the coils *b b′* there will no longer be augmentation of the force of attraction; but, on the contrary, these pole-pieces will momentarily lose their force of attraction, because the current will act therein in a demagnetizing manner, so that the electromagnet A will be easily able to attract the armature, which will be either not at all or very little attracted by the polarized electromagnet B *d d′ b b′*. In the first case we operate with the differences of force between the polarized electromagnet B *b b′ d d′* and the electromagnet A, whereas in the second case we operate with the combination of both these forces, because while the one arrangement is working the other is not at work. There are therefore in this latter case two factors which secure a great sensitiveness, and according to practical experiments this sensitiveness will vary in geometrical progression with the number of the elements of the battery employed. The important point is that the bar D should be free—that is to say, unaffected by any mechanical friction. This insures its sensitiveness. Each time that the bar D is attracted toward the electromagnet A—that is to say, is drawn down—it makes contact with the screws *w w′* and closes the circuit of the local battery, thus actuating the receiving apparatus. As soon as the current is interrupted the electromagnet A loses its attractive force, whereas the polarized electromagnet B *b b′ d d′* regains its power or, it may be, only preserves the same, and the bar D will be attracted by the pole-pieces *d d′*, and then it will no longer touch the screws *w w′*, and the circuit of the local battery will be interrupted.

What I claim is—

1. A telegraphic receiving instrument comprising an armature consisting of a light, freely-movable bar, an electromagnet arranged to attract said bar, magnetic means for retracting it and stops for limiting its movement.

2. A telegraphic receiving instrument, comprising an armature consisting of a light, freely-movable bar, an electromagnet arranged to attract said bar, a polarized electromagnet for retracting it, and stops for limiting its movement.

3. A telegraphic relay comprising an armature consisting of a light, freely-movable bar, an electromagnet in the line-circuit arranged to attract said bar, magnetic means for retracting it, and a contact connected in a local circuit, and located in the path of movement of said armature, whereby the latter opens and closes the local circuit.

4. A telegraphic relay comprising an armature consisting of a light, freely-movable bar, an electromagnet in the line-circuit arranged to attract said bar, magnetic means for retracting it, and contacts in a local circuit so located in the path of movement of said armature, that the latter bridges said contacts to close the local circuit.

5. A telegraphic receiving instrument, comprising an armature consisting of a light, freely-movable bar, an electromagnet arranged to attract said bar, magnetic means for retracting it and means for adjusting its limits of movement.

6. A telegraphic relay comprising a light, freely-movable armature with platinized tips, an ordinary electromagnet fixed in the line-circuit, a polarized electromagnet, the said armature being placed freely between said two electromagnets, two contact-screws connected to the poles of a local battery and by contact with which the armature closes through itself the local circuit, and stops limiting the upward movement of the free armature.

7. A telegraphic receiving instrument, comprising an armature consisting of a light, freely-movable bar, an electromagnet arranged to attract said bar, a polarized electromagnet for retracting it, and means for reversing the direction of the current through said polarized electromagnet.

8. A telegraphic receiving instrument, comprising an armature consisting of a light, freely-movable bar, an electromagnet arranged to attract said bar, a polarized electromagnet for retracting it, and a commutator

adapted in one position to direct the current through the polarized magnet to reinforce its magnetism, and in another position to reverse the direction of the current through said polarized magnet to oppose its magnetism.

9. A telegraphic relay comprising a light, freely-movable armature with platinized tips, an ordinary electromagnet fixed in the line-circuit, a polarized electromagnet, the said armature being placed freely between said two electromagnets, two contact-screws connected to the poles of a local battery and by contact with which the armature closes through itself the local circuit, and stops limiting the upward movement of the free armature, and a suitable commutator included in the line-circuit and designed to put the coils of the polarized electromagnet into series connection with those of the first electromagnet in such manner, that they can be traversed by the line-current either in one direction or in the reverse direction, so that the action of the last current in the polarized electromagnet may be added to or subtracted from that exercised by the first-mentioned electromagnet upon the said armature.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

NICOLAS FLECHTENMACHER.

Witnesses:
AMAND RITTER,
LEO BUCHELIN.