No. 813,184. PATENTED FEB. 20, 1906.

A. & L. G. VERA.

RELAY.

APPLICATION FILED NOV. 26, 1904.

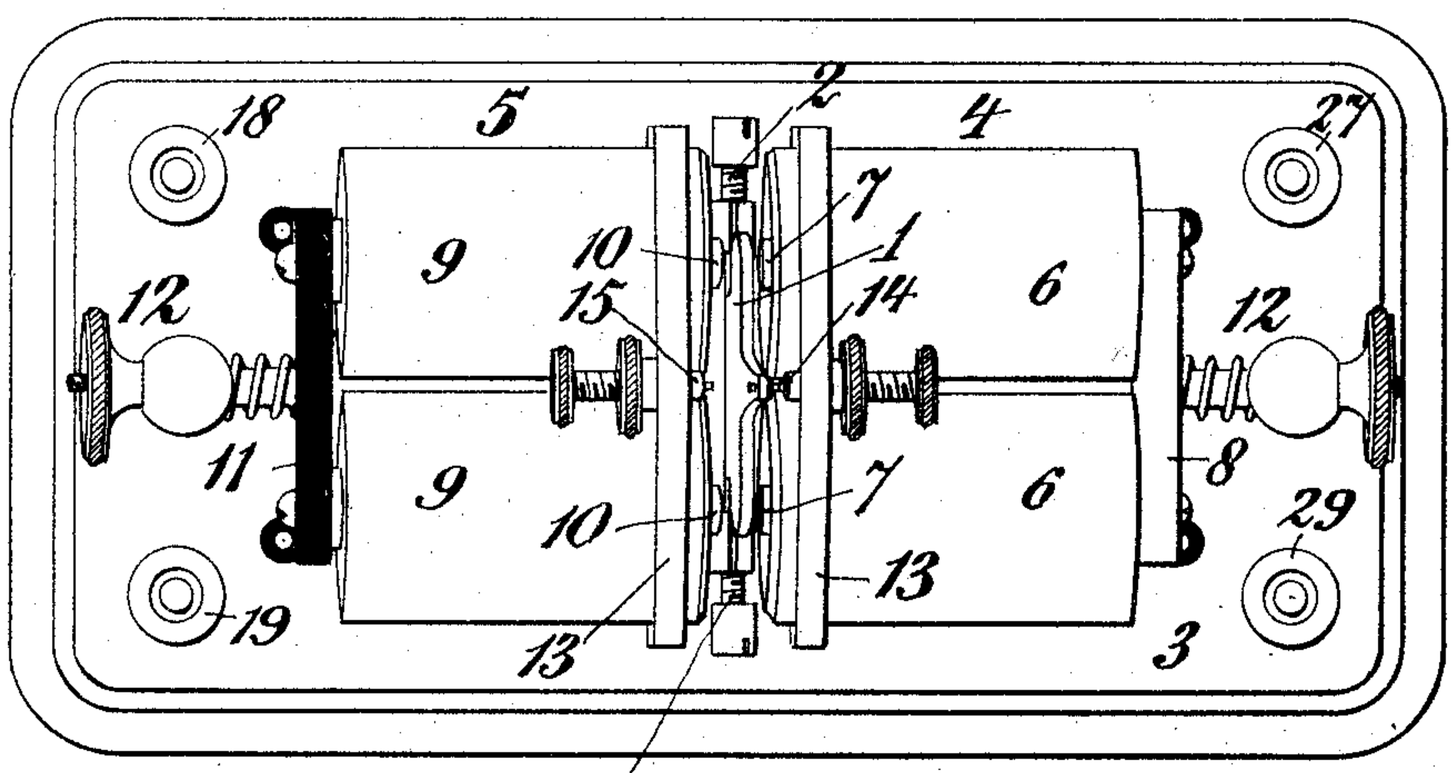

Fig. 1,

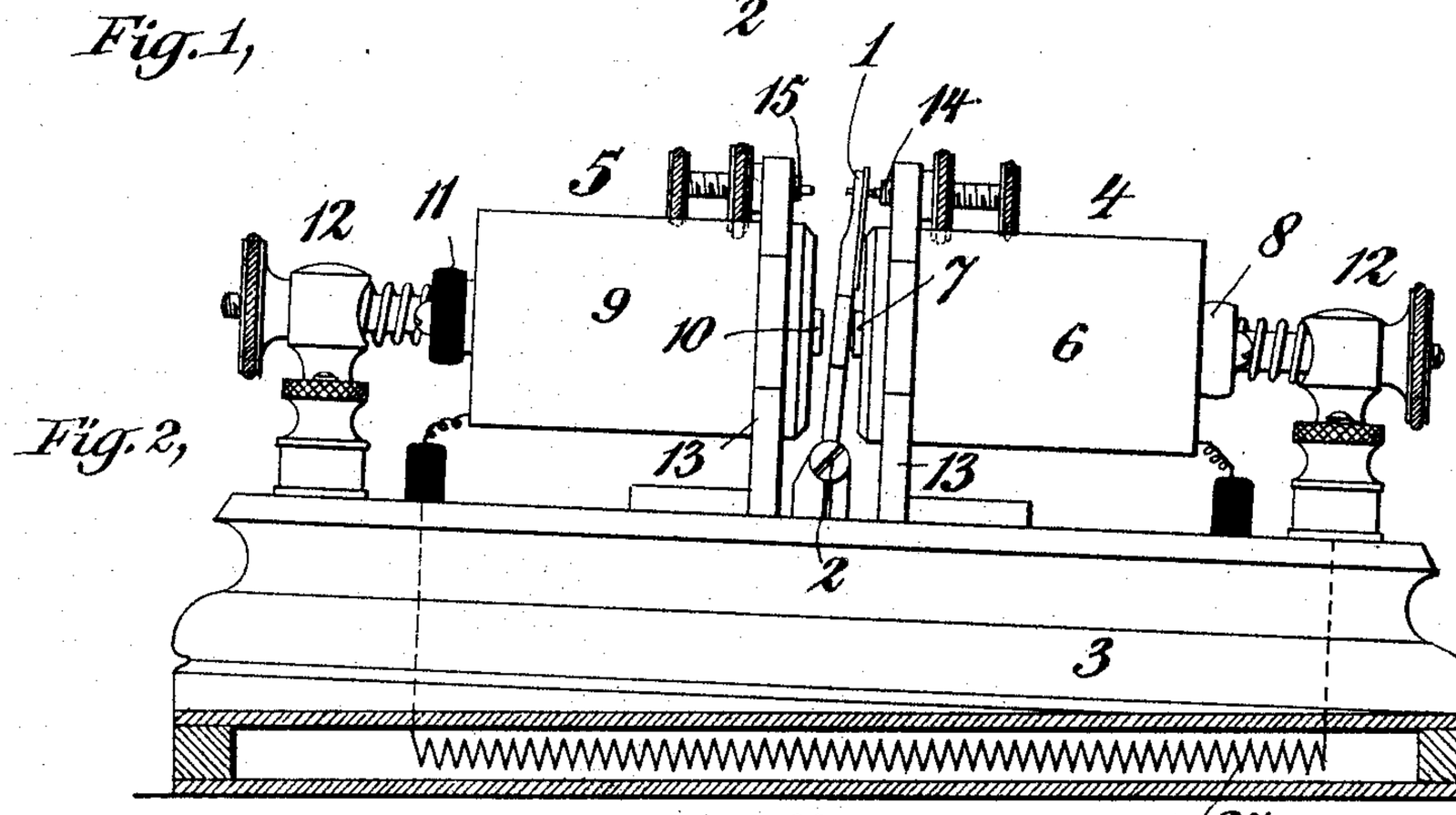

Fig. 2,

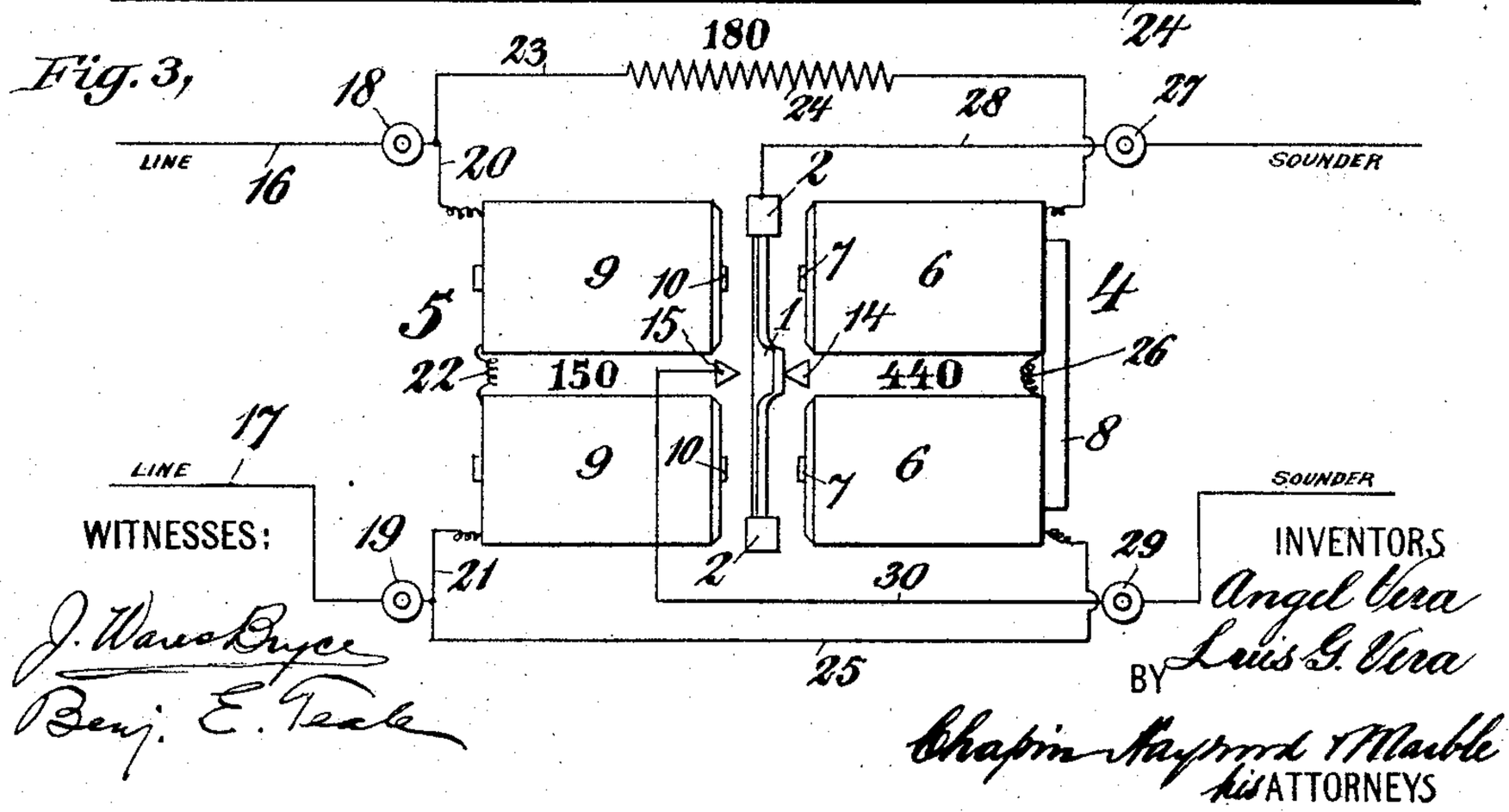

Fig. 3,

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ANGEL VERA AND LUIS G. VERA, OF QUERETARO, MEXICO.

RELAY.

No. 813,184. Specification of Letters Patent. Patented Feb. 20, 1906.

Application filed November 26, 1904. Serial No. 234,333.

To all whom it may concern:

Be it known that we, ANGEL VERA and LUIS G. VERA, citizens of Mexico, and residents of the city of Queretaro, State of Queretaro, Republic of Mexico, have invented certain new and useful Improvements in Relays, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

Our invention relates to improvements in relays; and it consists particularly in certain novel construction and arrangement of the electromagnetic means for the armature thereof, including means for operating same, which consists in subjecting the armature to the action of opposed magnetic fields and in increasing and decreasing the magnetic fields concurrently, but one more rapidly than the other.

The main object of our invention is to increase the range of operativeness of an instrument of this character upon a single adjustment thereof, so that readjustment under varying conditions of the line will not be required within wide limits.

Our invention also consists in certain details of construction and combination of parts, as will hereinafter be more fully pointed out.

We will now proceed to describe a method and apparatus embodying our invention and will then point out the novel features in claims.

In the drawings, Figure 1 is a top view of a switch or relay embodying our invention. Fig. 2 is a view in side elevation of the same with a portion of the base in section, showing diagrammatically a resistance-coil contained therein. Fig. 3 is a diagrammatic representation, showing particularly the circuits.

In the construction herein shown the armature or switch-lever 1 is pivotally mounted at 2 upon the base 3 between two electromagnetic devices 4 and 5. The electromagnetic device 4 is of the horseshoe-magnet type, comprising two coils 6 6, surrounding core-pieces 7, connected by a metallic yoke 8. The electromagnetic device 5 comprises two coils 9 9, surrounding core-pieces 10, which are independent and insulated from each other, but here shown supported by an insulating-strip 11. The electromagnets may be adjusted toward and away from the armature by any suitable adjusting means, as by the ordinary screw and spring means 12, as shown, and the front ends thereof may be guided by front guides 13 13, as is common. An adjustable back-stop 14 is arranged on the side of the armature having the electromagnet 4, and an adjustable contact 15 is arranged on the opposite side thereof. The two electromagnetic devices 4 and 5 are arranged in multiple with each other, the two coils of each electromagnetic device being in series, and resistance may be interposed between the electromagnets 4 and 5, whereby the major portion of the current will pass through the electromagnetic means 5.

In a device we have built and employed successfully in practice the coils of the electromagnet 4 were wound so as to have four hundred and forty ohms resistance, while the coils of the electromagnetic means 5 were wound to have one hundred and fifty ohms resistance. The resistance between the magnets 4 and 5 was one hundred and eighty ohms. These resistances were then so arranged that about eight-tenths of the current from the line passed through the magnet 5, while about two-tenths passed through the magnet 4. The relationship of these various resistances and their amounts may be of course varied within wide limits, the foregoing being merely illustrative of a device actually made. With the electromagnetic means constructed and arranged as above described the magnet 5 will be energized and deënergized much more quickly than will the magnet 4, even though the circuit through them both be made simultaneously and broken simultaneously, as must happen when they are arranged in multiple with each other from the same line, as shown and described. This is largely because of the presence of the magnetic field closed through the cores 7, yoke-piece 8, and armature 1 in the electro magnet 4, while in the case of the electromagnetic device 5 there is no corresponding field because of the absence of any yoke-piece connecting the cores thereof, the only magnetic field present being that set up in and around the individual cores.

In the diagram 3, 16, and 17 designate the line-wires, and 18 and 19 two binding-posts Wires 20 21 lead from the binding-posts 18 and 19 to the coils 9 9, the wire 22 connecting the two coils in series. A branch wire 23 leads from the binding-post 18 to one of the coils 6, the resistance 24 being interposed therein. A branch wire 25 leads from the

binding-post 19 to the other coil 6, and a wire 26 connects the two coils 6 together in series. The armature 1 is connected to a binding-post 27 by means of a wire 28, and the contact 15 is connected to another binding-post 29 by means of a wire 30. The binding-posts 27 and 29 may be arranged in any circuit which it is desired to control. When using the device as a relay in telegraph-work, the said binding-posts will be connected with a sounder, as is usual.

The armature 1 is preferably arranged to engage the back-stop 14 in the normal rest position of the device, and in order that it may have this normal position at all times except when positively operated we preferably provide that it be overbalanced by gravity in this direction. In the construction herein shown we have so arranged that the device as a whole is set at a slight angle with its support, the base being arranged with a slight tilt, as will be readily understood by reference to Fig. 2, and as a matter of convenience we have located the resistance-coil 24 in a hollow portion of the base.

The operation is as follows: Circuit being closed in the line 16 17, the electromagnets 4 and 5 will be energized; but for the reasons before stated the magnet 5 will operate very much quicker than will the electromagnet 4 and will hence attract the armature to the contact 15 and away from the back-stop 14. The armature will remain so attracted even when the electromagnet 4 becomes fully energized, because it will exert very much less force upon the armature, owing to the greater distance between the ends of its poles and the armature when the armature is against the contact 15. When current is interrupted in the line, the coils 9 will be deenergized very much more quickly than will the coils 6, and hence the magnet 4 will exert power for a brief period after the magnet 5 has ceased to do so. The effect of this will be to positively and rapidly attract the armature away from the contact 15 toward the back-stop 14 to break circuit through the said contact. The movement of the armature toward the back-stop will further be aided by gravity if the armature is overbalanced as to gravity, as set forth above.

We have described and shown this invention as particularly adapted for use in telegraph-work; but it will of course be understood that the invention has a much wider range of adaptability than this and may be employed wherever electrical contacts are to be made and broken by electromagnetic means.

We have found that an apparatus constructed in accordance with this invention requires almost no adjustment for varying conditions of the line, so that in telegraph-work the same instrument may be used for longer or shorter lines or under varying weather conditions without constant adjustment, as is necessary in the present form of instruments. If the instrument is once adjusted to respond to the weak currents, it will respond to increasing currents up to very high intensities, and thus the adjustment becomes practically universal. This is attained because of the novel method of operating the armature, which consists in subjecting the same to the action of opposed magnetic fields and in increasing and decreasing the same concurrently, but one more rapidly than the other. An increase of current for operating the device will increase the power of both magnetic devices, but will retain the relationship between them, and hence the device will continue to work.

What we claim is—

1. The combination with an armature, of opposed electromagnets therefor, the one arranged to operate more rapidly than the other, the more rapid of said magnets actuating the armature upon closing of circuit therethrough, and the other of said magnets actuating the armature upon opening of the circuit therethrough.

2. The combination with an armature, of opposed electromagnets therefor, connected with the same source of current, the one arranged to operate more rapidly than the other, the more rapid of said magnets actuating the armature upon closing of circuit therethrough, and the other of said magnets actuating the armature upon opening of the circuit therethrough.

3. The combination with an armature, of opposed electromagnets therefor, the one having magnetically-connected cores, and the other having an unconnected core with free ends.

4. The combination with an armature, of opposed electromagnets therefor, the one having a horseshoe-core, and the other having a straight-line core.

5. The combination with an armature, of opposed electromagnets therefor, each having two coils and cores around which the said coils are wound, the cores of one electromagnet magnetically connected together, and the cores of the other electromagnet free and unconnected.

6. The combination with an armature, of opposed electromagnets therefor, arranged in multiple with each other, each having two coils arranged in series, and cores around which the said coils are wound, the cores of one electromagnet magnetically connected together, and the cores of the other electromagnet free and unconnected.

7. The combination with an armature, of opposed electromagnets therefor, the one arranged to operate more rapidly than the other, said armature arranged to rest normally in the direction of the less-rapidly-operated magnet.

8. The combination with an armature of opposed electromagnets therefor, the one arranged to operate more rapidly than the other, said armature arranged to fall by gravity in the direction of the less-rapidly-operated magnet.

9. The combination with an armature, of opposed electromagnets therefor, connected with the same source of current, the one offering a greater resistance than the other, one of said magnets actuating the armature upon closing of circuit therethrough, and the other of said magnets actuating the armature upon opening of the circuit therethrough.

10. The combination with an armature, of opposed electromagnets therefor, connected with the same source of current, and a resistance arranged between the two said magnets, one of said magnets actuating the armature upon closing of circuit therethrough, and the other of said magnets actuating the armature upon opening of the circuit therethrough.

11. The combination with an armature, of opposed electromagnets therefor, the one arranged to operate more rapidly than the other, said electromagnets connected with the same source of current, and offering the one a greater resistance than the other, one of said magnets actuating the armature upon closing of circuit therethrough, and the other of said magnets actuating the armature upon opening of the circuit therethrough.

12. The combination with an armature, of means for producing opposed magnetic fields therefor, said means simultaneously controlled, but operating the one more rapidly than the other, the more rapid of said magnetic fields actuating the armature in one direction, at substantially the moment of production thereof, and the other of said magnetic fields actuating the armature in the other direction, at substantially the moment of reduction thereof.

13. The combination with an armature, of opposed electromagnets therefor, simultaneously operated, but arranged the one for more rapid magnetization and demagnetization than the other one of said electromagnets actuating the armature in one direction upon magnetization, and the other of said electromagnets actuating the armature in the other direction, at substantially the moment of deënergization.

14. A neutral electromagnetic instrument comprising an armature, and two simultaneously-controlled electromagnets in the same circuit, one of said electromagnets attracting the armature in one direction upon closing of circuit through both the magnets, and the other of said electromagnets attracting the armature in the other direction upon opening of circuit through both the magnets.

15. The combination with an armature, of opposed electromagnets therefor connected in multiple circuit with respect to each other, and one arranged to magnetize and demagnetize more rapidly than the other.

16. The combination with an armature, of opposed electromagnets therefor connected in multiple circuit with respect to each other, and one arranged to magnetize and demagnetize more rapidly than the other, and resistance in series circuit with the less rapid of said magnets.

In witness whereof we have set our hands this 17th day of November, 1904.

ANGEL VERA.
LUIS G. VERA.

Witnesses:
W. THOMPSON,
RAMON C. PÉNZ.