(No Model.)

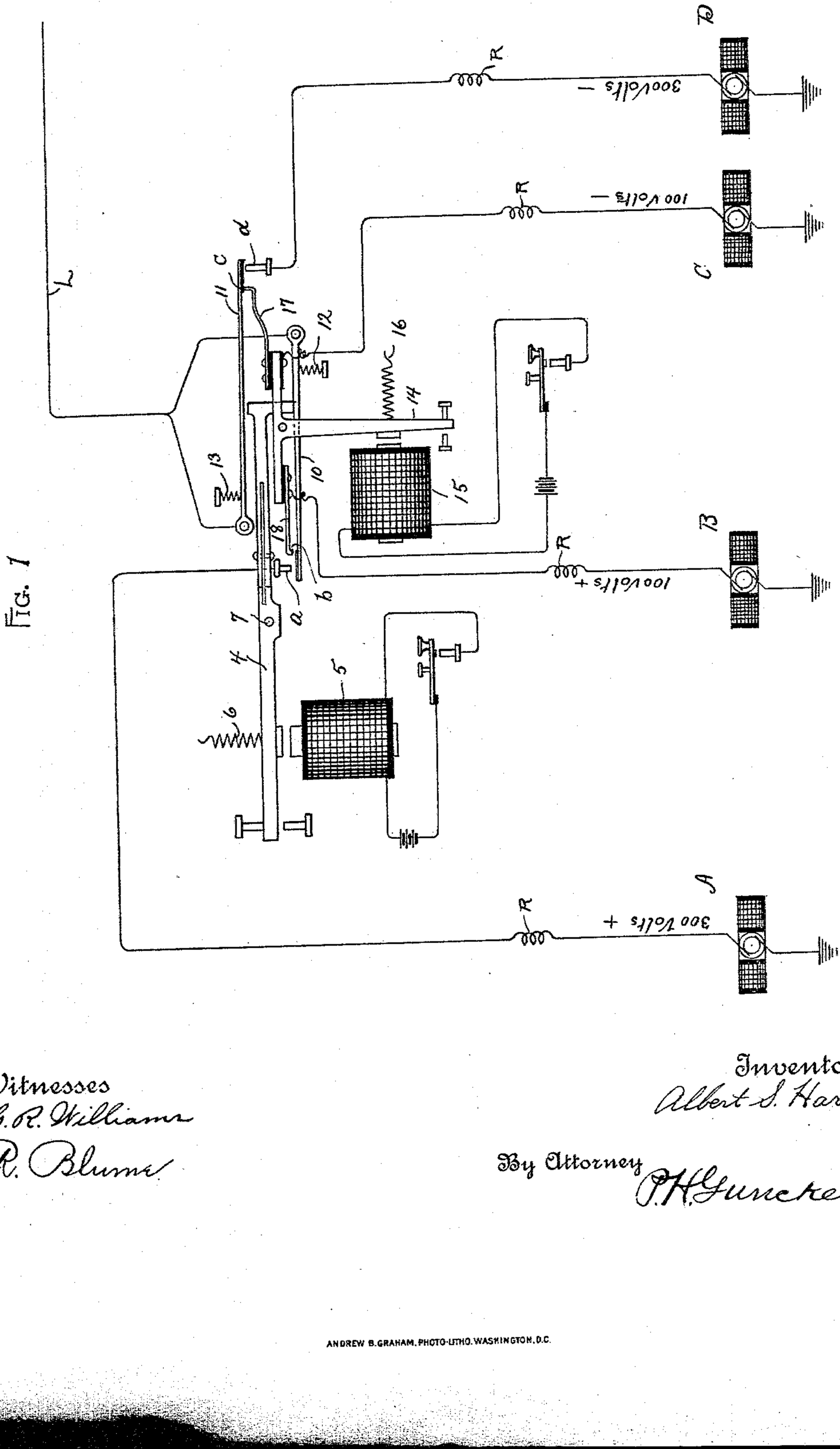
2 Sheets—Sheet 1.

A. S. HARRIS.

DYNAMO TELEGRAPHY.

No. 546,324. Patented Sept. 17, 1895.

FIG. 1



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(No Model.)

2 Sheets—Sheet 2.

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FIG. 2

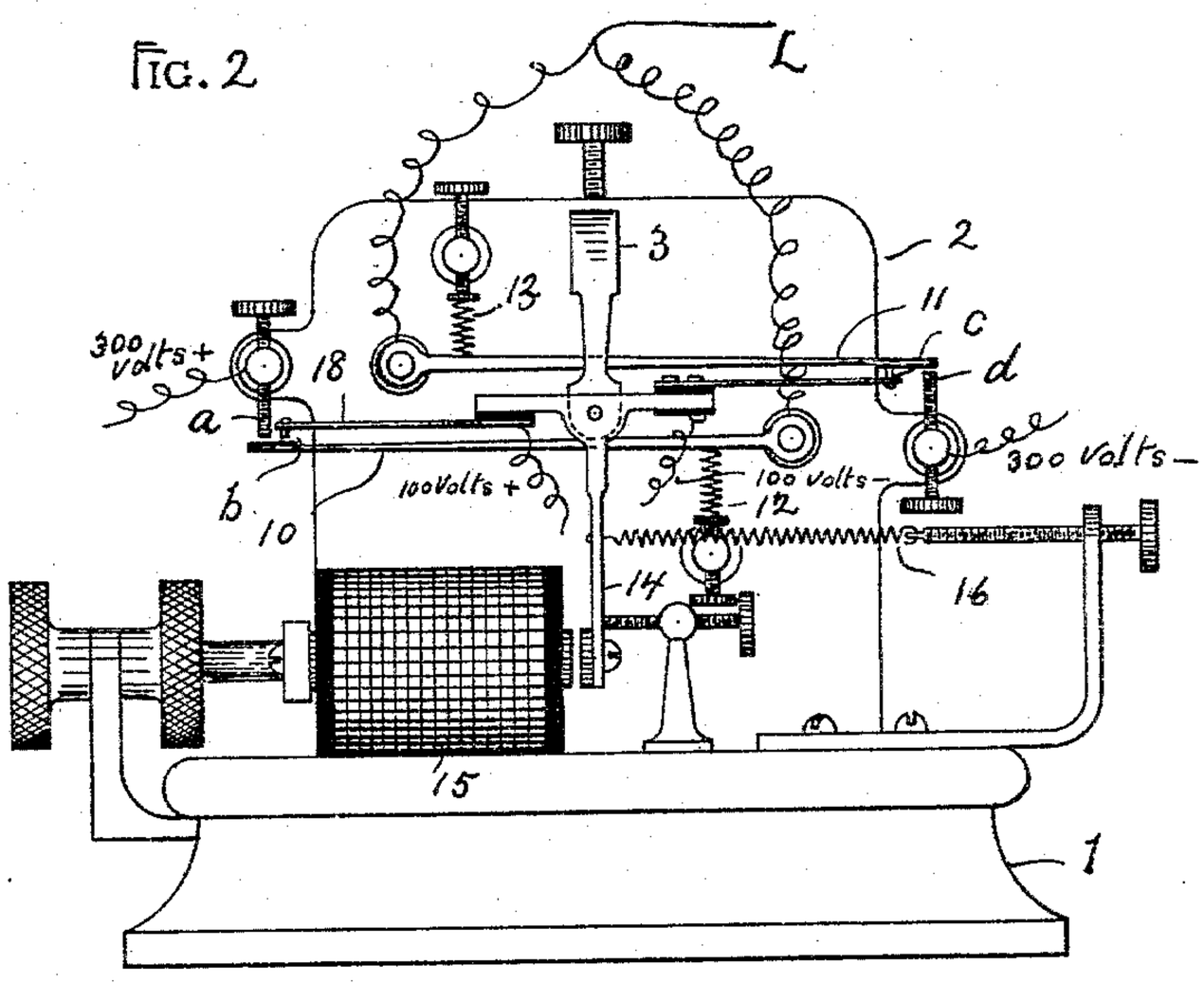
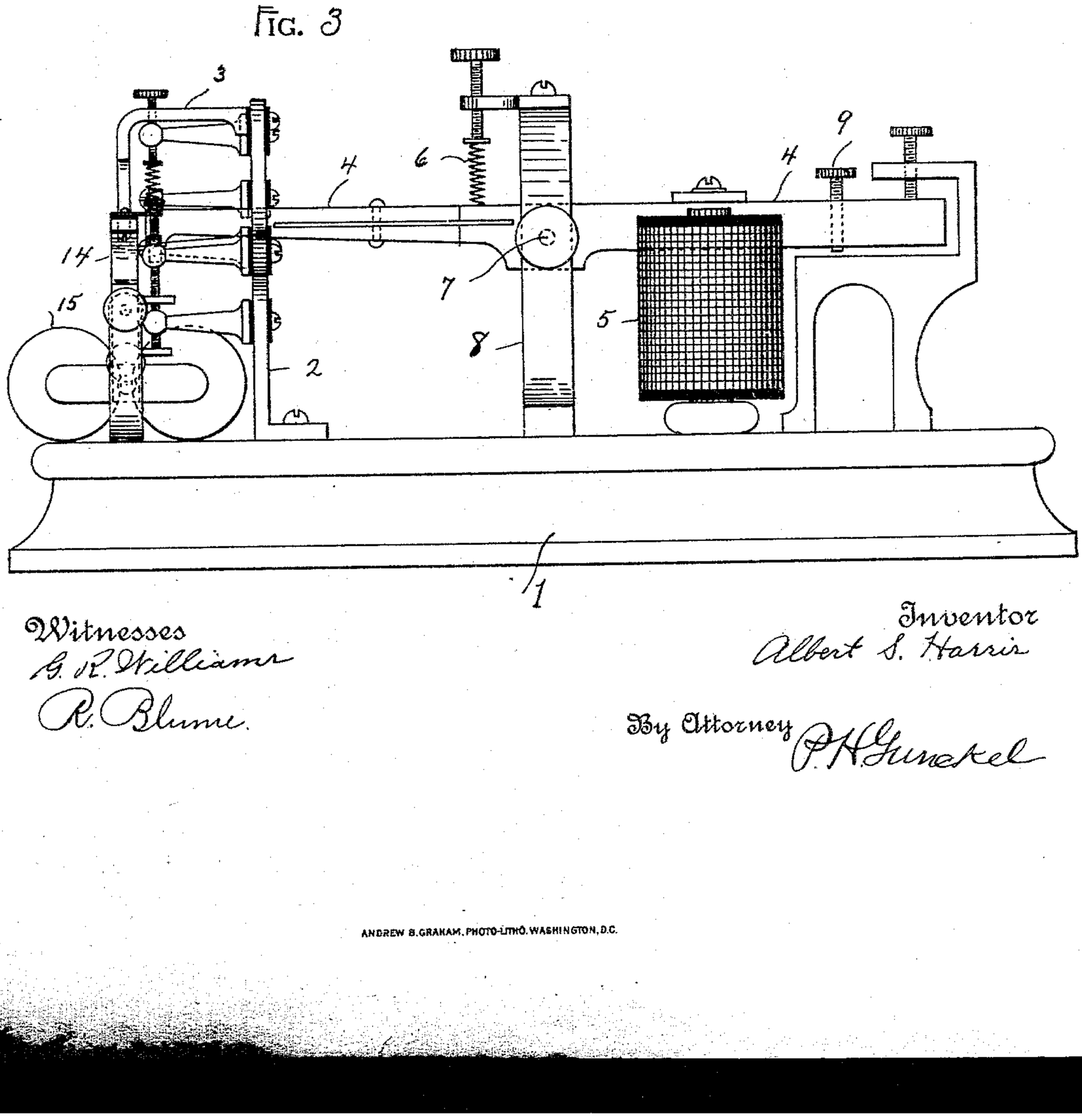


FIG. 3



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UNITED STATES PATENT OFFICE.

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DYNAMO-TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 546,324, dated September 17, 1895.

Application filed February 13, 1895. Serial No. 538,183. (No model.)

To all whom it may concern:

Be it known that I, ALBERT S. HARRIS, a citizen of the United States, residing in the city of Minneapolis, county of Hennepin, and State of Minnesota, have invented a certain new and useful Improvement in Dynamo-Telegraphy, of which the following is a specification.

My invention relates to mechanical devices to be employed in the working of duplex and quadruplex telegraphy; and the object of the invention is, chiefly, to provide simple and efficient means for producing the necessary conditions for the operation of quadruplex telegraphy in connection with the use of dynamo-machines or their equivalents as sources of electric energy.

Generally stated, my improvement relates to an apparatus of special construction combining keys for alternating potential and polarity, each key controlling a pair of levers provided with contact points and independently operative and separately controlled by an electromagnet, one of said levers being designed to transmit messages by changes of potential and the other by reversals of polarity, each of the respective levers being arranged to perform its functions irrespective of the position of the other.

Various methods and means have been used or devised for the utilization of dynamo-machines in telegraphy. In some of these two sources of current of maximum potential, but of opposite polarity, are employed, together with artificial leaks to earth for securing desired conditions in the wire. An objection to this plan is the loss of the current which traverses the leak to the ground. In other systems four sources of current, one for each requisite condition of the line, are employed, possibly with economy, but only with increased complication of the apparatus. In this latter system two transmitting-keys have heretofore been used, one having four and the other two movable contact-points, making in all six contact-points, and the current in passing from the source to the line in such instruments is compelled to pass through at least two of the contact-points. In some arrangements of this system in which circuit-preserving keys are employed a short period intervenes when the contact-points are changing from one to the other and a path for the current is established between machines that are performing no actual work, and although this is of short duration and the waste of current is of small value in the use of but one set of keys, yet where several sets of keys are working from one source the aggregate amount is considerable, and one of the effects is to suddenly throw the load on and off the machines, causing unsteady currents to be generated.

Under the present improvements it is practicable to use four sources of current, with only four movable contact-points, one for each source of current, and the current in passing from its source to the line traverses only its appropriate point. When not performing actual work, each source is effectually disconnected and only the source supplying current to the line is provided a means of escape. It will be seen that with the arrangement of devices herein proposed the necessity of the two-point keys of some earlier devices is avoided and the apparatus is simplified and adapted to furnish more direct and less obstructed passages for the current from its source to the line.

In illustration of my improvements I have shown in the accompanying drawings, in Figure 1, an arbitrary diagram of an arrangement of the instrumentalities employed; in Fig. 2, an elevation of the telegraphic instrument viewed from its end, and in Fig. 3 a side elevation.

In said drawings, 1 designates a base, 2 an upright support, and 3 an arm attached to it supporting some of the devices hereinafter described. A lever 4, controlled by an electromagnet 5 and by a suitable retractile spring 6 for returning it to normal position when not controlled by the magnet, is provided to reverse the polarity of the current passing to the line irrespective of the potential or of the position of the mechanical devices for controlling the potential. Mechanically considered, the part 4 is a horizontal bar pivoted at 7 on a support 8 in proper relationship to the electromagnet 5 to serve the purpose of a key to be manipulated by means of a button 9 or otherwise to make and break the circuit connections. In normal position its forward end bears upon a pivoted arm 10, and when depressed by means of the button it lifts an arm 11. These arms are controlled by suitable retractile springs 12 and 13, respectively. A

second pivoted lever 14, used in connection with the magnet 15 and retractile spring 16, is provided with arms 17 and 18. The four contacts controlled by these levers are indicated at *a*, *b*, *c*, and *d*. The current is represented as being controlled by dynamo-machines indicated, respectively, by A, B, C, and D. The machines are indicated as operating independently of one another, but of course may be worked in series. Dynamo A is indicated as furnishing a tension of three hundred volts of positive polarity, machine B as furnishing one hundred volts of positive polarity, machine C a tension of one hundred volts, but of negative polarity, and machine D a tension of three hundred volts of negative polarity. It will be seen that dynamos A and D supply contact-points *a* and *d* each with a potential of three hundred volts, but of opposite polarity, and that machines B and C furnish their respective contacts *b* and *c* with opposite polarities also, but with potentials of only one hundred volts each. With the levers in normal position, as shown, the contacts *b* and *c* are slightly in advance of points *a* and *d*, and all of them would be open except the contact *c*, which will be supplying the line L with a negative polarity of one hundred volts. In this position both the neutral and polar relays at the distant end of the line would be on their open stops, as is well understood in the art. If, now, lever 4 be pressed downward to its closed stop, the arm 10 will be released and forced upward by its spring 12 until it comes to rest on contact *b*. At the same time the lever 4 engages the arm 11 and moves it from contact *c*. Machine B will then be furnishing the line with one hundred volts tension, as before, but of positive polarity, and machines A, C, and D will be disconnected. Thus the polar relay of the distant station will now be changed over and rest on its closed stop, because the current going to the line has been reversed, while the neutral relay will still remain on its open stop, because the tension has not been increased. If the lever 14 be then brought to its closed stop, points *b* and *c* will be drawn away from the arms 10 and 11 and the points *a* and *d* will be engaged by the arms 10 and 11. If lever 4 still remain at its closed stop, as last mentioned, and lever 14 also closed, the arm 10 will come to rest on contact *a* and the arm 11 will be removed from the contact *d*. Thus machines B, C, and D will be disconnected at their respective points and machine A will be supplying to the line through the point *a* and the arm 10 a potential of three hundred volts of positive polarity. The polar relay at the distant end will remain unclosed at its stop, because the direction of the current is still unchanged, while the neutral relay will come to rest at its closed stop, the increased tension having overcome the retractile spring and caused the movable lever to change its position. If lever 4 now be opened and come to rest on its open stop, while the lever 14 is still at its closed stop, the arm 10 will be engaged by lever 4 and removed from contact *a*. At the same time the arm 11 will be released and allowed to be pressed downward by its spring 13 until it rests on contact *d*. Thus machines A, B, and C are disconnected and the line will be supplied with potential of three hundred volts of negative polarity. The distant polar relay will now come to its open stop, because the direction of the current in the line has become reversed, but the neutral will remain at its closed stop, because the tension is unchanged. It will thus be seen that lever 4 may change the polarity of the current in the line, while the lever 14 is either opened or closed, and that the latter lever may change the potential, while the lever 4 is either opened or closed. An operator controlling the lever 4 may send messages by reversals of polarity, and an operator controlling lever 14 may send messages by changes of potential, each irrespective of and without conflict with the other. It will of course be understood that practically an unlimited number of quadruplex or duplex sets or single may be worked from these dynamo-machines, as is done in other systems where generators are used, the number being limited only to the capacity of machines to supply sufficient current for their operation.

What I claim, and desire to secure by Letters Patent, is—

1. A transmitting instrument embodying two sets of contact points, each set being independently controlled by a lever, two sources of current of like potential but of opposite polarity connected to one set of contacts, and two other sources of current of different potential and opposite polarity connected to the second set of contacts, substantially as set forth.

2. In a telegraphic instrument, two operating levers independently controlled by electro-magnets, two sets of contacts, one set arranged to constitute the open and closed points for the first lever while the second lever is in normal position and the other set arranged to constitute the open and closed points for the first lever upon movement of the second lever by its magnet, substantially as set forth.

3. In a transmitting instrument, the combination with a lever and electro-magnet controlling a pair of arms; a second lever and electro-magnet controlling a second pair of arms; two sets of contact points, one set serving as the contacts for the first lever in normal position and the second being substituted for them by the operation of the second lever by its magnet; sources of current of different potential and polarity, and suitable connections to said contacts, substantially as set forth.

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Witnesses:
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