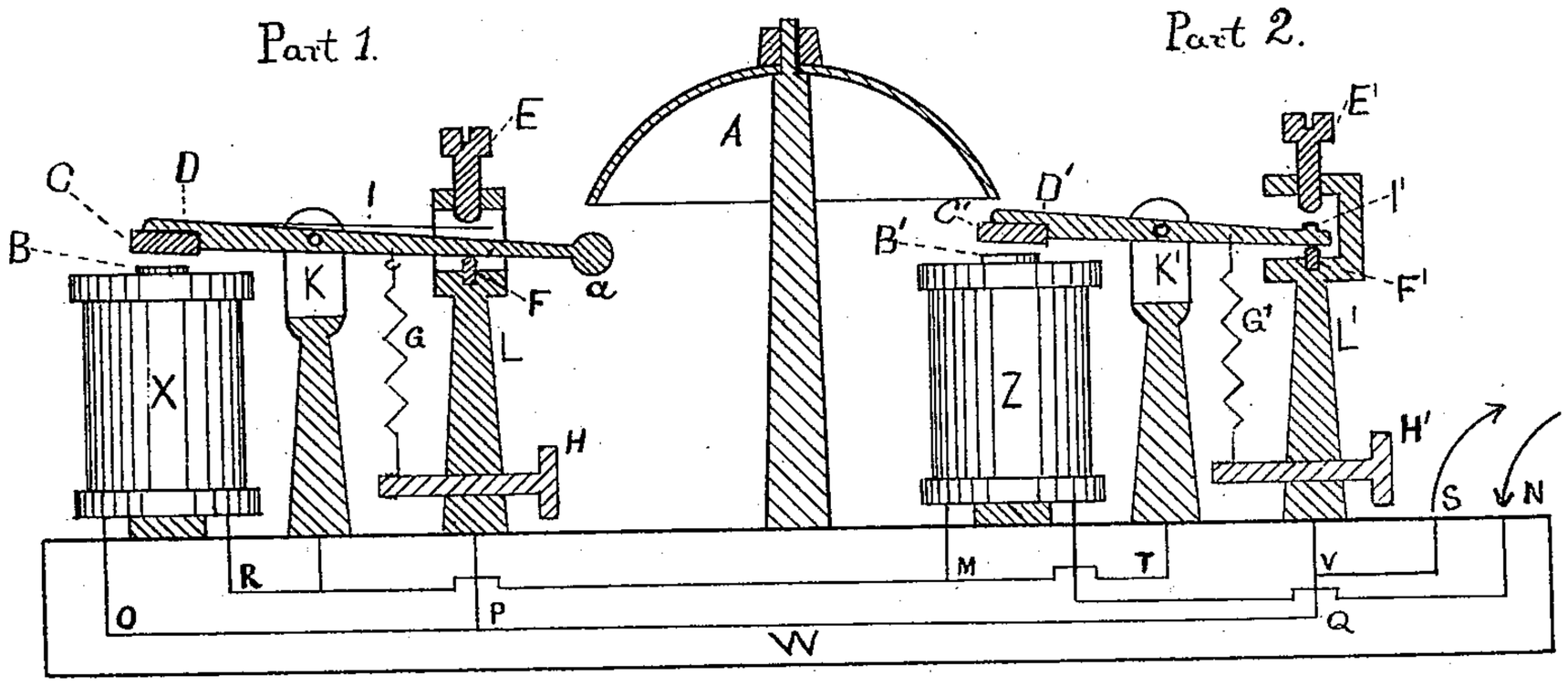
(No Model.) 3 Sheets—Sheet 1.

M. L. BAXTER.
Electric Call Bell.

No. 233,834. **Patented Nov. 2, 1880.**

Fig. 1.



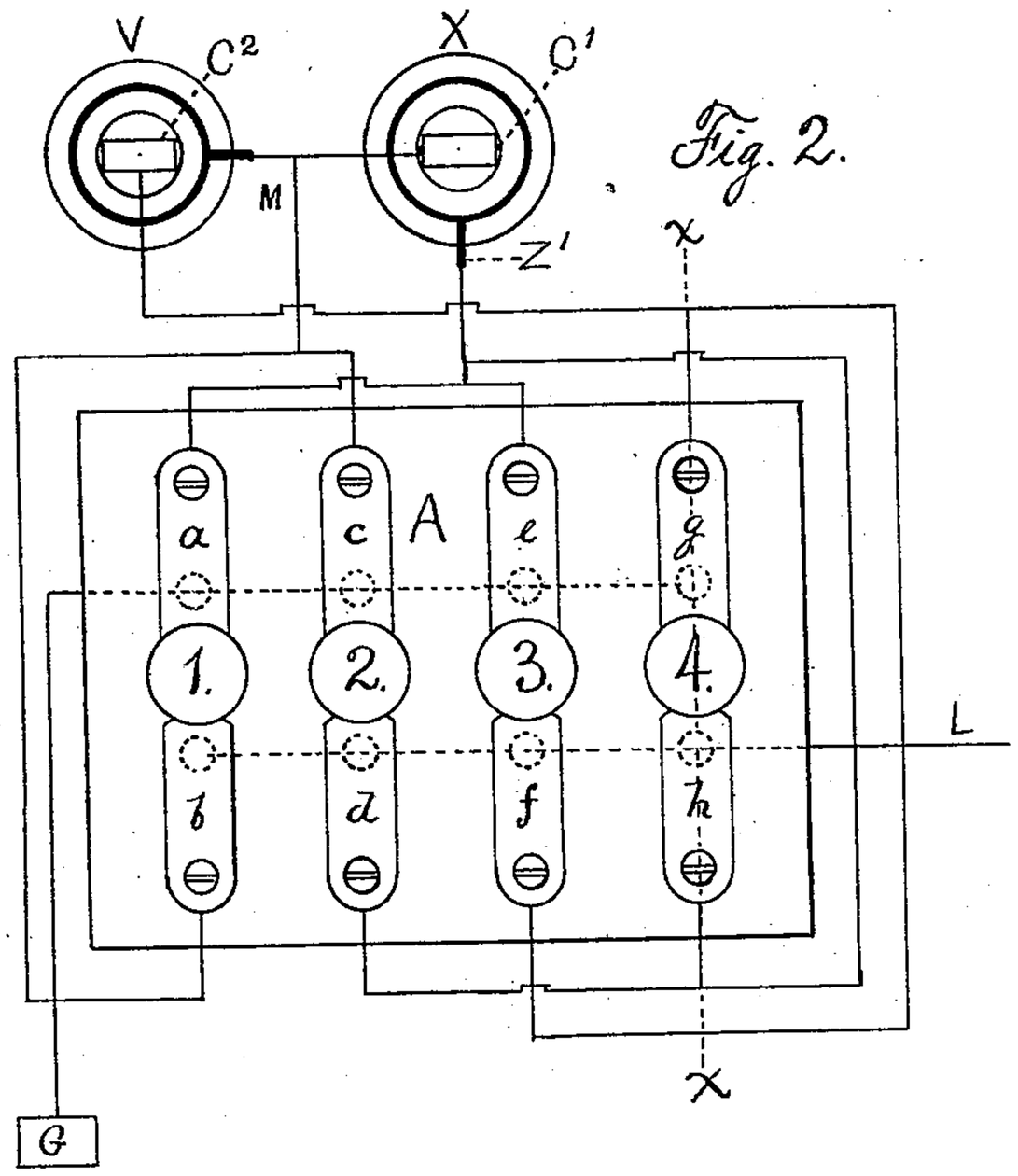


Fig. 2.

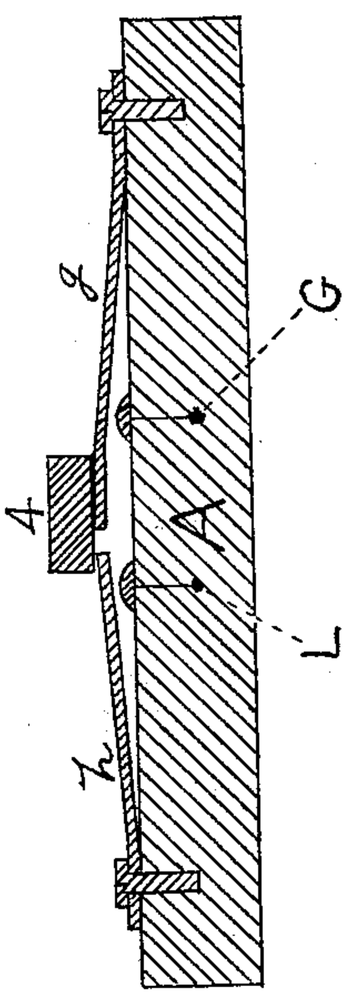


Fig. 3.

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Robert L. Cleas

Inventor:
Myron L. Baxter.

(No Model.) 3 Sheets—Sheet 2.

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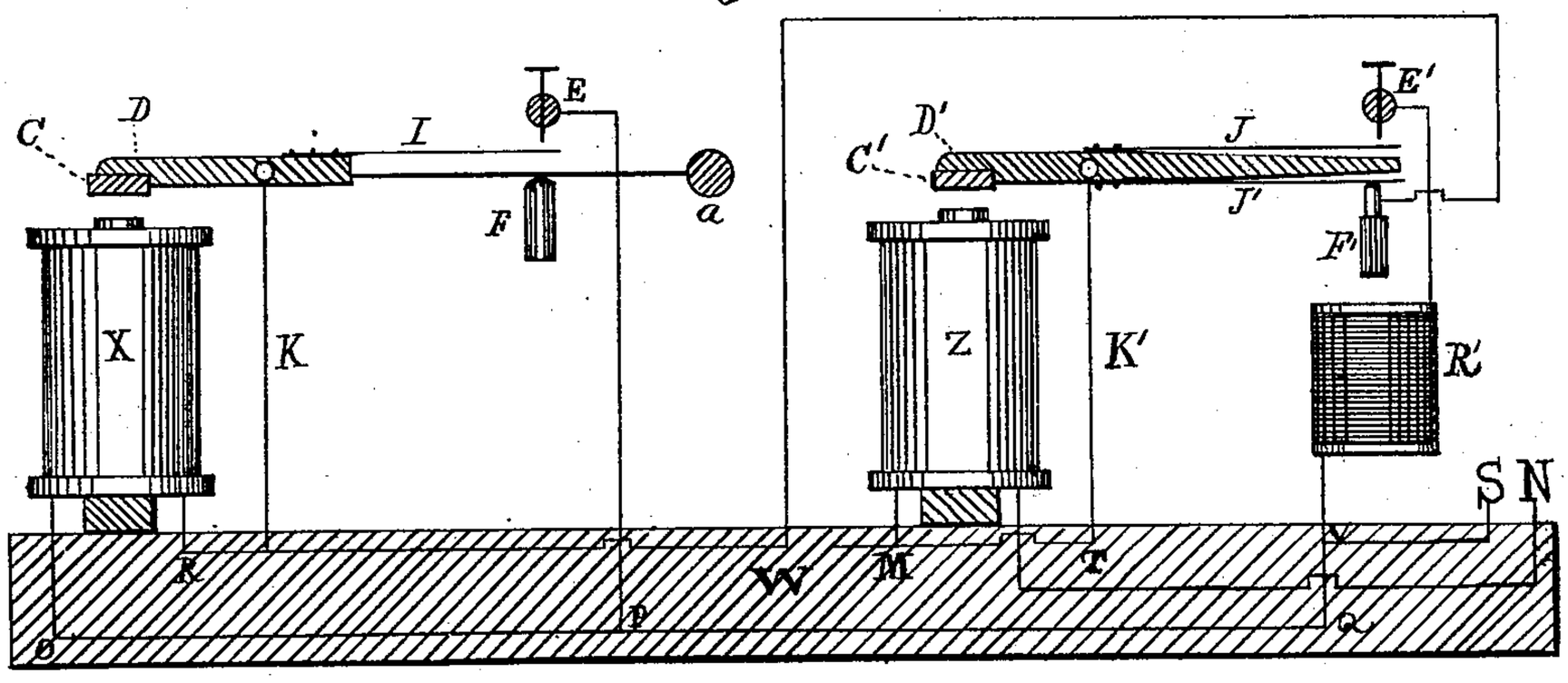
Fig. 4.



Witnesses:

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(No Model.) 3 Sheets—Sheet 3.

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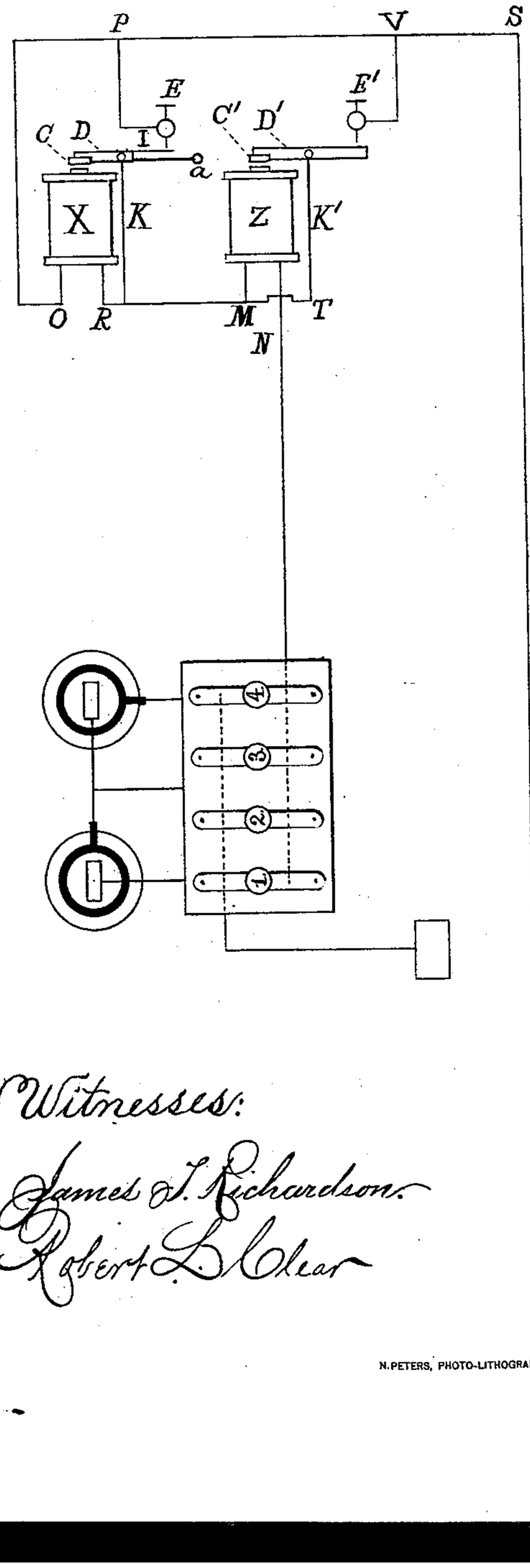
Fig. 5.

No. 1.



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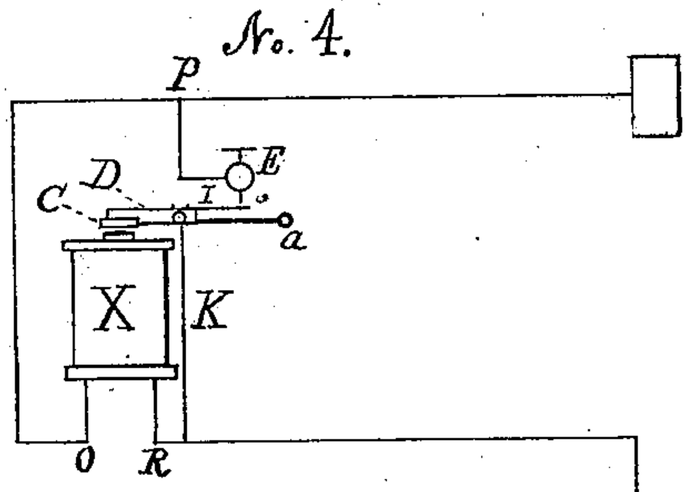

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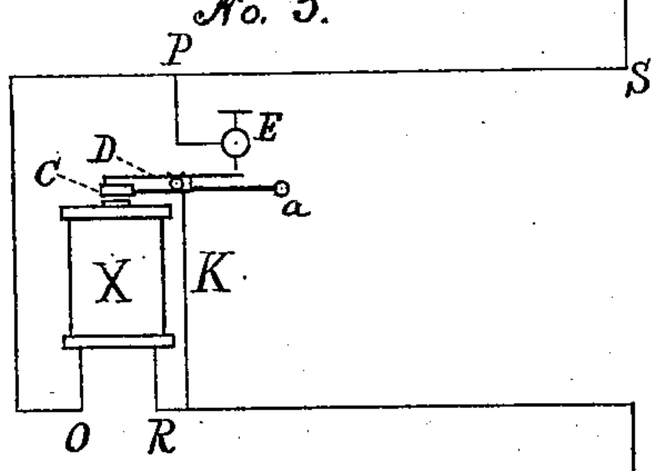

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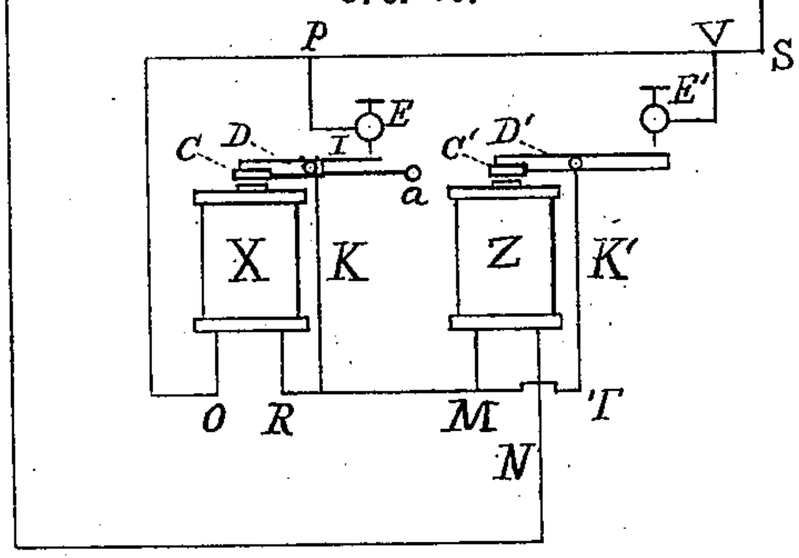

Witnesses:

James T. Richardson.

Robert L. Clear

Inventor:

Myron L. Baxter.

UNITED STATES PATENT OFFICE.

MYRON L. BAXTER, OF AURORA, ILLINOIS.

ELECTRIC CALL-BELL.

SPECIFICATION forming part of Letters Patent No. 233,834, dated November 2, 1880.

Application filed August 4, 1880. (No model.)

To all whom it may concern:

Be it known that I, MYRON LESLIE BAXTER, of the city of Aurora, county of Kane, and State of Illinois, have invented certain new and useful Improvements in Electric Call-Bells, of which the following is a specification.

The invention relates to a system of call-bells upon a telephonic or other line through which electric currents may pass, and upon which line there are located two or more offices or "subscribers;" and its object is to enable a person at the end of such line, or at what is called a "central office," to cause any particular bell to sound an alarm or call without ringing any other bell than the one intended.

Heretofore all the bells have been rung at the same time, the number of strokes indicating which office or subscriber was called; or, as in some recent improvements, synchronous movement of certain mechanisms at different places has been called into play to render inoperative all the bell-hammers on the line except one. The mechanical interposition of an obstruction dependent upon the strength of the current used has also been employed. The first method is objectionable because each subscriber is obliged to give heed to all calls in order to know when his own is sounded. The second method is objectionable because of the liability of mechanism intended to operate synchronously to get out of time, and also because of the time and trouble necessary to bring all the machines into condition for sounding a call. The third method is objectionable because so many strengths of current are required, more than two being of doubtful availability.

The object of my invention is to provide a system of call-bells whereby only one-half as many strengths of current are required as there are bells on the line, and a means of sounding a call upon any particular bell by merely depressing and holding down a knob bearing the designating-number of the bell sought to be sounded.

The invention consists in arranging at certain offices additional instruments, which I call "cut-outs," and which at proper times will short-circuit the current without breaking its continuity, thereby cutting out the electric bell and prevent its ringing; also, in a key-board so arranged that different currents may be sent out on the line by depressing a single key or knob for each effect produced, thus avoiding the movement of two or more switches, heretofore necessary.

On lines having but two offices I use two ordinary electric call-bells, which give continuous ringing without breaking the main circuit, as hereinafter described, and the cut-out referred to is not necessary. These bells have polarized armatures of opposite polarities, (or, if of the same polarity, the current is made to traverse the respective helices in opposite directions,) so that by sending out a positive or a negative current at will by the use of the key-board, hereinafter described, either bell may be sounded and the other will remain silent.

Although adapted to lines with few or many offices, I consider my invention best adapted to lines having four offices, and herein describe its use more particularly upon such lines.

In the accompanying drawings, Figure 1 is a vertical section of a call-bell and supplementary machine or cut-out, such as I use at offices numbered 1 and 2. This figure is divided into parts 1 and 2, because part 1, separated from part 2, represents fully the call-bells used in offices numbered 3 and 4 without the cut-out shown complete in part 2. Fig. 2 is a top view of the key-board properly connected with two cells of battery for signaling either of four offices. Fig. 3 is a vertical section of the key-board through the dotted lines *x x*, Fig. 2. Fig. 4 shows a modification of Fig. 1, whereby the circuit through the bell-helix may be broken and a suitable resistance be inserted without breaking the continuity of the line, and Fig. 5 is a diagrammatic view of a complete series of stations.

In Fig. 1, A is a bell, fastened rigidly to its standard and belonging to part 1 of the figure. B B′ are soft-iron cores surrounded respectively by the helices X and Z. C and C′ are armatures, C being made of steel and polarized, and C′ of soft iron. D and D′ are oscillating beams supported by proper bearings or points by the metallic standards K and K′, and held down upon the insulating-plugs F and F′ by the spiral springs G and G′, tension being

regulated by the adjusting-rods H and H′. The beam D carries, attached at a point near the armature C, the thin spring I, and at its other extremity the bell-hammer *a*. The beam C′ carries at its outer end the metallic stud I′. The screws E and E′ fit tightly in the metallic jaws in the tops of the metallic posts L and L′, and are susceptible of a vertical adjustment. The cores, standards, and posts are secured to the non-conducting base W, and the lines O, R, P, M, T, Q, V, S, and N represent connecting-wires.

In Fig. 2 the porcelain or ivory knobs 1, 2, 3, and 4 are attached respectively to the spring-plates *a*, *c*, *e*, and *g*, and project beyond them a sufficient distance to engage the ends of the spring-plates *b*, *d*, *f*, and *h*, as shown in section in Fig. 3. There is, however, no direct metallic contact between the spring-plates of the first series and those last named, and the outer ends of all of them are attached by screws to the non-conducting base or board A. The line L (shown in the base A, Fig. 2, by a dotted line) is in connection with a row of four metallic buttons, one under each of the spring-plates *b*, *d*, *f*, and *h*, and represented by dotted circles in Fig. 2, and shown in vertical section at L in Fig. 3. This line L leads out to the offices to be called.

The line G (shown in the base A, Fig. 2, by a dotted line) is in connection with four metallic buttons, one under each of the spring-plates *a*, *c*, *e*, and *g*, and represented by dotted circles in Fig. 2, and shown in vertical section at G in Fig. 3. This line G leads to the ground.

The spring-plates are connected variously with the two cells of battery V and X by wires, here shown in detail outside the base A, but in practice concealed therein. Where these wires cross each other at right angles no metallic contact is intended to be indicated.

Part 1 of Fig. 1 represents one form of a call-bell in which a continuous ringing is obtained by simply allowing the current to flow continuously.

The current, entering the helix X by the wire R and passing out by the wire O, renders the iron core magnetic, and the armature C (if it be of proper polarity) is drawn down, the other end of the beam D leaving the insulating-plug F. As soon, however, as the hammer *a* has struck the bell A the spring I is in contact with the screw E, and the current will now be diverted from the helix X, taking the shorter course through K, I, E, and L to P. Then the spiral spring G breaks the contact between the spring I and the screw E, compelling the current to again traverse the helix X, and these changes repeated give to the beam D a regular oscillating movement and insure the continuous ringing of the bell A, this without breaking the circuit or interfering with the continuous flow of the current in the line-wire. The current which rings the bell has, however, (in offices 1 and 2,) always to pass through the helix Z, as shown by its entrance at N, its course to Z, and thence to M and R. The adjustment or tension of the spiral spring G′ is such, however, that a weak current, though capable of ringing the bell, cannot move the armature C′; but if a stronger current be allowed to pass, the armature C′ is attracted, the beam D′, until now resting upon the insulating-plug F′, carries the stud I′ up against the screw E′, the current is short-circuited, and part 1 of Fig. 1 is cut out. The current now, instead of going from M to R, has a shorter outlet through T, K′, D′, I′, E′, L′, and V to S. Thus a weak current will ring the bell and a strong one will not.

Fig. 4 shows a device for breaking the circuit through the bell-helix and introducing resistance into the line without breaking the continuity of the same. It consists, essentially, of two contact-springs, J J′, applied to the beam D′, and a metallic plug, (inserted in the insulating-plug F′,) upon which the contact-spring J′ normally rests. In the use of this device the wire running from M to R, Fig. 1, is cut near M, and the part nearest R connected directly to the said metallic plug. With this arrangement the current, after leaving the helix Z, finds its way to the helix X through T K′ D′ J′ and the metallic plug.

Whenever a strong current operates armature C′ the contact-spring J reaches the screw E′ just before the spring J′ leaves the metallic plug, so that when the armature C′ has completed its movement the current is all flowing through the resistance R′, the contact between J′ and the metallic plug being broken. When the armature C′ is released the same operation is repeated, but in reversed order, the contact-spring J′ establishing a circuit through helix X before that through R′ is broken. As this change does not break the continuity of the line or affect the helix Z, the armature C′ will work with certainty.

The operation of the devices herein described, when applied to a line of four offices, is as follows: Office No. 1 is equipped with the complete instrument shown in Fig. 1, the armature C being polarized so as to respond to a positive current. Office No. 2 is equipped in the same manner, except that its polarized armature C will respond only to a negative current. Office No. 3 is equipped with a call-bell only, as shown in part 1 of Fig. 1, its polarized armature C being so held by the spiral spring G that it will respond to a strong positive current only, a weak one being incapable of operating it. Office No. 4 is equipped the same as No. 3, except that its polarized armature C will respond only to a strong negative current.

If, now, it be desired to call office No. 1, the knob 1 of the key-board, Fig. 2, is depressed. This brings the spring-plate *b* in contact with a metallic button connected with the line-wire L, and it also brings the spring-plate *a* into contact with a metallic button connected with

the ground-wire G. This connects the ground G, through *a*, with negative pole Z′ of the battery-cell X, and allows the positive current of one-cell power (which I call the "weak" current) to flow out through the wire M and spring-plate *b* into the line-wire L. The call-bell in office No. 1 will respond to this and the others will all remain silent, because the polarized armature C at office No. 2 responds only to a negative current, and the polarized armatures at offices Nos. 3 and 4 will not respond to a weak current of any kind.

If it be desired to call office No. 2, the knob numbered 2 is depressed. This connects the ground-wire G, through *c* and the wire M, with the positive pole C′ of the battery-cell X, and allows the negative current (so to speak) to flow out through Z′ and *d* to the line-wire L, giving, as before, the weak current, but in an opposite direction. To this current the polarized armature C at office No. 1 fails to respond, but that at office No. 2 is operated freely, while, as before, No. 3 and No. 4 will not respond to the weak current.

If it be desired to call office No. 3, the knob numbered 3 is depressed. This connects the ground-wire G, through *e*, with the negative pole Z′ of the battery-cell X, and allows the positive current from both cells V and X to flow out from the positive pole C^2 through the spring-plate *f* to the line-wire L. To this strong current the call-bell at office No. 1 would respond if it were not prevented by the cut-out there connected with it operating as described. The polarity of the armature C at office No. 2 might not prevent a feeble response there, but its cut-out operates the same as that at office No. 1. The bell at office No. 3 responds to this strong positive current, but No. 4 is silent because it requires a strong negative current to operate it. Therefore no bell rings except No. 3.

If it be desired to call office No. 4, the knob numbered 4 is depressed. This connects the ground-wire G, through *g*, with the positive pole C^2 of battery-cell V, and allows the full negative current (so to speak) of both cells to flow out from Z′ through *h* into the line-wire L. As already foreshadowed, this strong negative current works the cut-outs at offices 1 and 2, is opposed to the polarity of the armature at office No. 3, but easily operates No. 4 bell.

By cutting out the helices X at offices 1 and 2 the resistance of the whole line is considerably altered, especially if the line-wire be comparatively short or of low resistance; and whenever it becomes necessary to counteract this I introduce resistance-coils, which are thrown into circuit at the same time the call-bells are cut out, substantially as hereinbefore described.

Having fully described my invention, what I desire to claim and secure by Letters Patent is—

1. The combination of an electric call-bell, which rings continuously when in circuit with a battery, with a device for diverting the electric current, so that the bell shall cease ringing if the current is increased, substantially as described.

2. An electric call-bell which rings continuously when in circuit with a battery, in combination with a device whereby the circuit through the bell-helix is broken and a resistance, small or great, is substituted therefor without breaking the continuity of the current from the battery, substantially as shown and described.

3. The combination of an electric call-bell, which rings continuously when in circuit with a battery without interrupting the current from the battery, with a device for diverting the electric current, so that the bell shall cease ringing if the current is increased, substantially as described.

4. An electric call-bell, with polarized armature, which rings continuously when in circuit with a battery without interrupting the current from the battery, substantially as shown and described, and for the purpose specified.

5. An electric call-bell having a polarized armature, which rings continuously when in circuit with a battery, in combination with a device whereby the current is diverted, so that the bell shall cease ringing if the current be increased, substantially as described.

6. An electric call-bell having a polarized armature, which rings continuously when in circuit with a battery, in combination with a device whereby the circuit through the bell-helix is broken and a resistance, great or small, is substituted therefor without breaking the continuity of the current from the battery, substantially as shown and described.

7. The combination of an electric call-bell having a polarized armature, which rings continuously when in circuit with a battery, with a device for changing either or both the strength and direction of an electric current at one motion, substantially as described.

8. An electric call-bell with polarized armature, which rings continuously when in circuit with a battery without interrupting the current from the battery, in combination with a device whereby the current is diverted, so that the bell shall cease ringing if the strength of the current be increased, substantially as described.

9. The combination of an electric call-bell having a polarized armature, which rings continuously when in circuit with a battery without interrupting the current from the battery, with a device for changing either or both the strength and direction of an electric current at one motion, substantially as described.

10. The combination of an electric call-bell having a polarized armature, which rings continuously when in circuit with a battery, with a device for diverting the electric current, so that the bell shall cease ringing if the current is increased, and a device for changing either

or both the strength and direction of an electric current at one motion, substantially as described.

11. The combination of an electric call-bell having a polarized armature, which rings continuously when in circuit with a battery without interrupting the current from the battery, with a device for diverting the electric current, so that the bell shall cease ringing if the current is increased, and a device for changing either or both the strength and direction of an electric current at one motion, substantially as described.

12. A system of electric call-bells wherein the bells which are rung by the weaker currents are silenced when the stronger currents are employed by the establishment of a shorter circuit than that through their helices, substantially as described.

13. A system of electric call-bells wherein the bells which are rung by the weaker currents are silenced when the stronger currents are employed, by having their helices cut out of circuit and resistances, small or great, inserted in their stead, substantially as shown and described.

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Witnesses:

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ROBT. L. CLEAR.