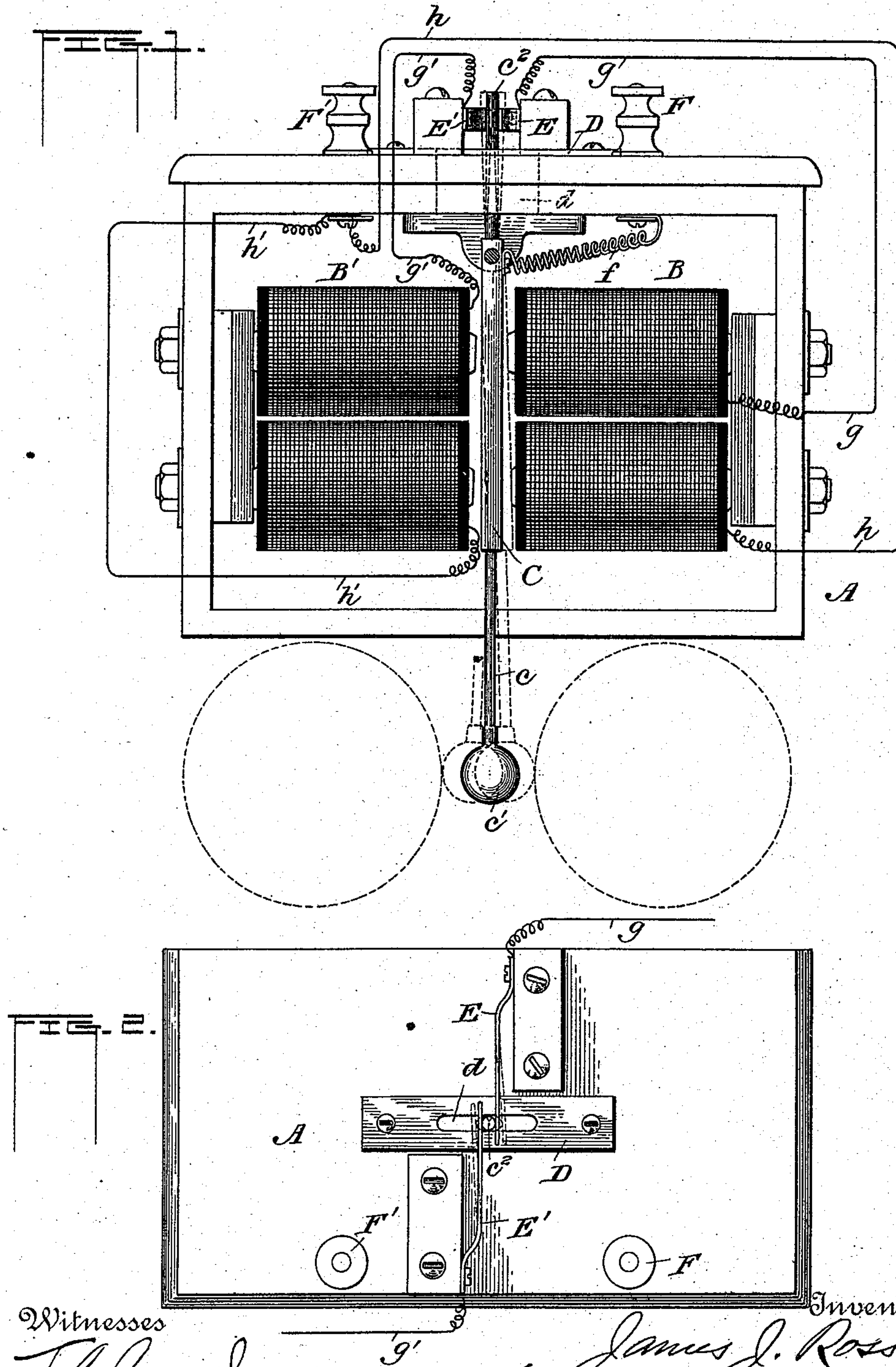


(No Model.)

J. J. ROSS.
ELECTRO MAGNETIC BELL.

No. 486,354.

Patented Nov. 15, 1892.



Witnesses
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UNITED STATES PATENT OFFICE.

JAMES J. ROSS, OF DETROIT, MICHIGAN, ASSIGNOR OF ONE-HALF TO GEORGE R. HOLDEN, OF SAME PLACE.

ELECTRO-MAGNETIC BELL.

SPECIFICATION forming part of Letters Patent No. 486,354, dated November 15, 1892.

Application filed December 29, 1891. Serial No. 416,474. (No model.)

To all whom it may concern:

Be it known that I, JAMES J. ROSS, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Electro-Magnetic Bells; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to electric bell-ringing apparatus of the character usually employed at railway street-crossings, in burglar-alarms, and in various other relations where it is desired to produce a continuous bell-ringing action for a greater or less length of time.

It has heretofore been proposed to provide electric apparatus for ringing a bell continuously during the desired period of time by means of two electro-magnets arranged to act alternately upon an armature common to both magnets and attached to a vibrating rod carrying a bell hammer or hammers adapted to strike opposite sides of a bell or gong in alternation. The electric current being automatically switched or shunted from one magnet to the other by means of a circuit-changing device actuated by the movements of the armature and vibrating rod; but such apparatus are objectionable in practice on account of the difficulty experienced in adjusting and keeping the circuit changer properly positioned with relation to other parts, so as to effect a change in the course of the electric current at the proper instant of time necessary to produce the desired results. The circuit-changer is also liable to become deranged in action, and when not properly adjusted and timed in its movements with relation to the vibrating rod and armature it will not move in harmony therewith, and the apparatus is thus rendered incapable of producing satisfactory results. Moreover, such previous apparatus are subject to further objection on account of the multiplicity of parts employed, as the greater the number of parts the greater the liability to get out of order, and the cost of construction and maintenance is also correspondingly increased.

The object of my invention is to overcome the foregoing objections, and to provide a sim-

ple, efficient, and inexpensive self-regulating continuous bell-ringing apparatus in which the armature shall be evenly poised between two or more electro-magnets in such manner as not to be affected by the inequalities of the magnets or the variations in the power of the battery or source of electric energy. The armature being placed directly in the circuits connecting with the helices of the electro-magnets and provided with spring-contact devices, whereby continuous electrical connection is maintained between the armature and both magnets when the apparatus is not in action, so that the electric current may pass directly and simultaneously to both magnet-coils when the circuit is first closed, thus permitting either magnet to attract the armature and effect the initial stroke of the bell, whereupon the electric circuit will be established alternately through the magnet coils at either side of the armature, and, acting alternately thereon, will produce a continuous ringing of the bell. By this means the power of both magnets is brought to bear on the armature on the initial movement of the current, so that if for any cause one magnet should fail to exert sufficient force to attract the armature, the other magnet will act, and when both are rapidly energized the inequalities will cause the armature to move toward the one having the greatest strength.

The invention will first be described in connection with the accompanying drawings, and then particularly pointed out in the claims at the end of this description.

Referring to the drawings, which form a part of this specification, and in which like letters of reference are used to denote like parts of the apparatus, Figure 1 is a front elevation of an apparatus embodying my invention, and Fig. 2 is a plan illustrating the arrangement of the contact-springs and armature.

The working parts of the apparatus may be secured to a box or frame of any desired construction—such, for instance, as that denoted by the letter A in the drawings.

B B' denote electro-magnets attached to the box or frame A, and provided with an armature-lever C, which is common to both magnets and which may be pivotally supported

or suspended between them, so that it will be attracted and rocked upon its pivot when either magnet is energized. The longer arm of the armature-lever is provided with an extension or rod c , which carries a hammer or clapper c' , and a suitable gong or bell or a pair of gongs, as indicated in dotted lines, Fig. 1, may be arranged, one at either side of the clapper, so that when the latter is swung laterally by the vibrations of the armature the gongs will be struck in rapid succession. The shorter arm or reduced extension c^2 of the armature-lever, which may project through an elongated slot d , in a guide piece or plate D , secured to the frame, is placed between two contact springs or brushes $E E'$, attached to the box or frame on opposite sides of the armature and adapted to hold the latter normally in a central position between the magnets. The springs $E E'$ have a triple function. They serve to center the armature-lever between the magnets when no current is passing and aid in effecting the return stroke of the bell at each vibration of the armature, and they also serve as brushes or contacts for alternately making and breaking the electric circuit through the helices of the electro-magnets.

One wire of the battery is attached to the binding-screw F , from which a wire f leads directly to the armature-lever C . A wire g leads from the metallic spring E to the helices of the magnet B , and another wire h connects the latter with the binding-screw F' , to which is attached the other wire of the battery. The opposite metallic spring-plate E' is connected with the magnet B' by means of a wire g' , and from the latter magnet a wire h' leads to the binding-screw F' .

The operation of the apparatus will now be described. Supposing that the electric current enters the apparatus by the wire connecting with the binding-post F , it will flow directly to the armature through the wire f and thence by way of the metallic extension c^2 to one or both of the metallic springs or brushes $E E'$, thence to the helices of the magnets $B B'$ by way of the wires $g g'$, and thence through the wires $h h'$ and binding-post F' to the battery. The magnets will thus be simultaneously energized when the circuit is first closed, though not necessarily to the same extent, and the armature will be attracted by one of the magnets, so as to cause the clapper c' to strike the gong or bell. This movement of the armature will break the circuit through the active magnet by disengaging the spring-contact E or E' and cause the electric current to traverse the coils of the opposite magnet through the spring which remains in contact with the extension of the armature-lever, whereupon the latter magnet will be energized and attract the armature, so as to cause the clapper to strike the bell on the opposite side, and in this manner the current will be caused to flow alternately

from one magnet to the other with the least possible resistance, and, aided by the recoil of the springs pressing upon the extension c^2 , will produce a rapid vibration of the armature-lever, and thus effect a practically-continuous ringing of the bell. At the moment that the reversal of the current occurs, the magnetic attraction of the magnet just coming into action is least effective, and at this moment, as will be observed by reference to dotted lines in Fig. 2, the force of the spring E or E' is greatest, so as to compensate for the lack of magnetic energy, and thereby a uniform and rapid vibration of the armature is effected and the power of the magnet and springs is utilized to the best possible advantage. The movement of the extension c^2 of the armature-lever in frictional contact with the springs $E E'$ will also tend to polish the contacting metallic surfaces, and thus insure a perfect electrical contact between such parts.

I am aware that it has heretofore been proposed to provide a pressure and fluid-level indicator with two electro-magnets, between which is suspended by a steel-blade spring a contact-piece connected to one pole of a battery and having a hammer at its lower end and a contact-spring at each side, each connecting with one extremity of the coil of one of the magnets, the other extremities of the coil being connected to the other pole of the battery by the intervention of a magnetic needle so arranged that when deflected it will close the circuit through one only of the magnets (the circuit through the other magnet remaining open) and cause such magnet to attract the contact-piece and ring a bell at one side thereof, the return stroke of the hammer being effected by one of the contact-springs. I therefore make no claim to such an apparatus; but it will be observed that in my apparatus the pivoting of the armature-lever, the arrangement of the contacts, and the wiring are such that the circuits are normally closed through both magnets, which are adapted to be simultaneously excited on the initial movement of the current, so as to act first by their inequalities and then in alternation in attracting the armature-lever, so as to produce by magnetic action independent of the returning springs a rapid ringing of the bell or bells at each side of the hammer, the springs being auxiliary and adapted to assist at that instant of time when the force of the active magnet is least effective.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. In an electric bell-ringing apparatus, the combination, with two or more electro-magnets, of the armature-lever pivoted intermediate the ends thereof between said magnets and carrying a hammer at one end, the bell or bells arranged in proximity to said hammer, the contact-springs resting against op-

posite sides of the other arm or end of said armature-lever, and circuit connections, substantially as described, normally closed through said armature-lever and both of said magnets and contact springs, whereby a continuous bell-ringing action is produced by the reciprocal action of the magnets, substantially as set forth.

2. A continuous bell-ringing apparatus, comprising two or more electro-magnets, an armature-lever pivoted intermediate the ends thereof between said magnets, a hammer on the long arm of said lever, a suitable bell or bells arranged in proximity to said hammer, contact-springs resting against opposite sides of the short arm of said lever and tending to normally center the same between the magnets, and electric circuit connections normally closed through said armature-lever and both of said magnets and contact-springs, whereby a rapid vibratory movement of the lever may be produced by the reciprocal action of the magnets and springs, thus causing the hammer to strike opposite sides of the

bell or bells alternately in quick succession, substantially as described.

3. In combination with the electro-magnets, the rocking armature-lever pivotally supported intermediate the ends thereof between said magnets, a suitable hammer secured to the longer arm of said lever, the guide-plate having the elongated slot in which the short arm or extension of said lever works, the spring-plates secured in frictional contact with opposite sides of said extension, and suitable circuit connections through said magnets, armature-lever, and springs, whereby said springs will be automatically polished, so as to insure perfect electrical contact between the same and said armature-lever, substantially as set forth.

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

JAMES J. ROSS.

Witnesses:

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GEO. L. NADOLLECK.