(No Model.)

J. R. HARD.

ELECTRIC BELL.

No. 485,379. Patented Nov. 1, 1892.

Fig: 1.

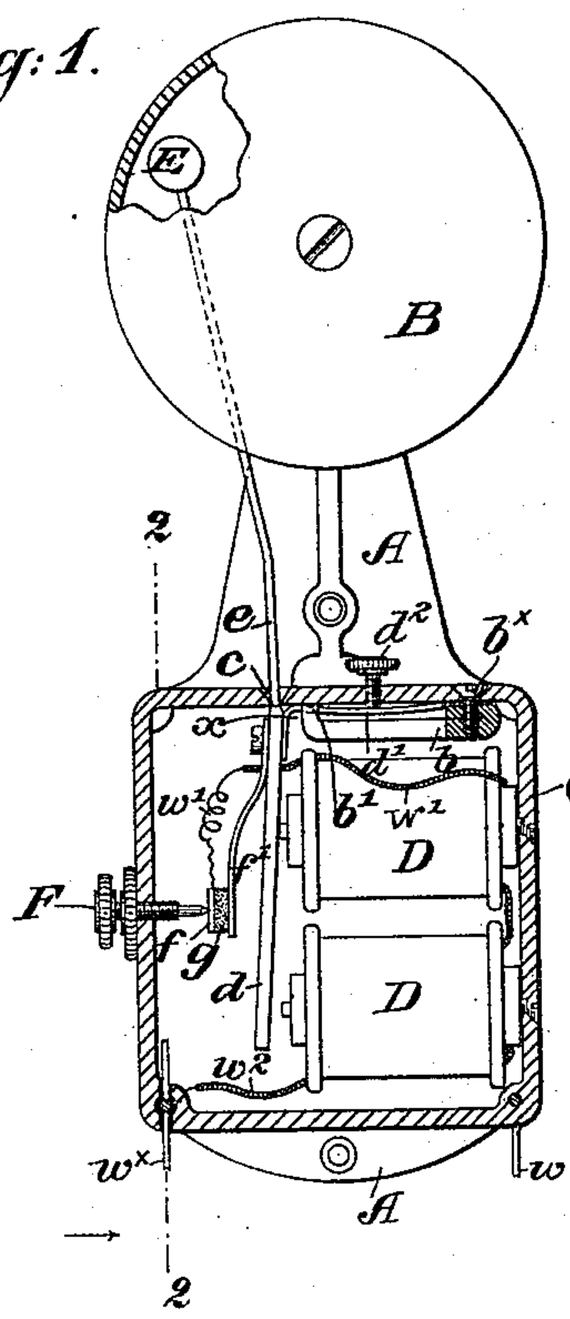


Fig: 2.

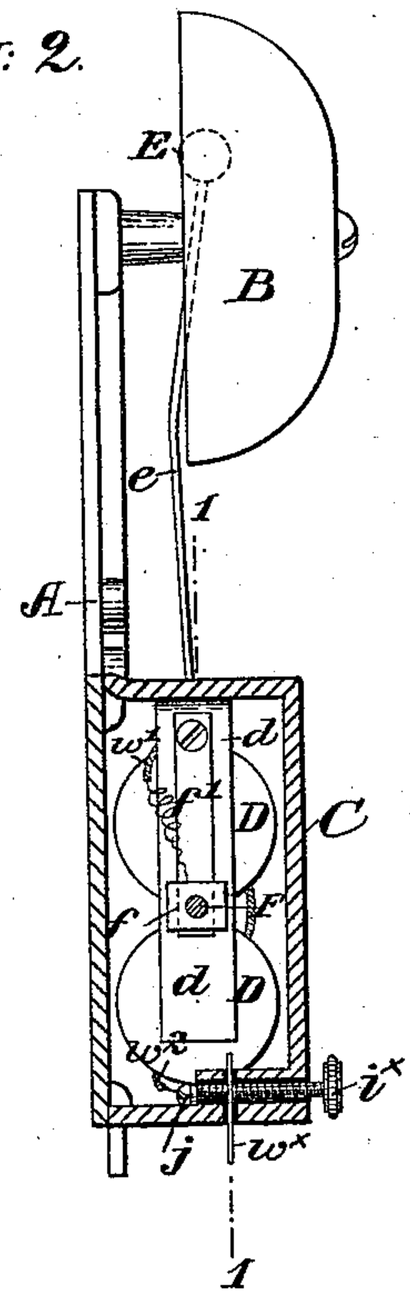


Fig: 3.

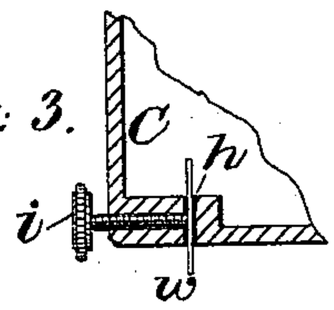


Fig: 4.

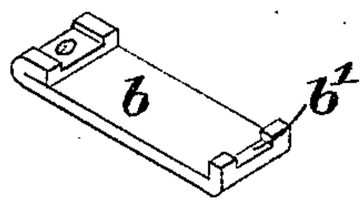
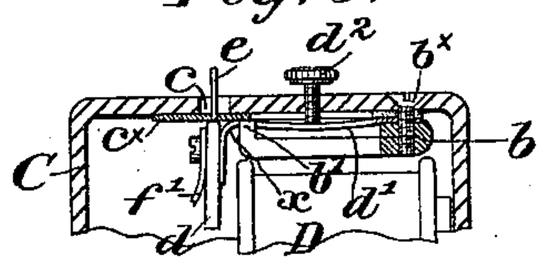


Fig: 5.



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UNITED STATES PATENT OFFICE.

JOHN RANDOLPH HARD, OF NEW YORK, N. Y.

ELECTRIC BELL.

SPECIFICATION forming part of Letters Patent No. 485,379, dated November 1, 1892.

Application filed June 7, 1892. Serial No. 435,817. (No model.)

To all whom it may concern:

Be it known that I, JOHN RANDOLPH HARD, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Electric Bells, of which the following is a specification.

My invention relates to the general class of electrically-actuated annunciators wherein the hammer is actuated through the vibration of the armature of an electro-magnet, the mechanism being inclosed in a dust-proof casing; and the object of the invention is in part to provide a novel means of excluding dust and insects from the casing; in part, to improve the mounting and spring-adjustment of the armature; in part, to provide a novel construction of the contact, whereby insulation of the adjustable contact from the casing is rendered unnecessary; in part, to effect an economy by providing a construction which does not require binding-posts, and in part to improve the general construction of the bell. My invention will be fully described hereinafter, and its novel features carefully defined in the claims.

In the accompanying drawings, which illustrate an electric bell embodying my improvements, Figure 1 is a front elevation of the bell with the inclosing casing in section on line 1 1 in Fig. 2. Fig. 2 is an edge or side elevation with the casing in vertical section on line 2 2 in Fig. 1. Figs. 3 and 4 illustrate details of construction which will be hereinafter described. Fig. 5 is a fragmentary view of the casing, showing a thin apertured plate where the hammer-arm passes out through the casing.

A represents the back plate of the bell, on which is mounted the gong B.

C is the casing which incloses the electro-magnet D, said casing being removably mounted on the back plate A. This casing incloses all the mechanism of the bell, except the gong and the hammer E, within a practically-dust-proof chamber, the aperture through which the hammer-arm *e* passes being closed by said arm with sufficient nicety to practically exclude dust and insects and mainly the latter.

I am well aware that it is not new to inclose the bell-magnet, &c., in a dust-proof casing, leaving the gong outside of said casing, and to provide an opening in said casing for the hammer-arm to pass through; but so far as I am aware the construction employed has been quite different from that I employ. To attain this object, I construct my bell as will now be described.

The armature *d* is not furnished with pivoted bearings at the point *x*, about which it vibrates, but is secured near this point to a thin spring or spring-plate *d'*, bent into an L shape, which is secured to the casing at its other end by a clamp-plate *b* and screw $b^{\times}$, the said plate *b* furnishing a keeper and bearing *b'* for the spring *d'*, near the point *x*, where the spring is bent. The screw d^2, which serves to regulate the tension of the spring *d'*, screws through the casing and bears on the latter at a point between the guide-bearing *b'* and the screw $b^{\times}$. By driving the screw d^2 in upon the spring this latter is flexed and the armature moved back from the poles of the magnet. The arrangement of the armature *d* with reference to the wall of the casing is such that the point *x* is quite close to the inner face of the said wall, and as the hammer-arm *e* is secured to the armature at this point *x*—that is, to the end of the armature which abuts against the casing—and passes at this point out through the aperture in the casing I am enabled to make this aperture, practically speaking, of the same diameter as that of the hammer-arm which passes through it, as the vibration of the arm at a point so close to the point *x* will not be material or of practical moment. At the free extremity of the arm, however, where the hammer E is situated, the vibration will be amplified by the length of the arm and will suffice for all purposes. The avoidance of pivots for the armature and the employment in lieu thereof of the bent spring *d'*, whereby the spring flexes at the bend in it when the armature vibrates, is also a factor in the operation of the hammer. This flexure of the spring at its bend imparts a measurable amount of endwise movement to the armature and the hammer-arm. This enables me to at-

tain a greater extent of useful movement of the hammer E than is due to the lateral vibration alone.

In order that the aperture *c* shall have about it very thin walls, and thus be enabled to fit the hammer-arm rather snugly and still allow it to vibrate properly, I thin down the metal about the hammer arm or stem, and this may be effected by enlarging or countersinking the aperture *c* in the casing from the outside, as seen in Fig. 1, which is the simplest way, or by forming a rather large aperture in the thick wall of the casing, as seen in Fig. 5, and applying over said aperture inside of the casing a thin plate $c^{\times}$, having in it an aperture of substantially the same size as the stem. The plate $c^{\times}$ will apply itself closely to the inner face of the wall of the casing and may be held in position by the clamp-plate *b*.

I prefer to make the contact-piece at the back of the armature adjustable and employ for this purpose, by preference, a screw F, which is in electrical contact with the metal casing C, which is in circuit with the circuit-wire *w*. One wire *w'* from the magnet-coil is connected electrically with a metal plate *f*, carried by a spring *f'* on the armature and insulated therefrom by a piece of insulating material *g*.

I prefer to make the contact-plate *f* of platinum in the usual way; but instead of securing it rigidly and directly to the spring *f'* and insulating the spring, as is commonly done, I insulate the plate from the spring and connect the wire *w'* directly with the plate. I find that this produces better results and enables the point of contact to be shifted to better advantage.

In bells as ordinarily constructed, where the connection between the wire of the circuit and the contact-spring on the armature is made at the point where the spring is fixed to the armature there is usually set up in the free end of said spring a rapid vibration which is independent of the armature vibration, and this vibration causes numerous unintentional breaks on the circuit, and consequent irregularity and sparking. My above-described construction obviates this by the control of the free end of the contact-spring *f'*, afforded by the attachment of the circuit-wire *w'* indirectly to the spring at or very near the contact-point, as seen in Fig. 1. This wire steadies the spring *f'* at its free end, and while it does not stand in the way of the proper movement of the spring it measurably retards it, and thus effectually prevents vibrations of said spring.

I connect the circuit-wires *w* and $w^{\times}$ to the bell without the aid of the usual binding-posts. The manner of connecting the wire *w* with the casing A is illustrated in the fragmentary sectional view, Fig. 3. The wire is simply inserted in a hole *h*, bored in the casing, and is secured in place by a binding-screw *i*. As it is necessary to insulate the wire $w^{\times}$ from the casing, the mode of binding it will be as illustrated in Fig. 2. The wire w^{2}, forming one terminal of the magnet-coil, is secured by a screw *j*, which screws through a plug of insulating material laterally into the hole through which the wire $w^{\times}$ is inserted, and the binding-screw $i^{\times}$ screws, also, through a similar plug, the wire $w^{\times}$ being clamped between the tips of the screws $i^{\times}$ and *j*. This wire passes, also, through a tube or plug of insulating material.

Having thus described my invention, I claim—

1. In an electric bell, the combination, with the casing, the magnet mounted therein, and the vibrating armature, of the armature-spring secured to the armature at one end and to a fixed part at its other end, the tension-regulating screw which bears on said spring, and a bearing for the spring, arranged between the point of attachment of the latter to the armature and the point where the tension-regulating screw bears thereon, substantially as set forth.

2. In an electric bell, the combination, with the metal casing, the magnet mounted therein, the vibrating armature, and the contact-spring carried by the latter, of the contact-plate mounted on said spring and insulated therefrom, the contact-piece on the casing, connected electrically with the latter, and the terminal wires of the magnet-coils, said wires being connected one to the casing, but insulated therefrom, and the other electrically with the said contact-plate near the contact-point, whereby said wire serves to measurably retard the spring and prevent undue vibrations in the same, as set forth.

3. In an electric bell, the combination, with the casing having a contact-piece in the circuit, the magnet mounted in the casing, its vibrating armature, and the spring *f'*, carried by the armature, of the metallic contact-plate *f*, mounted on the back of said spring near its free end and insulated therefrom, said plate being in and forming a part of the circuit, as set forth.

4. In an electric bell, the combination, with a casing having in it a small aperture with a thin margin for the passage of the hammer-arm, of the inclosed electro-magnet, its armature secured rigidly to one arm or branch of an L-shaped spring *d'*, the other arm or branch of which is secured to the casing, the said spring having its angle or bend, about which the armature vibrates, arranged closely adjacent to the said aperture in the casing, the said hammer-arm secured to the armature at the point where the latter approaches nearest to the aperture in the casing, whereby the arm is permitted to practically close said aperture and exclude insects and dust, and the hammer and gong, as set forth.

5. In an electric bell having in it an aperture for the passage of the hammer-arm and

a thin fixed plate $c^{\times}$, applied over said aperture, said plate having in it an aperture through which the hammer-arm loosely plays, of the inclosed electro-magnet, its armature secured rigidly to one branch of an L-shaped spring d', the other branch of which is fixed, the said spring having its angle or bend about which the armature vibrates arranged closely adjacent to the aperture in the plate $c^{\times}$, the said hammer-arm secured to the armature at the joint where the latter approaches nearest to the plate $c^{\times}$, the hammer, and the gong, all arranged to operate substantially as set forth.

6. In an electric bell, the combination, with a metal casing C, having in it holes to receive the terminals of the circuit-wires, of binding-screws set in said casing in position to bind the wires in said holes, as set forth.

7. The combination, with the metallic casing C, having a hole with an insulated lining to receive a circuit-wire, of the screws $i^{\times}$ and j, insulated from the casing and adapted to clamp the circuit-wire between their tips, as set forth.

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

JOHN RANDOLPH HARD.

Witnesses:
HENRY CONNETT,
J. D. CAPLINGER.