(No Model.)

J. F. McLAUGHLIN.

ELECTRIC TREMBLER BELL.

No. 406,294. Patented July 2, 1889.

Fig. 1.

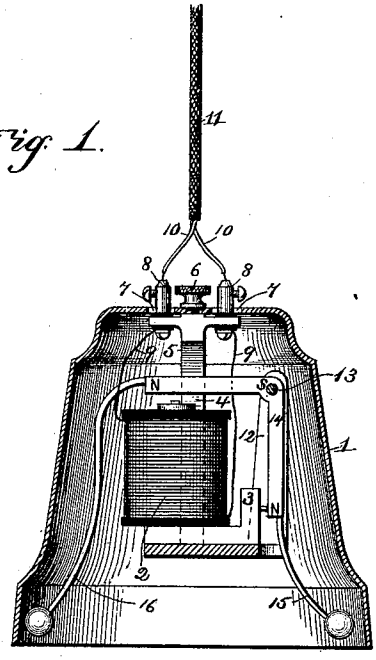
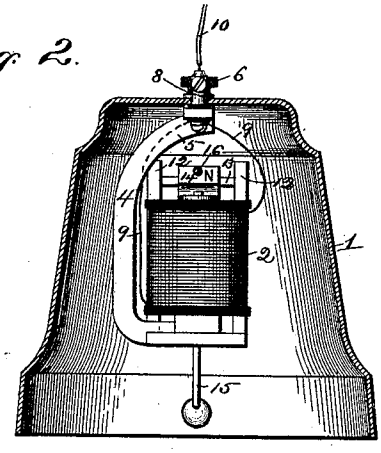


Fig. 2.



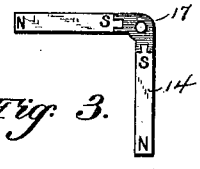


Fig. 3.

WITNESSES:

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ELECTRIC TREMBLER-BELL.

SPECIFICATION forming part of Letters Patent No. 406,294, dated July 2, 1889.

Application filed March 29, 1889. Serial No. 305,213. (No model.)

To all whom it may concern:

Be it known that I, JAMES F. McLAUGHLIN, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Electric Trembler-Bells, of which the following is a specification.

My invention has reference to electric bells in which an electro-magnet having a single energizing-coil is used, substantially in the manner shown in my patent, No. 393,998, granted December 4, 1888; and the object of my present invention is to adapt such electric bell for operation in response to alternating electric currents sent over the line by any of the generators of such currents in use in telephone and other calls.

The bell mechanism is made to respond to each of the alternating electric-current impulses, and the bell thus becomes what is technically known as a "trembler-bell," in which, however, the circuit is never broken, so that the circuit making and breaking contacts which are used in other trembler-bells are dispensed with, thus avoiding the use of platinum, and thereby reducing the cost of manufacture.

In carrying out my invention the electro-magnet is constructed substantially in the manner shown in my aforesaid patent, with two free active poles, and a bell-crank armature-lever carrying the bell hammer or hammers is polarized with like poles at its free ends, each in operative relation to one of the poles of the electro-magnet, so that each electrical impulse will cause one of the free ends of the bell-crank armature to be attracted and the other to be repelled, and since both the attraction and repulsion operate to turn the bell-crank armature in the same sense about its pivot one of the bell-hammers will strike a powerful blow to the bell. At the next succeeding electrical impulse this operation will be reversed—that is to say, the end of the bell-crank armature which at the preceding impulse had been attracted will now be repelled, and the one that had been repelled will now be attracted, and if two bell-hammers are used the bell will again be struck a powerful blow. I thus secure the double object of rendering my electric bell operative under the influence of alternating currents with the dispensation of platinum contacts, and also obtain twice the number of strokes upon the bell that is produced in the ordinary trembler-bell. In addition thereto and with the view of rendering the apparatus highly sensitive, so that it will respond readily to faint electrical impulses of very short duration, the core of the electro-magnet is made quite neutral, not being either connected with or in inductive proximity to an inducing-magnet, so that the electrical impulses passing through the coil will not be consumed in part in the depolarization of the core, as is the case in other bells of this character where said core is polarized by contact or by close proximity to an inducing permanent magnet.

My invention is applicable to a great variety of forms of bells, whether the same be supported upon a standard and placed upon a table or desk, or whether it be secured against the wall or mounted in any other suitable well-known manner. In the accompanying drawings, however, which form a part of this specification, I have shown my invention as applied to a bell which is suspended from the ceiling or otherwise; but it will be easily understood by those skilled in the art that my invention is by no means confined to bells thus suspended.

I have illustrated in Figure 1 a vertical sectional elevation of my improved trembler-bell; in Fig. 2 a like view with the section at right angles to that of Fig. 1; and in Fig. 3 a modified form of the bell-crank armature.

Like numerals of reference indicate like parts in the three figures of drawings.

Referring now more particularly to Figs. 1 and 2 there is shown within the bell 1 an electro-magnet 2, having a single coil and a neutral core with one of its polar terminals extended and turned up parallel with the coil of the magnet, as indicated at 3. This electro-magnet is mounted upon a bracket 4, which extends from the yoke of the electro-magnet, and is curved over the latter, as shown at 5, and is secured to the center of the

crown of the bell by a screw 6, or in any other suitable manner. On each side of the screw 6 there is a perforation 7, formed in the crown of the bell, and through the same pass the binding-posts 8 8 loosely, so as not to touch the body of the bell, and the same are secured to the upper laterally-extending end of the bracket 4, but are insulated from the latter, as indicated. From these binding-posts wires 9 9 lead to the terminals of the coil of the electro-magnet in the interior of the bell, and also to the line-wires 10 10 outside of the bell, which line-wires are preferably insulated, as indicated, are twisted together, and united in the flexible cable 11, as shown.

The core of the electro-magnet, in accordance with my invention, must be quite neutral so long as no current is passing through the coil, so that no part of the currents used for operating the bell will be consumed in the unprofitable work of depolarizing said core.

From this construction it will be seen that an electric impulse coming from the line will pass through the coil of the electro-magnet, and will produce a north pole at one free end of its core and a south pole at the other end of the same, while the next succeeding impulse, which is in the opposite direction from the preceding one, will reverse the polarities at the free ends of the core.

From the yoke of the electro-magnet rises a two-armed bracket 12, and to the upper ends of these two arms is pivoted by a trunnion 13 the bell-crank armature 14, with one of its free ends extending horizontally over the upper end of the core of the electro-magnet, and with its other arm extending vertically downward into operative relation to the upturned pole-piece 3 of the electro-magnet. This bell-crank armature is made of steel, and is polarized to have like poles at its free ends and a consequent pole in the middle.

In the drawings I have indicated the free ends of the bell-crank armature with north polarity, so that the consequent pole in the middle is a south pole.

From each end of the bell-crank armature extends a bell-hammer. One of these bell-hammers is marked 15 and the other 16, and the whole is so weighted and adjusted that there is a bias in favor of the vertical arm of the bell-crank armature, so that the latter is normally in an attracted position against the pole-extension 3, as shown, whereby the hammer 15 is brought to its greatest distance from the bell, while the hammer 16 almost touches, but not quite, the wall of the bell.

The operation of this trembler-bell will now be readily understood. Suppose that by the operation of a suitable signal-transmitting apparatus alternating electrical currents are sent over the line, and that the direction of the first of these impulses is such as to produce in the upper end of the core of the electro-magnet a north pole and in the extended pole-piece a south pole. The effect of this will be that the horizontal arm of the bell-crank armature will be repelled, while the vertical arm will be attracted; but since these arms are already in the repelled and attracted positions, respectively, they will there remain. The next succeeding electrical impulse will be in the opposite direction from the preceding one, and will produce a south pole in the upper end of the magnet-core and a north pole in the extended pole-piece 3, the effect of which will be to attract the horizontal arm of the armature, and to repel the vertical arm of the same, whereby the bell-hammer 15 will be moved to strike a powerful blow to the bell. The next succeeding impulse will reverse this operation, and the bell-hammer 16 will now strike a blow to the bell, and this operation will continue so long as alternating currents are coming from the line.

While I prefer to construct the bell-crank armature entirely of steel and polarized with a consequent pole in the middle, this construction is not absolutely essential, since I may construct this armature as shown in Fig. 3, where the horizontal and vertical arms of the armature are made permanent magnets polarized with their free ends to the same polarity, and joined by a central piece 17, of brass or other non-magnetic material.

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

1. An electric trembler-bell consisting, essentially, of a bell, a vibratory polarized armature having like poles in operative relation to each polar terminal of the neutral electro-magnet, and a bell hammer or hammers carried by the armature, substantially as described.

2. In an electric trembler-bell, the combination of a bell, an electro-magnet, a bell-crank polarized armature having like poles in operative relation to each polar terminal of the electro-magnet, and a bell hammer or hammers carried by the armature, substantially as described.

3. In an electric trembler-bell, the combination of a bell and electro-magnet supported within the same, having one of its poles extended and turned up parallel with the coil of the electro-magnet, with a polarized bell-crank armature having like poles at its free ends, with one of them extending horizontally in operative relation to the upper free end of the core of the electro-magnet, and the other arm extended vertically with its free end in operative relation to the extended upturned pole of the electro-magnet, and a bell hammer or hammers carried by the armature, substantially as described.

4. An electric trembler-bell consisting, es-

sentially, of a bell, a neutral electro-magnet, a polarized armature having a consequent pole in the middle, and its free poles in operative relation to the polar terminals of the electro-magnet, and a bell hammer or hammers carried by the armature, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES F. McLAUGHLIN.

Witnesses:

H. F. REARDON,

THOMAS H. HUNTER.