

(No Model.)

W. W. SLATER & H. C. BARNES.
BELL RINGING ATTACHMENT.

No. 461,718.

Patented Oct. 20, 1891.

FIG -1.

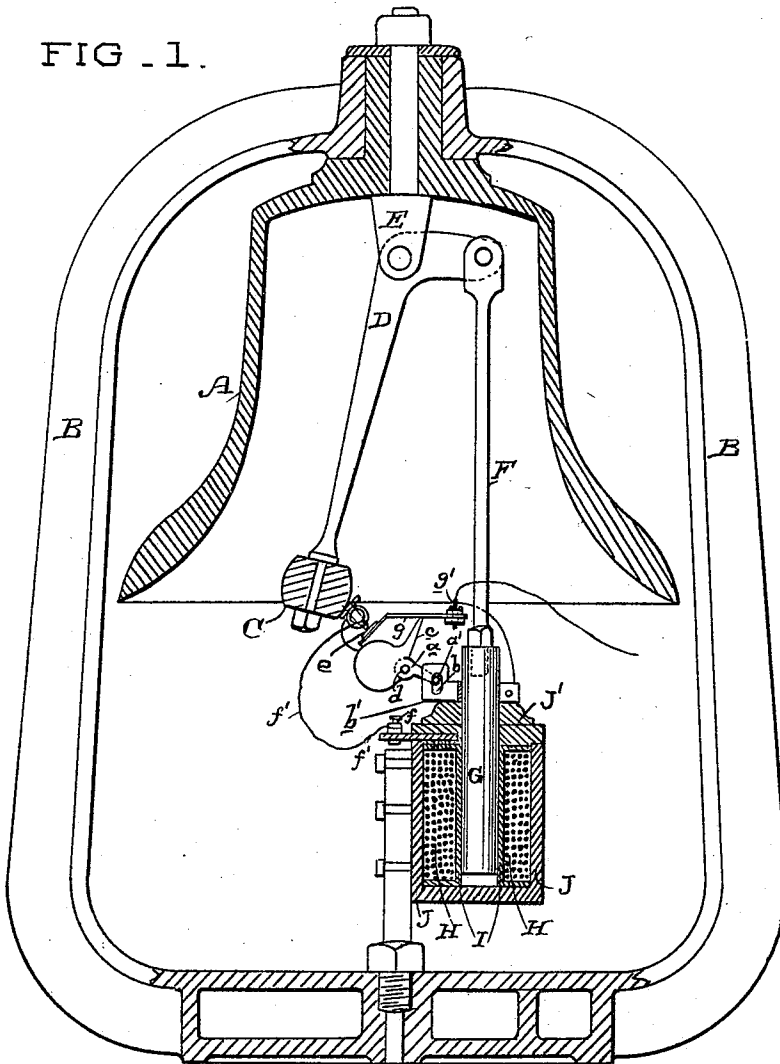
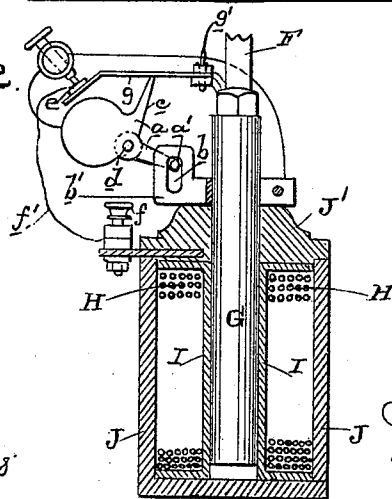


FIG. 2



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UNITED STATES PATENT OFFICE.

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BELL-RINGING ATTACHMENT.

SPECIFICATION forming part of Letters Patent No. 461,718, dated October 20, 1891.

Application filed May 12, 1891. Serial No. 392,488. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM W. SLATER and HARRY C. BARNES, citizens of the United States, residing at Oakland, Alameda county, State of California, have invented an Improvement in Electric Bell-Ringing Attachments; and we hereby declare the following to be a full, clear, and exact description of the same.

Our invention relates to an electric attachment for ringing bells at railroad-crossings or at other points where it is desirable to produce a signal or alarm; and it consists in the combination, with a stationary bell having a movable tongue or clapper, of a peculiarly-constructed electro-magnet, with a direct connection between the magnet and the movable tongue, and in certain details of construction which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a vertical section of a bell and the electric mechanism. Fig. 2 is an enlarged section of the electric mechanism.

The object of our present invention is to combine in an electro-magnet the advantageous points of an attracting-pole and a solenoid for the purpose of actuating the movable bell tongue or clapper, whereby a pull of sufficient length is produced with constantly-increasing strength to the end of the stroke and the tongue is made to strike the bell with great force just at the finish of the stroke.

A is the bell, properly supported in a bracket or standard B, having a tongue or clapper C fixed at the end of a bell-crank lever D, which is fulcrumed in the central bracket E, passing through the top of the bell and the supporting-bracket.

F is the rod by which the bell-tongue is actuated. This rod has its upper end connected with the short arm of the bell-crank lever which carries the bell-tongue and extends downward, being connected with the soft-iron core G. This core enters the corresponding longitudinal central opening of the electro-magnet.

The electro-magnet is formed by winding a sufficient quantity of insulated wire H around a non-magnetic metallic spool I, which we have made of copper or brass. Outside of the coil of insulated wire is an external casing J, of iron or magnetic material, surrounding the

whole device and extending across the lower end, which is closed thereby. The cap J', which covers the upper end, has a hole in the center of sufficient diameter to allow the core to pass freely through it. This core also acts as an armature. The surrounding iron casing conducts the lines of magnetic force due to the coil without deflecting them from their natural course, and the armature completes the magnetic circuit.

The operation will then be as follows: When the bell-tongue hangs suspended and uninfluenced from its supporting-bracket, it will be manifest that the armature will be correspondingly drawn out of the central space in the electro-magnet and at a considerable distance from the bottom thereof. As soon as connection is made so that the current flows through the coil of the electro-magnet the action of the latter will draw the core downward within the coil, and as it is drawn inward the bell-tongue is swung outwardly toward the side of the bell. It will be manifest that according to the operation of an electro-magnet ordinarily constructed without the exterior casing this core would be drawn into the coil until it reached the point where it would be balanced by the lines of attraction; but this would not be sufficient to cause the tongue to strike the bell, because the greatest attraction in such a device will be before the core has passed entirely through the coil, this attraction gradually diminishing until the core reaches a point where, as above described, it becomes balanced. It will be manifest, however, that the greatest power to act upon the swinging bell-tongue is necessary just before it reaches the side of the bell, because it has been swung farther from the perpendicular and its weight is relatively greater, offering an increased resistance to the pull of the core.

In our device the lower end of the core or armature will have reached a point where the direct attraction from the bottom of the casing, which is the attracting-pole, will be more appreciable, and under these conditions the nearer the armature approaches to the bottom of the casing the stronger the attraction will become until it reaches a point approximately in contact with the attracting-surface. This action will give an increasing velocity to the

swinging bell-tongue, and thus cause it to strike the side of the bell with great force and produce the strong tone which is necessary in such an apparatus.

5 The mechanism for completing and breaking the circuit through the electro-magnet consists of a lever *a*, fulcrumed at *d*, deriving its motion from arm *b'*, which is rigidly connected to the core *G*.

10 *c* is an arm of lever *a*, projected upwardly nearly at right angles with the lever *a*, and its upper end acts against an elastic plate *g*. This elastic plate is forced upward by the action of the lever-arm impinging against it.

15 It forms a contact with the point *e*.

a' is a pin or end of lever *a*, projecting through an eye-hole *b* in the arm *b'*, fitting loosely to a degree determined by the amount of motion which is required by core *G* before breaking contact.

20 In the present case we have shown the outer end of lever *a* weighted sufficiently to cause arm *c* to retain its position when holding elastic plate *g* in contact with the point *e* until the core has moved downward by an amount shown by the difference in the diameter of pin *a'* and eye-hole *b*. The lever *a* is not heavily weighted enough, however, to force *g* to a contact without the assistance of upward movement of the core. It will also be manifest that it might be operated by a spring and be equally efficient.

30 One of the wires *f'* of the circuit is connected through the binding-posts *f* of the electro-magnet with the point *e*, and the other wire *g'* connects with the elastic plate *g*, so that when the plate is brought in contact with the point *e* the circuit will be completed; but when it is moved away from the point by the downward movement of the core and the consequent rotation of the lever-arm *a c* the circuit will be broken, thus permitting the core to be drawn upward by the weight of the tongue or clapper, as previously described.

45 Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The combination, in a bell-ringing attachment, of a stationary bell, the swinging tongue thereof, an electric magnet, a casing of magnetic material surrounding the magnet and extending across and closing the lower end of the opening in the magnet, an armature or core fitted to move in the magnet, having its upper end connected with the swinging tongue of the bell, and a mechanism connected with the armature or core and movable therewith to alternately make and break

the connection between the electrodes and open and close the circuit, substantially as herein described. 60

2. The electro-magnet consisting of the coil wound upon the non-magnetic hollow spool and the exterior casing of magnetic material surrounding and inclosing the coil and extending across and closing the lower end of the opening therein, in combination with an armature moving freely within the coil, whereby it is first drawn into the coil by the action of the magnetic currents and the motion continued with increased power by the direct attraction of the lower end of the casing, a rod connecting said armature with a lever, a bell-tongue fixed to the opposite end of said lever, and a bell suspended with relation to the tongue so that the latter will strike the bell at the instant when the armature is drawn into contact with the lower end of the magnetic casing, substantially as herein described. 70 75 80

3. In a bell-ringing attachment, the stationary bell, the swinging clapper, the hollow electro-magnetic coil with external magnetic casing, and a core or armature reciprocating therein and connected directly with the swinging clapper, electrodes connected with the wires from the source of electrical supply, a spring-arm fixed to make or break connection between the electrodes, and an oscillating lever having one end connected with the reciprocating core and the other acting to force the spring-arm into contact with or allow it to withdraw from the electrode, substantially as herein described. 85 90 95

4. In a bell-ringing attachment, the stationary bell, the swinging clapper, the electro-magnetic coil with a core reciprocating therein and connected directly with the bell-clapper, an arm reciprocated by the movement of the core and having a hole in one end, a weighted lever having a pin at one end of smaller diameter than and engaging the hole in the arm, and a spring-arm connected with one of the electrodes of the electrical supply and so fixed with relation to the lever that the oscillation of the latter alternately forces it into contact with the other electrode and allows it to break the contact, substantially as herein described. 100 105 110

In witness whereof we have hereunto set our hands.

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HARRY C. BARNES.

Witnesses:

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