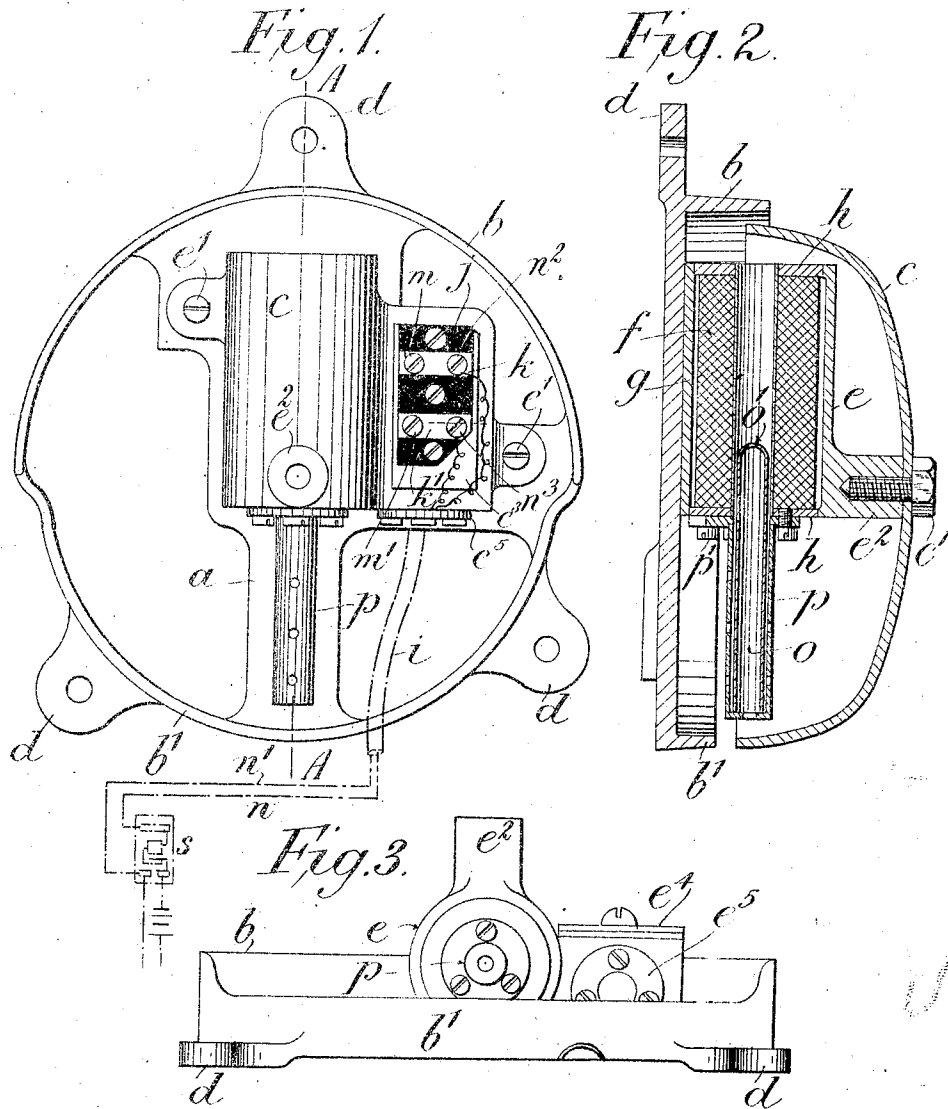


E. A. GRAHAM.
ELECTRIC BELL.
APPLICATION FILED FEB. 2, 1909.

937,594.

Patented Oct. 19, 1909.
3 SHEETS—SHEET 1.



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Fig. 4.

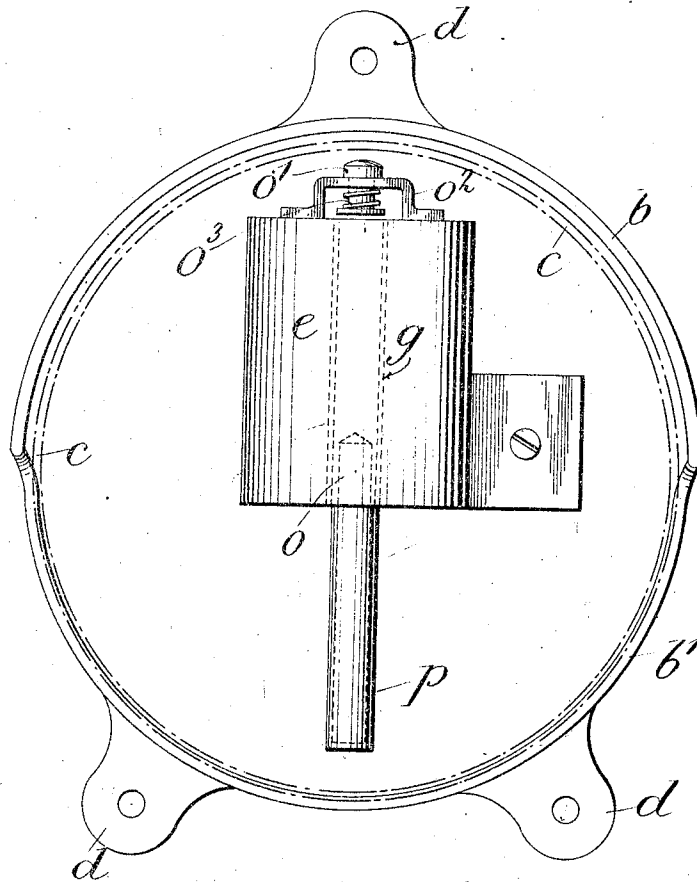


Fig. 5.



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3 SHEETS—SHEET 3

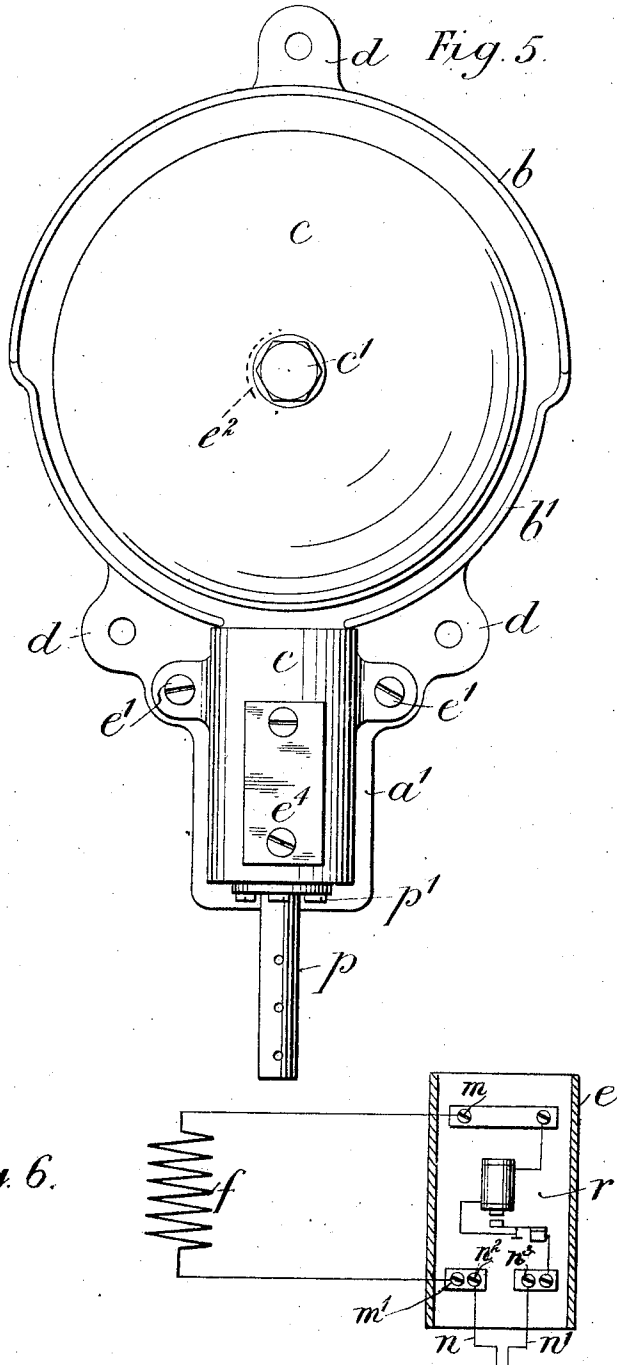


Fig. 6.

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UNITED STATES PATENT OFFICE.

EDWARD ALFRED GRAHAM, OF BROCKLEY, ENGLAND.

ELECTRIC BELL.

937,594.

Specification of Letters Patent.

Patented Oct. 19, 1909.

Application filed February 2, 1909. Serial No. 475,589.

To all whom it may concern:

Be it known that I, EDWARD ALFRED GRAHAM, a subject of the King of Great Britain and Ireland, residing at Brockley, in the county of London, England, have invented Improvements in or Relating to Electric Bells, of which the following is a specification.

This invention relates to electric bells of the kind in which the striking mechanism comprises a striker constituted as a movable magnetic element adapted to be directly influenced by the electro-magnetic element in such manner that the striking of the bell is effected by momentum of the magnetic element acquired upon excitation of the electro-magnetic element, and damping of the bell vibrations or rebound of the striker is prevented by the combined action on the striker of gravity and that of the electro-magnetic device aided or not by a spring.

The object of the present invention is to generally improve the construction of such a bell so that the electrical parts are completely protected against moisture and so that the parts which are exposed shall be unaffected thereby.

In the accompanying drawings, Figure 1 is a front elevation with parts removed, Fig. 2 a central vertical section on the line A A of Fig. 1, and Fig. 3 an underside view, of a single stroke bell. Figs. 4 and 5 are front elevations, showing modifications. Fig. 6 is a detail view, partly in section, showing a further modification. Fig. 7 is a cross section of a modified form of striker.

As shown in Figs. 1, 2 and 3, a skeleton frame *a* is employed having a rim the upper portion *b* of which is approximately semicylindrical and of an internal radius greater than the radius corresponding to the external diameter of the gong *c* so that the said gong is partially surrounded thereby, while the lower portion *b*¹ of the rim, also of approximately semicylindrical form, is of lesser width than the portion *b* but corresponds substantially in dimensions to the edge of the gong *c*. The frame *a* may be supported in any convenient way, lugs *d* being shown on the rim portions *b*, *b*¹ for this purpose. The gong *c* is carried by a casing *e* secured, as by screws *e*¹ to the frame *a*, the attachment of the gong *c* to the casing *e* being effected by a screw *e*² entering a lug or projection *e*³ on the casing. The casing *e* serves

to inclose a solenoid *f* which may conveniently be wound upon a tube *g* the ends of which are sweated into cheeks *h* themselves in turn sweated into correspondingly shaped openings in the top and bottom of the casing *e* so that the latter is at these parts watertight. The casing *e* also constitutes a terminal chamber *e*³ that is fitted with a watertight cover *e*⁴ and a watertight gland *e*⁵ to which for example a lead sheathed cable *i* passing therethrough can be soldered. The terminal chamber *e*³ contains a block *j* of insulating material to which are secured two metal terminal blocks *k*, *k*¹, the ends of the solenoid winding *f* being attached thereto by the screws *m*, *m*¹ respectively and the ends of the two conductors *n*, *n*¹ of the cable *i* similarly attached by the screws *n*², *n*³. The solenoid is provided with a combined solenoid core and gong striker *o* that may advantageously be made hollow with a rounded head *o*¹ and be sheathed, as by electro-deposition, with a metal that will not readily oxidize or become adversely affected by atmospheric action, such for example as copper; or, alternatively, be coated with an appropriate composition, such for example as vitrified enamel, or be otherwise treated so that there shall be no liability of the core sticking in the tube *g* by reason of rust or other deposit. To act as a support for the core striker *o* and maintain the same in the proper operative position relative to the solenoid *f* when the latter is deenergized, a flanged tube *p* of copper or similar metal may be attached by screws *p*¹ to the lower cheek *h*, the said tube having a perforated bottom and side to prevent air resistance to the movement of the core striker *o* and to permit any water which may inadvertently enter the tube to freely escape.

The position of the solenoid relatively to the gong *c*, and the proportionate length of the core *o* to the solenoid *f*, are so chosen, as shown, that the core, acting as the striker, acquires sufficient momentum on the energizing of the solenoid to strike the gong with full force and to be at once retracted to an intermediate position within the solenoid during the continuance of the flow of current, the action of gravity assisting the solenoid in returning the core to this intermediate position and finally returning the core to the initial position upon interruption of the current.

As a modification, the core *o* instead of di-

rectly striking the gong *c*, may, as shown in Fig. 4, be arranged to act against a striker head *o*¹ which is arranged to slide within a bearing *o*² and is maintained normally out of contact with the gong and seated upon its bearing *o*² by a spring *o*³, the arrangement being such that when the core *o*, after having acquired momentum, forces the head, against the influence of the spring *o*³, into contact with the gong, the spring assists the combined action of gravity and the solenoid in producing return movement of the striker.

As will be obvious, in lieu of arranging the parts within the gong as illustrated, the gong might be located to be struck exteriorly, as shown in Fig. 5, where the lug *e*² for the gong *c* is formed upon the frame *a* and the latter extended as at *a*¹ to support the casing *e*. Also, in either of such arrangements, any ordinary contact maker and breaker or circuit interrupter might be employed to convert the bell from a single stroke into a vibrating bell, the same being either inclosed, as shown at *r* in Fig. 6 in the water tight casing *e*, or in a separate casing as diagrammatically indicated at *s* in Fig. 1. As will also be obvious, the construction of the elements may be modified without departing from the scope of the invention, as for instance by forming the core *o* with longitudinal grooves, as shown in Fig. 7, for lightening the weight thereof.

What I claim is:—

1. An electric bell comprising a gong, a hollow electro-magnetic winding having its axis vertically arranged, a water tight casing inclosing the said winding exteriorly and interiorly, a non-corrodible striker vertically movable through the watertight casing and a perforated carrier for supporting the striker partly within and partly without the said casing.
2. An electric bell comprising a gong, a hollow electro-magnetic winding having its axis vertically arranged, a watertight casing inclosing the said winding exteriorly and interiorly, a hollow non-corrodible striker vertically movable through the watertight casing and a perforated carrier for supporting the striker partly within and partly without the said casing.
3. An electric bell comprising a gong, a solenoid having its axis vertically arranged, a casing inclosing the solenoid in a watertight manner and constituting a terminal chamber, a removable watertight cover for said chamber, a water tight gland through which the leads to the solenoid pass into the chamber, a striker vertically movable through the solenoid casing and a perforated carrier for supporting the striker partly within and partly without said casing.
4. An electric bell, comprising a gong, a solenoid having its axis vertically arranged, a tube extending through said solenoid, a

casing surrounding said winding, cheeks into which the tube is sweated and themselves sweated into the said casing, a magnetizable striker vertically movable through the said tube and a perforated tube alined with the latter tube in which the striker is normally supported.

5. An electric bell, comprising a gong, a solenoid having its axis vertically arranged, a tube extending through said solenoid, a casing surrounding said winding, cheeks into which the tube is sweated and themselves sweated into the said casing, a terminal chamber forming part of said casing, a watertight removable cover therefor, a watertight gland through which the leads to the solenoid pass into the chamber, a magnetizable striker vertically movable through the said tube and a perforated tube alined with the latter tube in which the striker is normally supported.

6. An electric bell comprising a gong, a solenoid having its axis vertically arranged, a casing inclosing the solenoid in a watertight manner and constituting a terminal chamber, a removable watertight cover for said chamber, a watertight gland through which the leads to the solenoid pass into the chamber, a circuit maker and breaker arranged in the circuit of said winding, a striker vertically movable through the solenoid casing and a perforated carrier for supporting the striker partly within and partly without said casing.

7. An electric bell, comprising a gong, a solenoid having its axis vertically arranged, a tube extending through said solenoid, a casing surrounding said winding, cheeks into which the tube is sweated and themselves sweated into the said casing, a connection box forming part of said casing, a watertight removable cover therefor, a watertight gland through which the leads to the solenoid pass into the connection box, a circuit maker and breaker and contact terminals in said box, a magnetizable striker vertically movable through the said tube and a perforated tube alined with the latter tube in which the striker is normally supported.

8. An electric bell comprising a gong, a solenoid having its axis vertically arranged, a tube extending through said solenoid, a casing surrounding said winding, cheeks into which the tube is secured in a watertight manner and themselves secured in a watertight manner to the said casing, a terminal chamber forming part of said casing, a watertight removable cover therefor, a watertight gland through which the leads to the solenoid pass into the chamber, a magnetizable striker vertically movable through the said tube, a perforated tube alined with the latter tube and in which the striker is normally supported, a frame carrying the casing of the solenoid and a lug on the cas-

ing arranged to carry the gong so that it conceals the whole of the foregoing parts and is struck by the striker on its inner periphery.

- 5 9. An electric bell, comprising a gong, a solenoid having its axis vertically arranged, a tube extending through said solenoid, a casing connected to said tube and inclosing said winding in a watertight manner, a connection box forming part of said casing, a water-tight removable cover therefor, a watertight gland through which the leads to the solenoid pass into the connection box, a circuit maker and breaker and contact terminals in said box, a magnetizable striker ver-
- 10
- 15

tically movable through said tube, a perforated tube aligned with the latter tube, in which the striker is normally supported, a frame carrying the casing of the solenoid and a lug on the casing carrying the gong so that it conceals the whole of the foregoing parts and is struck by the striker on its inner periphery.

Signed at St. Andrew's Works Crofton Park Brockley, London, this fifteenth day 25 of January 1909.

EDWARD ALFRED GRAHAM.

Witnesses:

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W. J. RICKETS.