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Patented June 4, 1901.

W. E. FOSTER.
ELECTRIC BELL MECHANISM.

(Application filed Dec. 8, 1899.)

(No Model.)

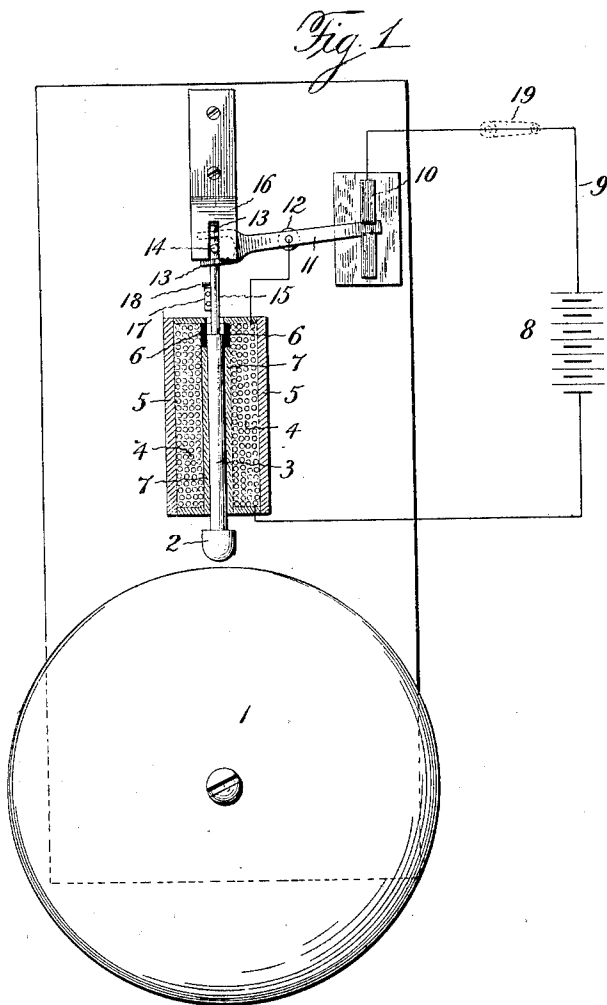
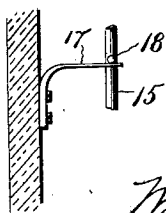


Fig. 2



Witnesses:
Jas. E. Hutchinson
C. W. Clement.

Inventor:
Walter E. Foster
By Watson & Watson
Attorneys

UNITED STATES PATENT OFFICE.

WALTER E. FOSTER, OF CARNEGIE, PENNSYLVANIA, ASSIGNOR TO THE
SARGENT AUTOMATIC RAILWAY SIGNAL COMPANY, OF ROCHESTER,
NEW YORK.

ELECTRIC-BELL MECHANISM.

SPECIFICATION forming part of Letters Patent No. 675,653, dated June 4, 1901.

Application filed December 8, 1899. Serial No. 739,631. (No model.)

To all whom it may concern:

Be it known that I, WALTER E. FOSTER, a citizen of the United States, residing at Carnegie, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Electric-Bell Mechanism, of which the following is a specification.

This invention comprises a solenoid of peculiar construction, a gong operated by the core of the solenoid, and an electric switch, also operated by said core.

The invention will be described in detail, reference being had to the accompanying drawings, in which—

Figure 1 is a front view of the apparatus, the solenoid-coil being shown in section; and Fig. 2 is a side view of the spring for sustaining the hammer normally out of contact with the gong.

Referring to the drawings, 1 indicates a gong or bell, of any suitable construction, and 2 the hammer with which the bell is struck. The hammer 2 is arranged upon the lower end of a reciprocating solenoid-core 3, which is vertically arranged within a coil 4. The coil 4 has its outer and inner walls and its ends surrounded by a layer of iron 5, which is formed by outer and inner tubes and suitable disks. The magnetic circuit formed by the covering 5 is complete, with the exception of a gap 6 at the upper end of the inner tube 7. This gap in the iron may be an air-gap or it may be filled with non-magnetic material. I prefer to use a ring or tube of brass forming a continuation of the tube 7 and upon which the coil may be wound. Any non-magnetic material may be used for this purpose. The core 3 is of such length that its upper end normally stands near the lower end of the magnetic gap 6. When current is passed through the coil, the core is raised until it bridges the magnetic gap, and when the circuit is broken the core drops and the hammer rings the bell or gong.

I have found a solenoid constructed as above described to be very efficient, operating with a minimum amount of current.

I have illustrated in diagram a battery 8 and a circuit 9 for operating the solenoid. The circuit 9 includes a switch comprising a

contact-plate 10 and a lever 11, which is pivoted at 12. The lever has a forked end 13, the tines of the fork being somewhat widely separated. Between the tines of the fork is a pin 14, which is attached to a stem 15, extending upwardly from the core 3. The pin 14 is guided in a guideway in a plate 16. It is necessary that the hammer after striking the gong should be immediately raised therefrom and held out of contact therewith to permit the gong to vibrate freely. To accomplish this, I place a suitable spring 17 in the path of a pin 18, which, as shown, is connected to the stem 15.

My improved gong is especially designed for use as an alarm for railway-crossings; but it may be used for any other purposes requiring an efficient and reliable sounding device. The solenoid having a magnetic gap arranged as described may also be used for other purposes. For railway purposes the circuit will be closed automatically upon the approach of a train; but for the purpose of illustration I have simply shown a hand-switch 19 in the circuit 9.

The operation is as follows: When the circuit 9 is closed, the core 3 is immediately drawn up, and as it reaches its upper position it throws the lever 11 out of contact with the plate 10. This breaks the circuit, and the core and hammer fall by their own weight upon the bell. In falling the lever 11 is again thrown into contact with the plate 10, and the circuit passes through the solenoid, immediately raising the hammer for the succeeding stroke. By using the wide fork 13 the switch-lever is given a very small movement and the core is free to fall through a considerable distance and acquire a considerable velocity before it engages the lever. Furthermore, the current is permitted to pass through the coil during the entire upstroke of the hammer, as the switch is not thrown until the hammer reaches the upper limit of its stroke.

I have found that an electric gong constructed as above described will ring as loudly with a weak current as with a strong current, the only difference being that with a strong current the strokes will be struck more rapidly. In either case the hammer will be raised to its full extent until the switch is opened,

and the stroke will be delivered by the force of gravity, which is always uniform.

I am aware that prior to my invention it has been proposed to employ a solenoid for the purpose of moving a bell-hammer in a direction away from the surface to be struck, the hammer being forced in the opposite direction against such striking-surface by means of a spring which was compressed by the withdrawal of the hammer under the influence of the current passing through the solenoid, and I do not wish to be understood as intending to include such a construction in my claims. With bell-ringing apparatus of this class, in which the force of the blow depends upon the amount of compression of the spring, it will be seen that variations in the strength of the current will necessarily cause a variation in the strength or volume of the sound—that is, as the current becomes weaker the solenoid-core will not be withdrawn as far as by a current of maximum strength, and therefore the spring by which the hammer is impelled against the bell will not be fully compressed, and as the force of the blow delivered by the hammer must depend upon the extent to which the spring is compressed it will be seen that, as stated above, variations in the current will cause variations in the volume of the tone. By my construction, however, the stroke or blow delivered by the hammer against the bell is always uniform regardless of the strength of the current by which the solenoid is actuated. This, as will be apparent, is of the utmost importance in alarm-bells for use at railway-crossings and similar places. By my construction the alarm no matter how the current may vary in strength will be always audible at a certain distance from its location, whereas with devices of the class heretofore proposed, and which are above referred to, employing springs for impelling the bell-ham-

mers, it will be impossible to hear the alarm at as great a distance from the place of its location when the current is weakened as when the current is of maximum strength.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an electric-bell mechanism, the combination of a gong, a solenoid adjacent to the gong, a hammer adapted to be moved away from the gong by the solenoid and to fall, by gravity, against the gong, means supplemental to the solenoid for moving the hammer out of contact with the gong after each stroke, an electric circuit including the solenoid, and a switch in said circuit operated by the hammer.

2. In an electric-bell mechanism, the combination of a gong, a solenoid, a gravity-hammer adapted to be moved away from the gong by the solenoid, a spring-arm engaging with the hammer to lift it slightly from contact with the gong after each stroke, an electric circuit including the solenoid, and a switch in said circuit operated by the hammer.

3. In an electric-bell mechanism, the combination of a gong, a hammer adapted to fall by gravity against the gong, a solenoid for moving the hammer away from the gong, a spring-arm having one end secured to a stationary support between the gong and solenoid and having its free end extending into the path of a stud on the hammer-stem, whereby the hammer will be lifted from, and normally held out of contact with the gong, an electric circuit including the solenoid, and a switch in said circuit.

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

WALTER E. FOSTER.

Witnesses:

L. C. HARTLEY,
R. L. SEARS.