

(No Model.)

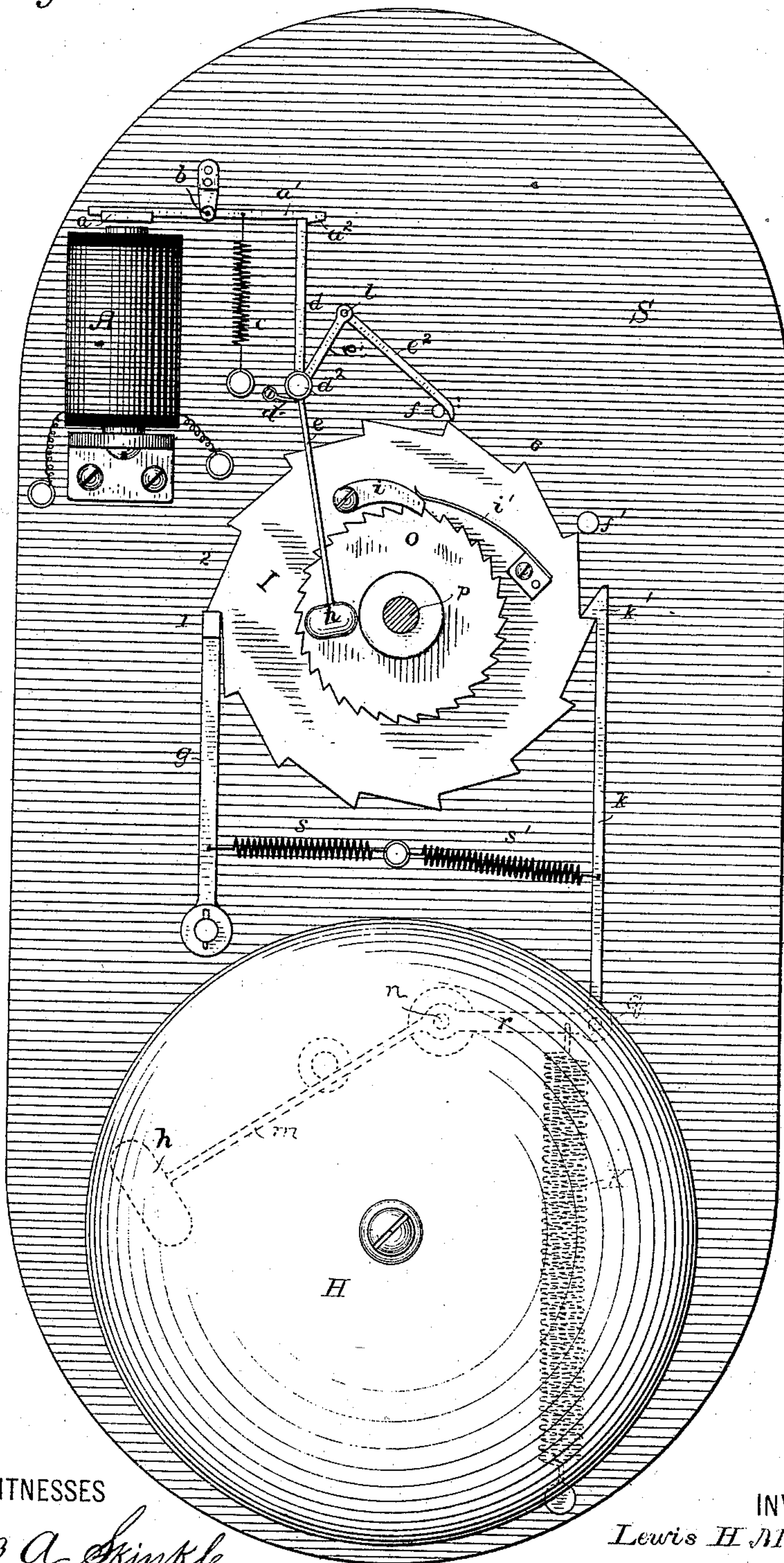
L. H. McCULLOUGH.

ELECTRO MECHANICAL GONG STRIKER.

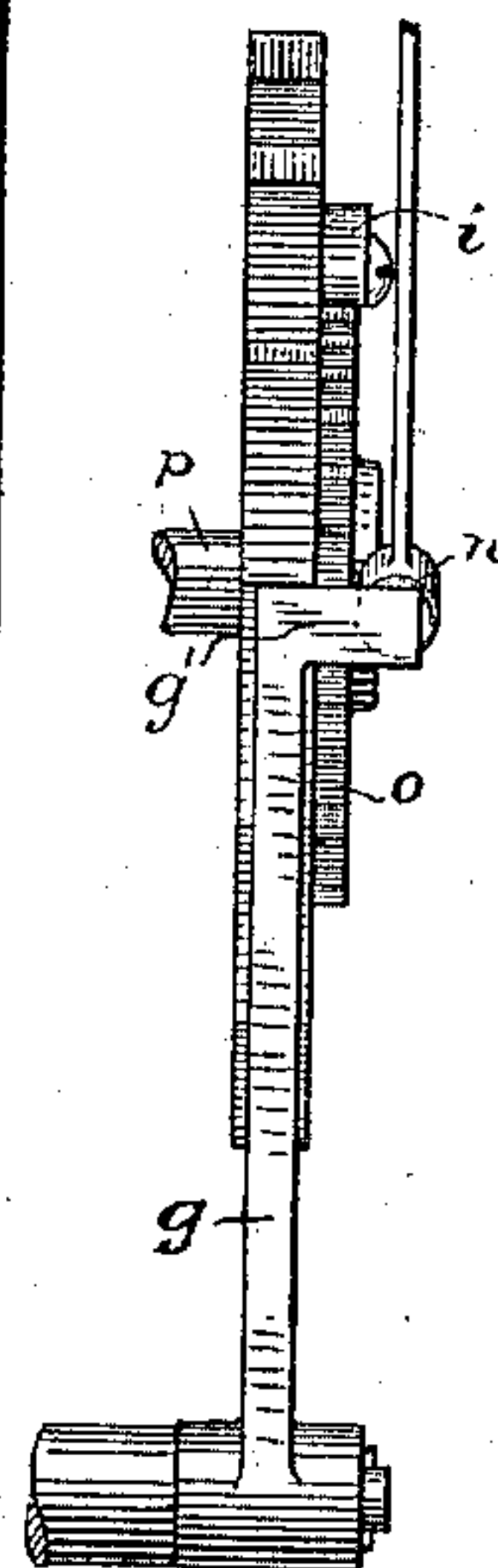
No. 316,476.

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*Fig. 1.*



*Fig. 2.*



WITNESSES

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# UNITED STATES PATENT OFFICE.

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## ELECTRO-MECHANICAL GONG-STRIKER.

SPECIFICATION forming part of Letters Patent No. 316,476, dated April 28, 1885.

Application filed August 5, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, LEWIS H. McCULLOUGH, a citizen of the United States, residing at Richmond, in the county of Wayne and State of Indiana, have invented certain new and useful Improvements in Electro-Mechanical Gong-Strikers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to apparatus for sounding alarm or other signals in which the sounding apparatus acts in response to electric impulses.

In the particular embodiment of apparatus which I here disclose the electric impulses, by energizing an electric magnet, cause an armature-lever to move so as to release a spring-actuated arm which carries a hammer. This hammer strikes the retaining-pawl of a spring-actuated ratchet-wheel out of engagement with the same, and thereby leaves it free to rotate under the influence of its driving-spring, except so far as it is restrained by a second or retractile pawl and its attached retractile spring, which acts against the force of the driving-spring. The latter, however, being stronger, gradually overpowers the former, and carries the retractile pawl along with it until it is forced out of engagement by a pin. The retractile spring then quickly withdraws the pawl, and by means of a hammer, which it also actuates, strikes a heavy blow on a gong. The releasing-hammer is meanwhile carried back into position for another blow by the movement of the ratchet-wheel, and both pawls are in their original position. The object attained by this construction is that it enables me to strike heavy blows on a gong by the use of feeble electric currents—that is, with little expenditure of battery-power.

In the drawings which accompany and form a part of this specification, Figure 1 is a front elevation of my improved gong apparatus and its supporting-frame; and Fig. 2 is a side view of the retaining-pawl of the ratchet mechanism, other details being shown incidentally.

A is the electro-magnet, and  $a$  its armature,

attached to the armature-lever  $a'$ . The armature-lever is pivoted at  $b$ , and is normally held by the spring  $c$ , so that the armature shall be away from the core of the magnet. A hook,  $a^2$ , on the end of the armature-lever, catches over the end of an arm,  $d$ , which is attached to the shaft  $d^2$ . On the same shaft are arms  $e$  and  $e'$ , the former carrying the hammer  $h$ , and the latter having loosely pivoted to it a second arm,  $e^2$ . A spring,  $d'$ , attached to the shaft  $d^2$  and to the frame  $S$ , tends to rotate the shaft in the direction of the arrow. The ratchet-wheel  $I$  is actuated by clock-work in a manner well understood,  $g$  and  $k$  being its pawls,  $o$  being a ratchet made fast to the driving-shaft  $p$ ,  $i$  and  $i'$  being the usual dog and locking-spring, and the driving-spring (not shown) being attached in the usual way—one end to the shaft and one to the frame. The pawls  $g$  and  $k$  are held to their work by the springs  $s$  and  $s'$ , respectively. The pawl-arm  $k$  is jointed at  $q$  to an arm,  $r$ , pivoted at  $n$ , and another arm,  $m$ , carrying a bell-hammer, is rigidly secured to the arm  $r$ . A heavy spring,  $K$ , is attached to the frame and to the joint of the arms  $r$  and  $k$ . A pin,  $f'$ , attached to the frame, acts to throw off the end of the pawl  $k$ , as will be described hereinafter.

The operation of the parts above described is as follows, it being understood that the apparatus is designed especially to be located in an engine-house, and that its releasing-magnet  $A$  will usually form part of a fire or district telegraph circuit. When the current passes, in response to the closing of the circuit at one of the signal-boxes in the circuit, the armature  $a$  is attracted, and the armature end of the lever  $a'$  is drawn down. The hook on the outer end of the armature-lever is drawn away from the end of the arm  $d$ , and the spring  $d'$  will cause the shaft  $d^2$  to turn, moving with it the arms  $d$  and  $e$ , and also the arm  $e$ , with its attached arm  $e^2$ . This motion causes the hammer  $h$  on the end of the arm  $e$  to strike against the end  $g'$  of the retaining-pawl  $g$ , and jar or shock it out of engagement with the teeth of the ratchet-wheel  $I$ . The ratchet-wheel would now be free to rotate under the influence of its driving-spring were it



not for the retractile spring K, acting against it through the pawl *k*. The spring K is somewhat weaker than the driving-spring, and is gradually overpowered thereby, the ratchet-wheel I rotating slowly and drawing the pawl *k* along with it. The end *k'* of the pawl *k* has an inclined face, as shown, and when the ratchet-wheel has advanced far enough so that its next tooth, as 2, rests on the end of the pawl *g*, this inclined face has ridden far enough on the pin *f'* to cause the pawl *k* to pass out of engagement with the ratchet-wheel and be left entirely under the influence of the spring K.

In drawing the pawl *k* back into engagement with the next tooth of the ratchet-wheel I, the spring K actuates at the same time the bell-hammer *h'*, causing it to strike once on the gong H. The pawls *g* and *k* are now in the position which they occupied before the mechanism was operated, and the other operative parts have also been restored in a manner which I will now describe. The end of the arm *e*<sup>2</sup> is thrown into one of the notches, as 6, of the ratchet-wheel I at the same time that the hammer *h* is thrown against the end of the pawl *g*. The ratchet-wheel I, however, in its advance after being released, moves forward the arm *e*<sup>2</sup>, and with it the arms *e'* and *d*. It thus pushes the arm *d* back into engagement with the hook *a*<sup>2</sup> on the armature-lever *a'*, and also restores the hammer H to its original position. Just before the next notch, as 2, comes to rest on the pawl *g* the end of the arm *e*<sup>2</sup> is forced out of its notch, as 6, by the stop *f*, as shown. The armature-lever is restored by the spring *c* as soon as the circuit of the magnet A is broken.

It is evident that every time the circuit of magnet A is closed a blow will be struck on the gong H, and that by closing the circuit a definite number of times an operator can sound a definite signal on the gong. The same thing can be accomplished automatically by releasing a circuit-closer which is adapted to close and open the circuit a definite number of times. Such circuit-closers are well known in fire-telegraph systems, in which my improved gong is especially designed to be used.

In practice, one of my gongs is placed in every engine-house, and announces to the attendants, in the manner above set forth, the number of the precinct from which an alarm has been rung in.

With little battery-power I can release a very heavy driving-spring, as the armature-lever merely holds the releasing-spring *d'*, which, acting as it does by percussion, may be comparatively weak and so exert little restraining force on the armature-lever. The spring K may also be very heavy and adapted to strike a heavy blow on the gong H. The arm *d* may be released by the breaking of the circuit through A as well as by its closure.

Having thus fully described my invention, what I claim is—

1. The combination, with a spring-actuated ratchet, a pawl for retaining the same, a spring-actuated hammer for removing the pawl, and an electro-magnet for releasing the hammer, of independently-driven gong-striking mechanism connected to the ratchet, and means, made operative by the movement of the ratchet, for releasing the said mechanism, substantially as set forth.

2. The combination, with a spring-actuated ratchet, a pawl for retaining the same, a spring-actuated hammer for removing the pawl, and means for releasing the hammer, of an actuating-spring for a gong-hammer, a pawl connecting the same with the ratchet, and means, made operative by the movement of the ratchet, for removing the said pawl, whereby the spring for the gong-hammer will be released to strike a blow, substantially as set forth.

3. In combination with a spring-actuated ratchet-wheel, a retaining-pawl therefor, and a hammer for removing the same by percussion, a spring detachably connected to the ratchet-wheel, so as to act against its driving-spring, and thereby cause the ratchet-wheel to move against its retaining-pawl after release without shock or jar.

4. In combination with a spring-actuated ratchet-wheel, a pawl for retaining the same, and means for removing the pawl, a second pawl for the same ratchet, connected to a retractile spring, and means made operative by the movement of the ratchet for removing the said pawl, and a gong-hammer, also connected to the said spring, substantially as described, whereby the ratchet-wheel is caused to move against its retaining-pawl after release without shock, and the hammer is operated.

5. The shaft *d*<sup>2</sup>, spring *d'*, arms *d*, *e*, and *e'*, pivoted arm *e*<sup>2</sup>, pin *f*, and catch or hook *a*<sup>2</sup>, in combination with the ratchet-wheel I and pawl *g*, whereby on the rotation of the ratchet-wheel after the release of the shaft *d*<sup>2</sup>, and the consequent release of the ratchet-wheel, the parts are restored to operative position, as set forth.

6. In combination with an electro-magnet, its armature-lever, and a catch or hook thereon, the shaft *d*<sup>2</sup>, spring *d'*, arms *d*, *e*, and *e'*, pivoted arm *e*<sup>2</sup>, and pin *f*, in combination with the ratchet-wheel I and pawl *g*, whereby on the passage of an electric current the shaft *d*<sup>2</sup> and ratchet-wheel I are released, and after release are restored to operative position, as set forth.

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

LEWIS H. McCULLOUGH.

Witnesses:

WM. M. STOCKBRIDGE,  
WARREN C. STONE.