(No Model.) 2 Sheets—Sheet 1.

F. W. COLE.

ELECTRO MECHANICAL GONG.

No. 452,931. Patented May 26, 1891.

Fig. 1

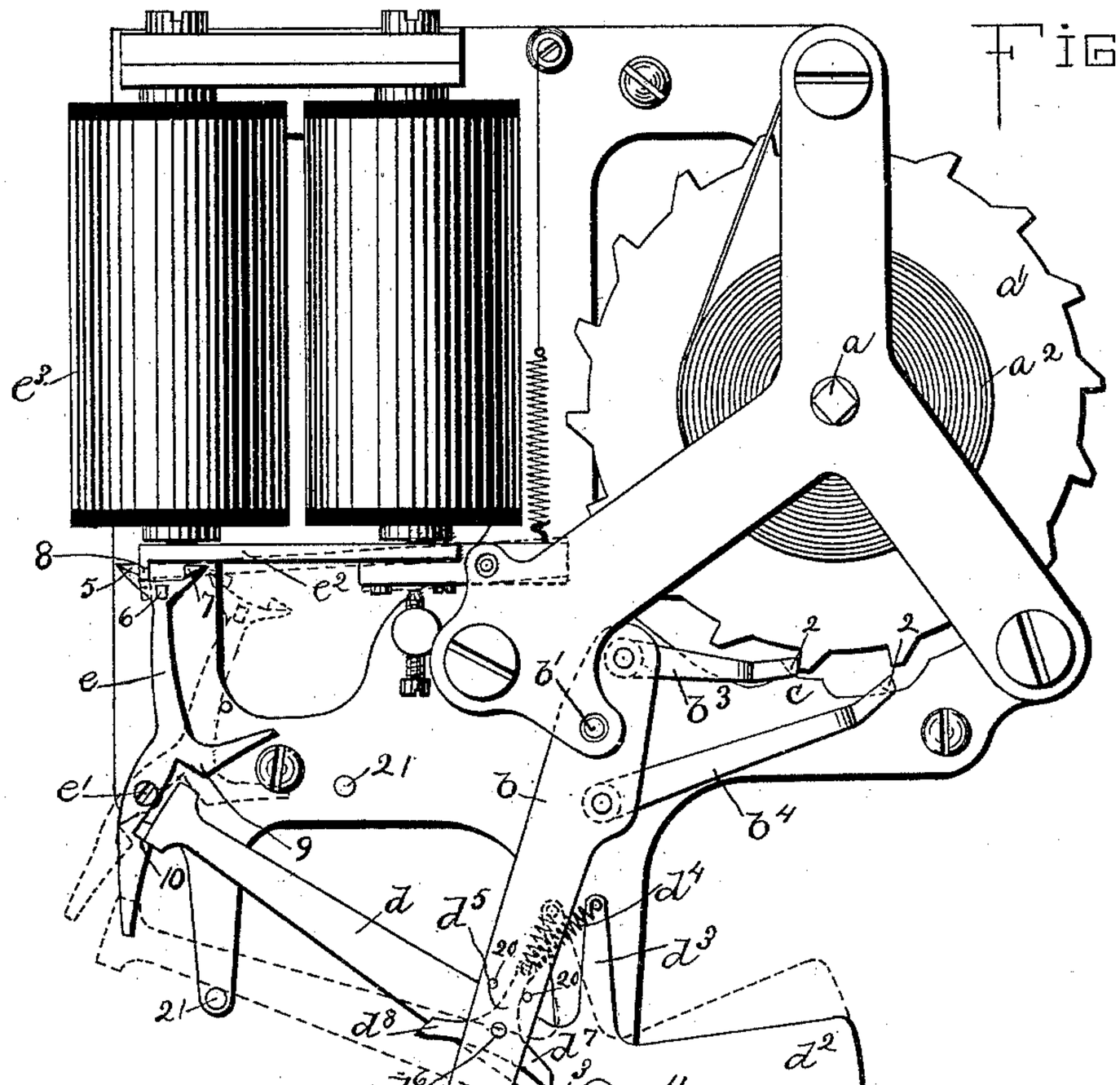


Fig. 3

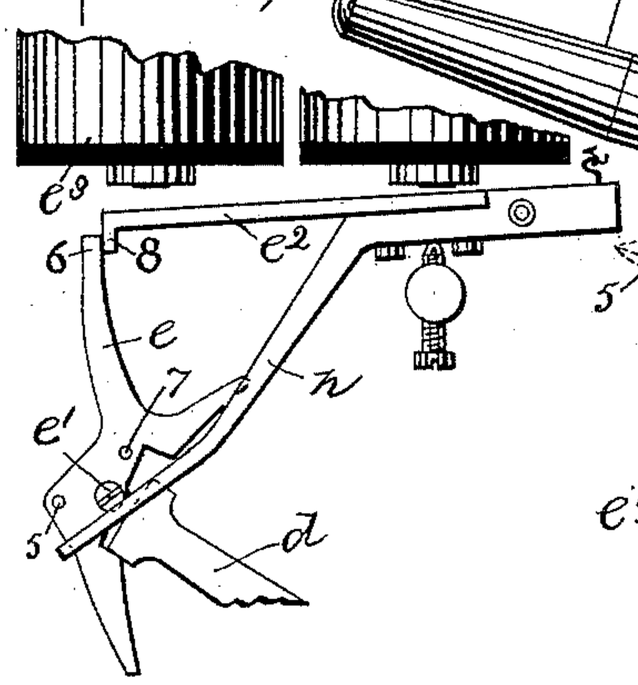


Fig. 2

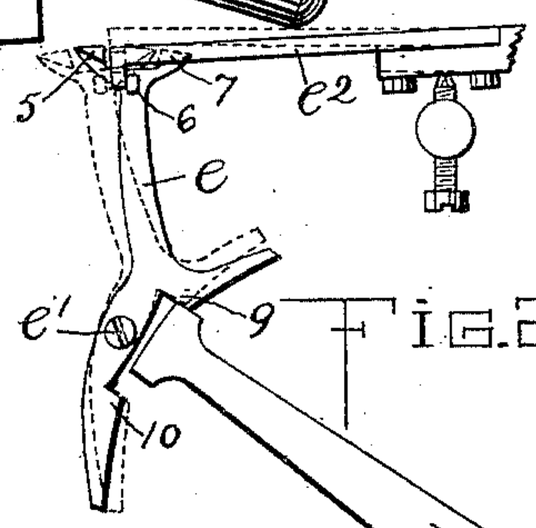
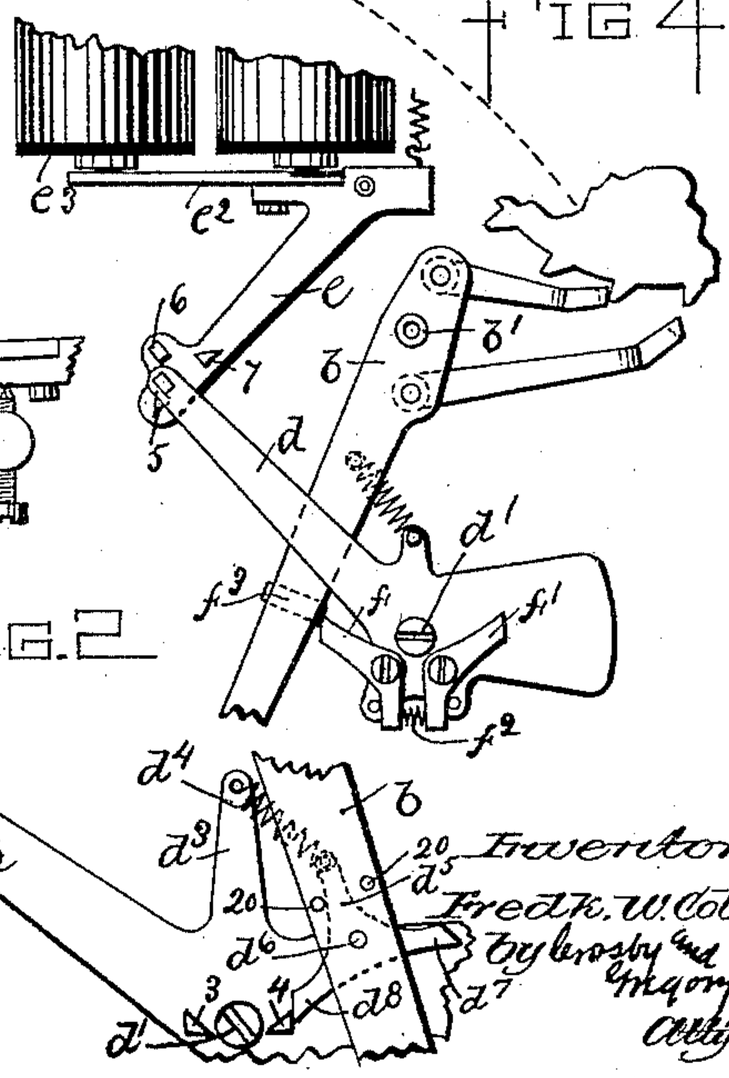


Fig. 4



Witnesses.
Jas H. Churchill
Frederick L. Emery

Inventor:
Fred K. W. Cole
by Crosby and Gregory
Attys

(No Model.)

2 Sheets—Sheet 2.

F. W. COLE.

ELECTRO MECHANICAL GONG.

No. 452,931. Patented May 26, 1891.

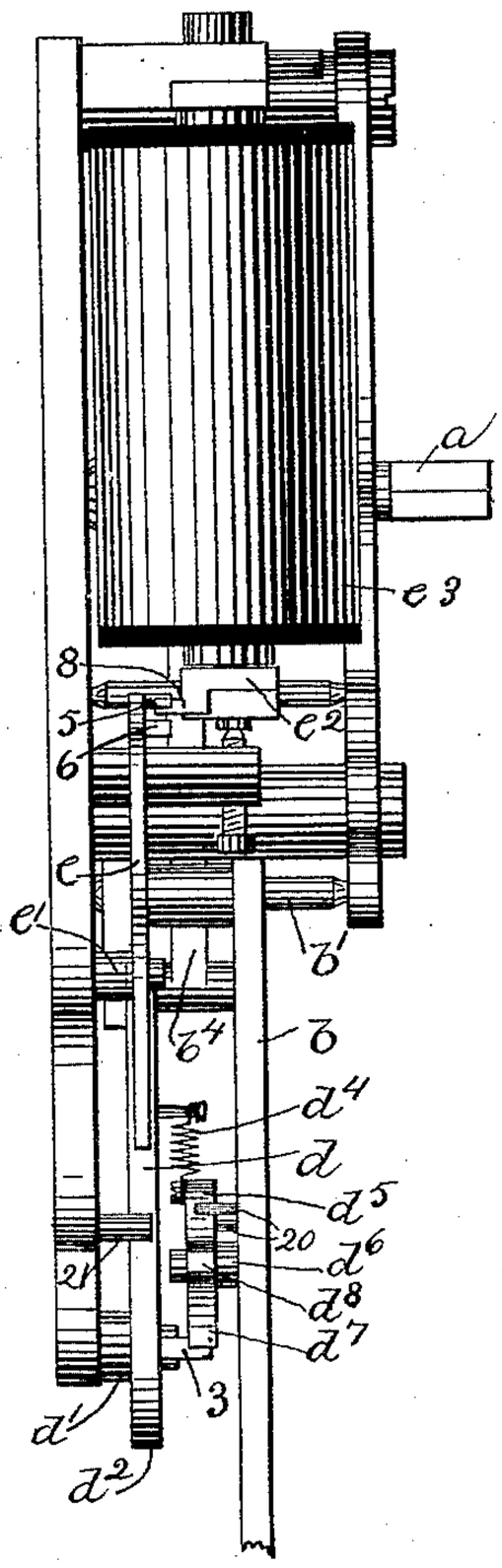


Fig. 6

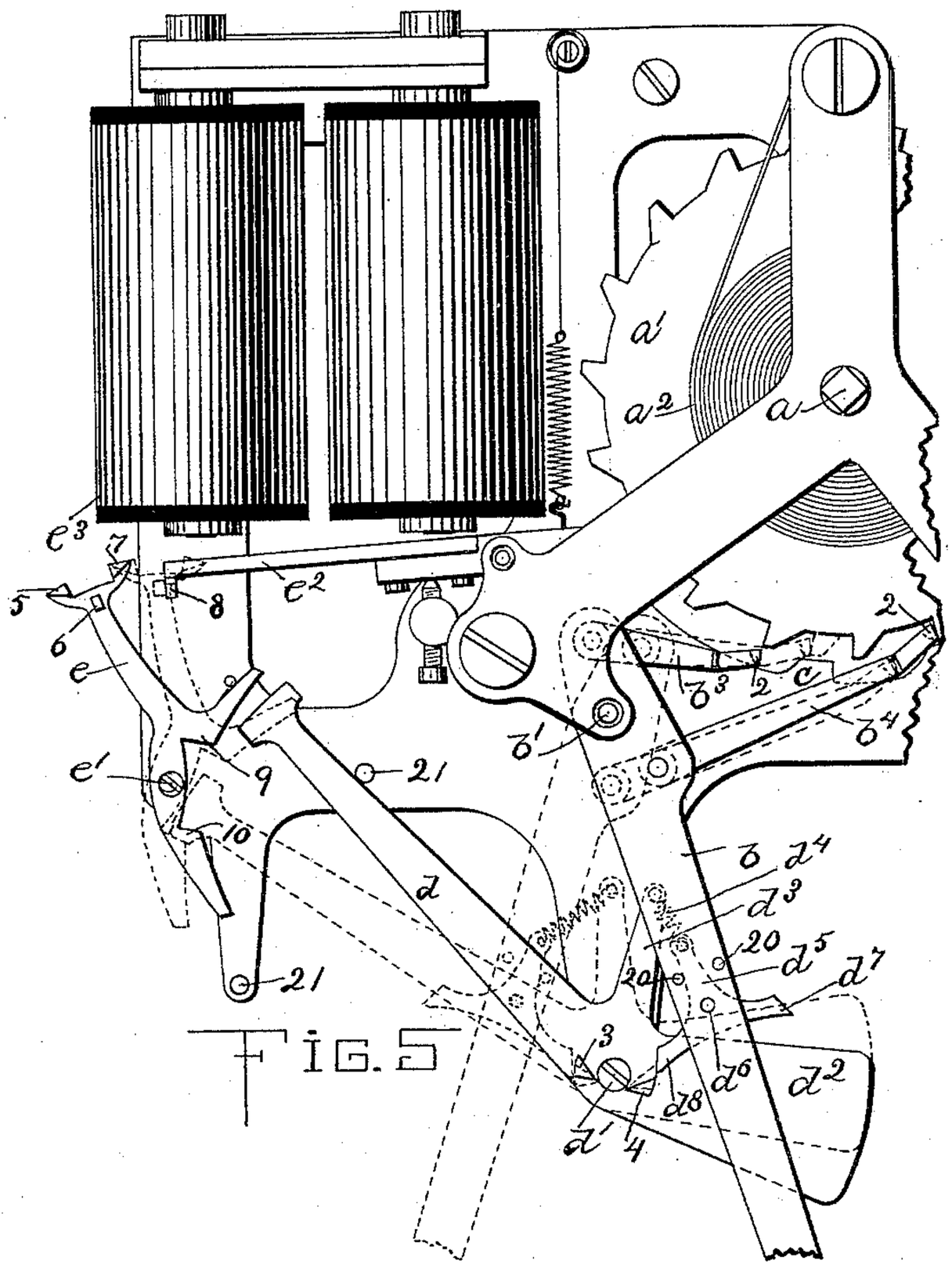
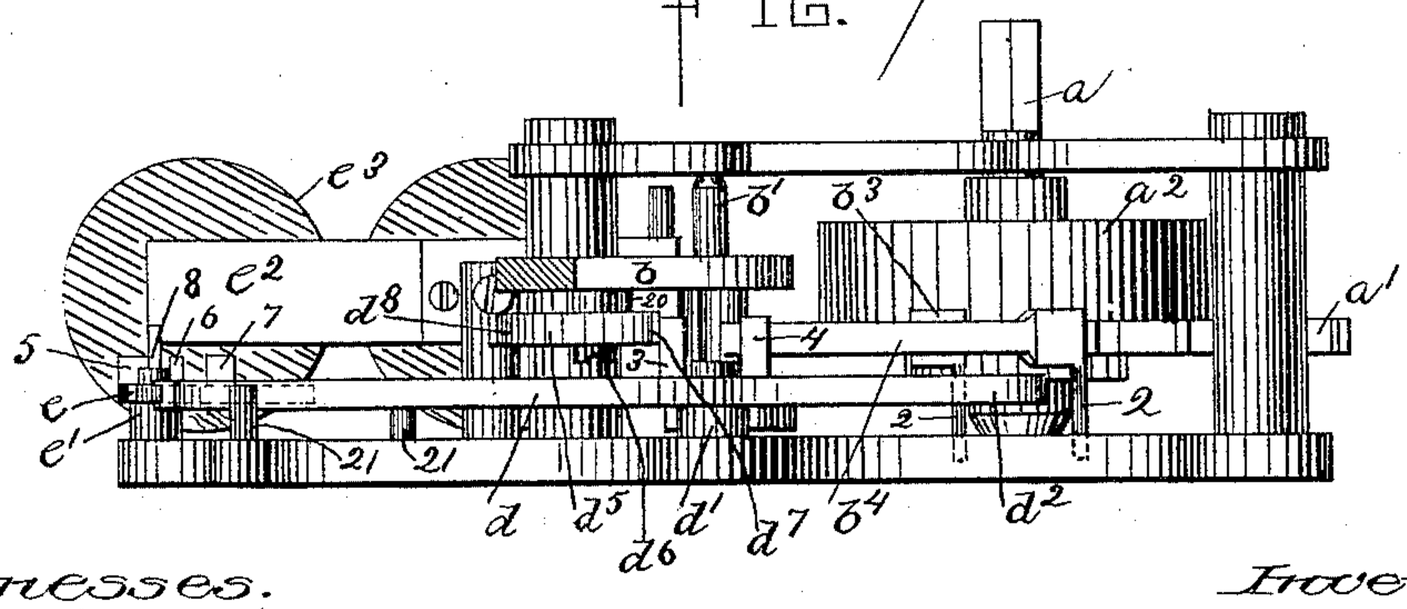


Fig. 5

Fig. 7



Witnesses.
Jas. H. Churchill
Frederick L. Emery

Inventor.
Frederick W. Cole,
by Crosby & Gregory
Attys

UNITED STATES PATENT OFFICE.

FREDERICK W. COLE, OF NEWTON, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO MOSES G. CRANE, OF SAME PLACE.

ELECTRO-MECHANICAL GONG.

SPECIFICATION forming part of Letters Patent No. 452,931, dated May 26, 1891.

Application filed December 9, 1890. Serial No. 374,039. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK W. COLE, of Newton, county of Middlesex, State of Massachusetts, have invented an Improvement in Electro-Mechanical Gongs, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention has for its object to improve the construction of electro-mechanical gongs, the chief aim being the production of a quick-acting gong.

In accordance with this invention the striker is designed to strike the gong on each and every stroke in either direction. A controlling mechanism is provided for the striking arm or lever, which is designed to lock it at or near the end of its stroke in each direction, which position is the beginning of its advancing stroke in each direction. Suitable releasing mechanism is provided for the controlling mechanism, which is governed by the armature of an electro-magnet.

Figure 1 shows in front elevation an electro-mechanical gong embodying this invention; Fig. 2, a detail of a portion of the controlling mechanism and the releasing mechanism shown in Fig. 1, the parts being in a different position; Figs. 3 and 4, modifications to be referred to; Fig. 5, a detail of Fig. 1, the parts being in different positions; Fig. 6, a left-hand side view of the gong shown in Fig. 1; Fig. 7, an under side view of the gong shown in Fig. 1.

The frame-work is of any usual or suitable construction to support the operating parts.

Mounted on the winding-shaft a is a ratchet-toothed wheel a', which is revolved by means of the main spring a^2 on said shaft. The striking arm or lever b is pivoted at b' to the frame-work and has at its outer end a hammer b^2, which strikes the gong $b^{3\times}$, (see dotted lines, Fig. 1,) and said striking arm or lever b has at its opposite end two pawls b^3 b^4, one of which is loosely connected to the said striking arm or lever at one side of its pivot b', and the other of which is loosely connected to the said striking arm or lever at the opposite side of its pivot b', and said pawls b^3 b^4 are each provided with a lateral projection, as 2, (see dotted lines and full lines, Fig. 7,) which rests upon a guide-faced portion, as c, of the main frame-work. The ends of the pawls b^3 b^4 are arranged to occupy the path of movement of the teeth of the ratchet-toothed wheel a' to be moved thereby. As the ratchet-wheel revolves, first one of the pawls, as b^3, which is in engagement with a tooth of said wheel, will be moved thereby, the pressure upon it holding said pawl in elevated position, and during said movement the striking arm or lever b will be moved on its pivot b' in the direction of the arrow thereon, and the pawl b^4 will be moved in the opposite direction to the pawl b^3, its pin 2 following up the inclined guide-face until the end of said pawl b^4 strikes one of the advancing teeth of the ratchet-wheel, and on account of the momentum of the hammer the wheel will then be forced backward until the bell is struck, and on such retrograde motion the pawl b^3 will be released, dropping onto the lower part of the guide-faced portion. Thus it will be seen that the pawls b^3 b^4, co-operating with the guide-face c and moved, as described, by the ratchet-wheel a', serve as a means for moving the striking arm or lever b first in one and then in the opposite direction positively.

The controlling mechanism for the striking arm or lever b consists of an arm d, pivoted at d', and preferably weighted, as at d^2; or it may be spring-pressed, said arm d having on it at each side of its pivot d' locking projections 3 4, and said arm d has a vertical extension d^3, to which one end of a spring d^4 is connected, the opposite end of said spring being connected to a double-toothed let-off d^5, pivoted at d^6 to the striking arm or lever b, one tooth of said let-off, as d^7, being adapted to engage with the projection 3 on the arm d, and the other tooth of said let-off, as d^8, being adapted to engage with the other projection 4 on the arm d as the striking arm or lever assumes its different positions, and acting to hold the striking arm or lever b at the beginning of each stroke.

The releasing mechanism for the controlling-arm d consists of a three-pin releasing-lever e, pivoted at e' and having at one end

three pins or projections 5 6 7, which separately co-operate with a projection 8 on the armature e^2 of the electro-magnet e^3. The three-pin releasing-lever has formed on it two shoulders 9 10, with one or the other of which the end of the controlling-lever d engages, according to the direction in which the said controlling-lever has a tendency to be moved, which direction is determined by the position of the hammer-arm b. With the parts in the position shown in full lines, Fig. 1, the armature e^2 is in its attracted position, and the parts are thereby at rest. When the parts are in this position, the controlling-lever d bears heavily on the shoulder 10 by the spring d^4, which is held taut by the locked striking arm or lever. When the armature e^2 is retracted, the three-pin releasing-lever e will be moved into the dotted-line position shown in Fig. 1 by the action of the controlling-lever d on it, and as the said three-pin releasing-lever assumes its dotted-line position the shoulder 10 is removed from beneath the controlling-lever d, and the latter thus released is moved into the dotted-line position shown in Fig. 1 by means of the spring d^4, and as said controlling-lever d assumes its dotted-line position the projection 3 is removed from engagement with the tooth d^7 of the double-toothed let-off, thereby releasing the striking arm or lever b, and the spring-actuated ratchet-wheel a' then acts on the pawl d^3 and moves said striking arm or lever b into the position shown in detail, Figs. 2 and 5, so that the hammer will strike the gong. As the striking arm or lever b is moved into its position to strike the first blow, as described, the double-toothed let-off d^5, carried by it, moves the spring d^4 from its position, as shown in Fig. 1, at one side of the pivot d' into the position shown in Figs. 2 and 5 at the opposite side of the pivot d', and said spring, drawing upon the controlling-lever d, lifts it until its outer end strikes the shoulder 9 of the releasing-lever e, moving said lever e from the dotted-line position shown in Fig. 1 to the full-line position shown in Fig. 2, the pin 6 at such time engaging the projection 8 on the armature e'. The projection 4 will be engaged by the tooth d^8 of the double-toothed let-off to thereby hold the striking arm or lever b in such position near the opposite side of the gong $b^{3\times}$, or at the beginning of its return-stroke. The parts will remain in this position as long as the armature remains retracted, and when the armature is next attracted the pin 6 on the three-pin releasing-lever e is released, and said lever e is moved by the action of the controlling-lever d on it into the dotted-line position shown in Fig. 2, at which time it will be caught and held by the projection 7 engaging the projection 8 on the attracted armature. When the armature e' is a second time retracted, the pin 7 will be disengaged, and the three-pin releasing-lever e will be moved by the pressure of the controlling-lever d on it into the position shown in full lines, Fig. 5, at which time the shoulder 9 will be removed from its engagement with the controlling-lever and the latter released. The controlling-lever d being thus released, the projection 4 will be removed from the position shown in Fig. 2 to position shown in full lines, Fig. 5, and will release the double-toothed let-off d^5, thereby placing the striking arm or lever b again under the control of the spring-actuated ratchet-wheel a', and said wheel, engaging the pawl b^4, will return the said striking arm or lever to the position shown in Fig. 1, carrying with it the said double-toothed let-off, that the latter may engage the projection 3 on the controlling-lever d, and as the said striking-arm resumes this position the spring d^4 will be also returned to its first position, and, drawing upon the said controlling-lever d, will move it, so that its outer end will engage the shoulder 10 on the three-pin releasing-lever, as represented in full lines, Fig. 1, and as said controlling-lever strikes the shoulder 10 the said three-pin releasing-lever is restored to a position with the projection 6 against the projection 8, as shown in dotted line, Fig. 5, until the armature is again attracted when the parts will assume the position shown in full lines, Fig. 1.

Limiting-stops 20 are provided, one at each side of the let-off d^5, to limit its movement in each direction, and limiting-stops 21 are also provided for the controlling-lever d. Thus it will be seen that at each impulse the striking arm or lever will be moved to strike the gong, and that the said striking arm or lever is operated to strike the gong at the end of its stroke in each direction.

In lieu of the three-pin releasing-lever e, (shown in Fig. 1,) I may employ a releasing-lever, as shown in Fig. 3, on which pins 5 and 7 are arranged, one at each side of the pivot e', and an arm n is secured to the armature e^2, which strikes one of the said pins at each time the armature is attracted, it being herein shown as arranged to strike the pin 7 only when the armature is attracted and the controlling-lever d bears against the shoulder 10, and to strike the pin 5 when the armature is attracted and the controlling-lever d bears against the shoulder 9. The upper end 6 of the lever e is adapted to engage the projection 8 on the end of the armature e^2 when said armature is retracted, as shown. The lever e, having the ends 6, and the pins 7 5, as just described, constitute the three-pin releasing-lever. The releasing-lever e, such as shown in Fig. 4, may be attached to the armature or have formed on it or secured to it the pins 5 6 7, and, furthermore, in lieu of the double-toothed let-off d^5 (shown in Fig. 1) two let-offs, as $f f'$, pivoted to the controlling arm or lever d, one at each side of its pivot d', and made spring-pressed by means of the spring f^2, may be employed to co-operate with a lateral-projection f^3 on the striking arm or lever b. So it will be seen that I do not desire to limit myself to the specific construc-

tion shown, as some of the features may be of great utility in connection with gongs of different makes.

I claim—

1. In an electro-mechanical gong, a striking arm or lever and means for moving it positively in each direction to strike a blow, and controlling mechanism which engages said striking arm or lever after each movement, combined with releasing mechanism for said controlling mechanism governed by the armature of the electro-magnet e^3, substantially as described.

2. In an electro-mechanical gong, the striking arm or lever *b* and means for moving it positively in each direction to strike a blow, combined with controlling mechanism for said striking arm or lever, and releasing mechanism therefor governed by each movement of the armature of the electro-magnet e^3, substantially as described.

3. In an electro-mechanical gong, the striking arm or lever *b* and controlling mechanism therefor, comprising a controlling-lever and let-off, which are operated in each direction by the striking arm, combined with releasing mechanism for said controlling mechanism, governed by the armature of the electro-magnet e^3, substantially as described.

4. In an electro-mechanical gong, the striking arm or lever *b* and means for moving it positively in each direction, combined with controlling mechanism for said arm or lever *b*, consisting of the controlling arm or lever and let-off, and releasing mechanism for said controlling-lever *d*, consisting of a three-pin releasing-lever controlled by the armature of the electro-magnet e^3, substantially as described.

5. In an electro-mechanical gong, the striking arm or lever movable positively in each direction to strike a blow and controlling mechanism therefor, connected with said striking arm or lever by a spring, combined with releasing mechanism for said spring-actuated controlling mechanism, an electro-magnet, and its armature governing the operation of the releasing mechanism, substantially as described.

6. In an electro-mechanical gong, the striking arm or lever *b* and means for moving it positively in each direction, and a controlling mechanism for said striking arm or lever, combined with releasing mechanism for said controlling mechanism, moved positively by one of the members of said controlling mechanism and governed by the armature of the electro-magnet e^3, substantially as described.

7. A vibrating arm, as e^2, carrying the projection 8, an operator for it, as the magnet e^3, a motor mechanism, and a releasing-lever therefor, as *e*, having the projections 5 6 7, which co-operate with the projection 8 on the vibrating arm to release the motor mechanism on each complete vibration of said arm e^2, one pin, as 6, having two locking-faces, and the two pins 5 7, having but one locking-face, substantially as described.

8. The magnet and its armature having the locking projection, as 8, combined with the three fixed pins 5 6 7, arranged on a vibrating lever, which pins co-operate with the projection 8 of the armature, substantially as described.

9. The magnet and its armature having the locking projection, as 8, combined with the vibrating lever having on it three fixed pins, two of which are engaged by the projection 8 at one side only and the other at both sides as the armature is vibrated, substantially as described.

10. The magnet and its armature having the projection 8, combined with a vibrating lever having on it three fixed pins, two of which are in position to be engaged by the armature when attracted and the other in position to be engaged by the armature when retracted, substantially as described.

11. The magnet and its armature, combined with the lever *e* and locking device thereon, which co-operates with said armature in both its attractive and retractive positions, and means for vibrating said lever first to one and then to the other side of its position of rest on the successive vibration of the magnet, substantially as described.

12. The magnet and its armature, combined with the releasing-lever *e* and motor mechanism controlled by it, said releasing-lever having shoulders 9 10 at each side its pivot, which co-operate with the controlling member of the motor mechanism, substantially as and for the purposes set forth.

13. The magnet, its armature, the striking arm or lever, and controlling mechanism therefor governed by said armature, said controlling mechanism comprising the pivoted arm *d*, having on it, at each side its pivot, a locking projection, and a double-toothed let-off, as d^5, borne by said striking arm or lever, substantially as described.

14. The electro-mechanical gong, the striking arm or lever, a double-toothed let-off carried by it, controlling mechanism having two locking projections with which said double-toothed let-off co-operates, a magnet, and its armature governing the operation of said controlling mechanism, substantially as described.

15. In an electro-mechanical gong, the toothed actuating-wheel, a reciprocating striking arm or lever which strikes the bell in each direction, two actuating-pawls therefor, which alternately engage said wheel, a controlling electro-magnet, and armature which locks the striking arm or lever at the beginning of each stroke in either direction, substantially as described.

16. In an electro-mechanical gong, the toothed actuating-wheel, a reciprocating striking arm or lever which strikes the bell in each direction, two actuating-pawls therefor, which

alternately engage said wheel, a controlling electro-magnet and armature, and intermediate locking device interposed between the armature and the striking-arm, which holds the striking-arm at the beginning of each stroke in either direction and is itself locked by the attracted and retracted armature successively, thereby requiring a complete vibration of the armature to allow successive strokes of the striking-arm, substantially as described.

17. The magnet and its armature having the locking projection, as 8, combined with the three fixed pins 5 6 7, arranged on a vibrating lever, which pins co-operate with the projection 8 of the armature, one, as 6, engaging at the end of each vibration the other two, as 5 7, acting alternately to engage one before each vibration of the vibrating lever, substantially as described.

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

FREDERICK W. COLE.

Witnesses:

BERNICE J. NOYES,

EMMA J. BENNETT.