(No Model.)

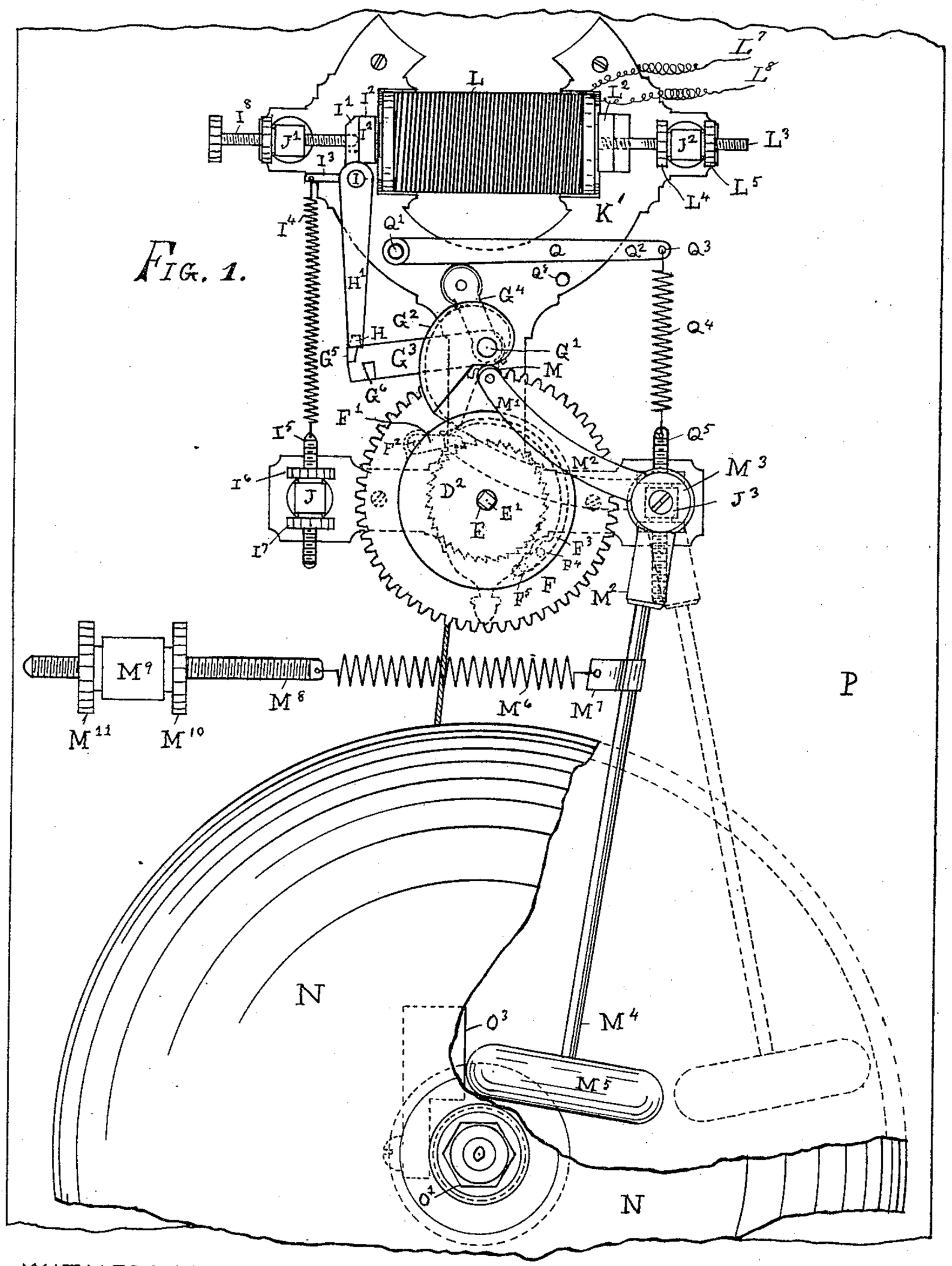
3 Sheets—Sheet 1.

T. F. GAYNOR.

ELECTRO MECHANICAL GONG STRIKING MACHINE.

No. 451,121. Patented Apr. 28, 1891.

FIG. 1.



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WITNESSES.
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(No Model.) 3 Sheets—Sheet 2.

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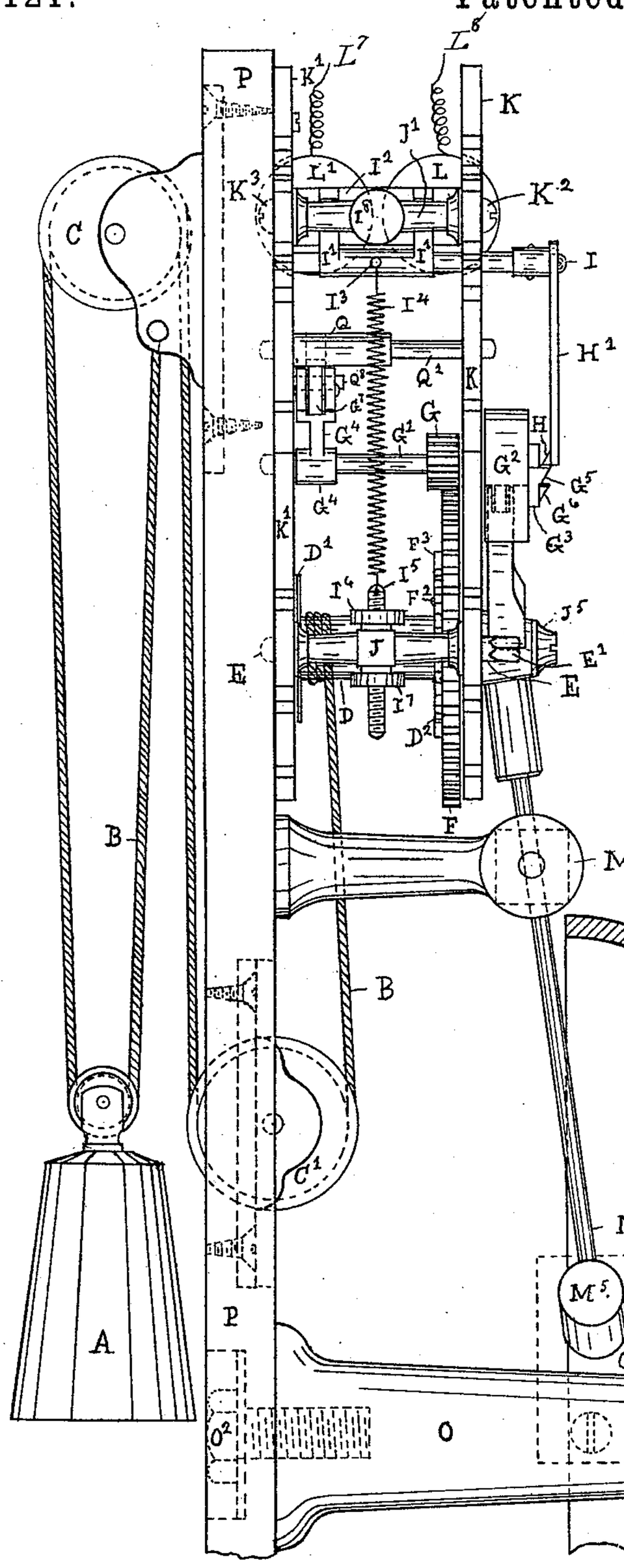

FIG. 2.

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T. F. GAYNOR.

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FIG. 3.

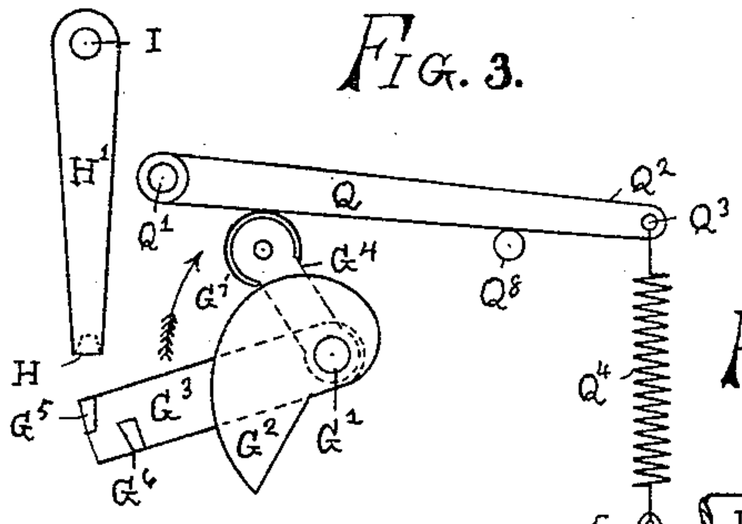


FIG. 4.

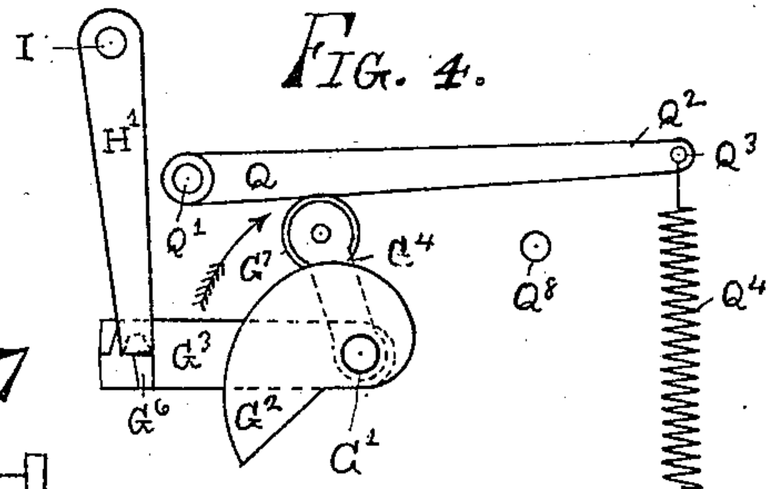


FIG 7

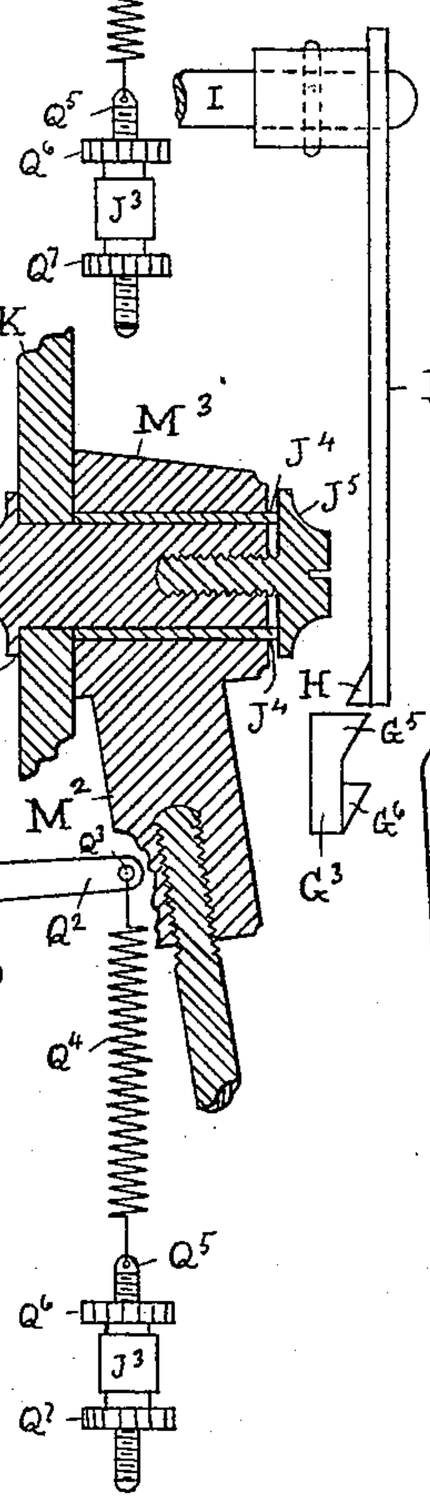


FIG 8

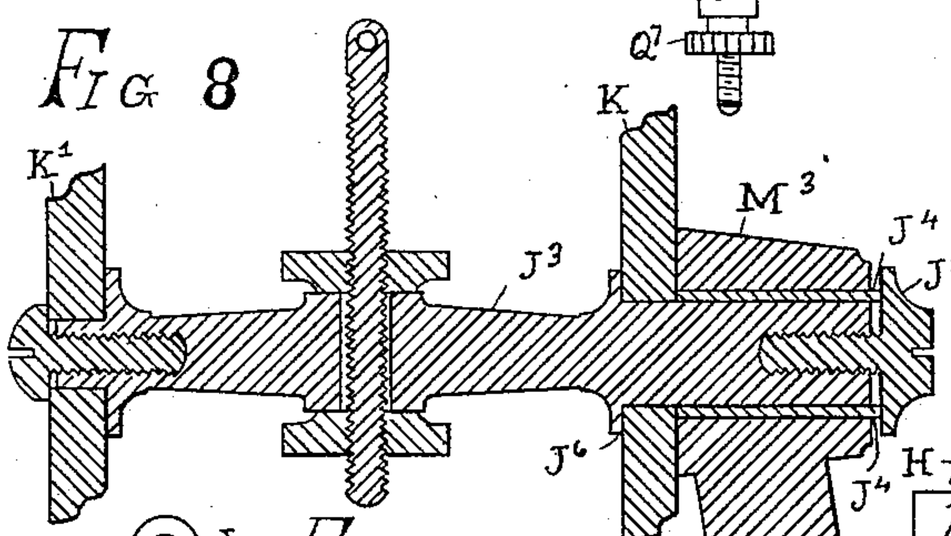


FIG. 5

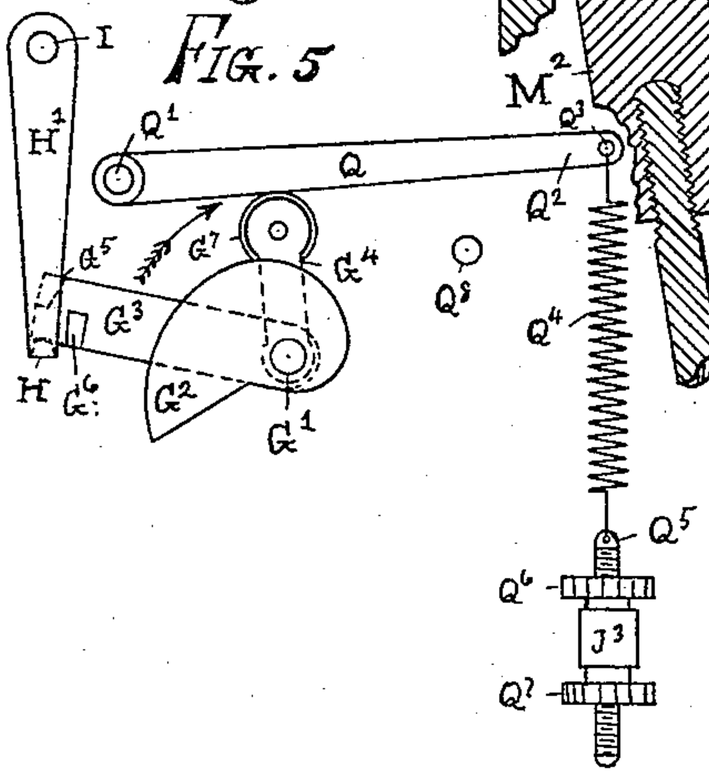
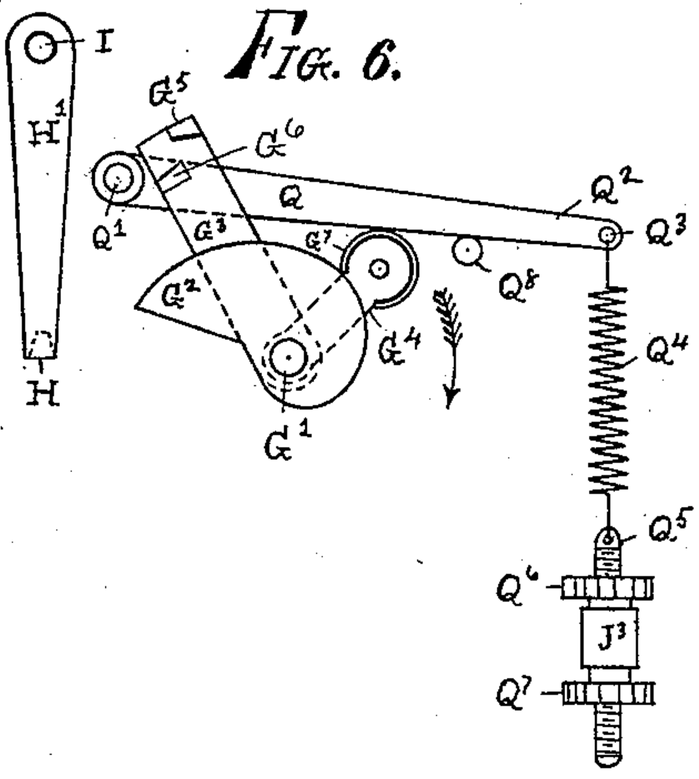


FIG. 6.



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UNITED STATES PATENT OFFICE.

THOMAS F. GAYNOR, OF LOUISVILLE, KENTUCKY, ASSIGNOR TO THE GAYNOR ELECTRIC COMPANY, OF SAME PLACE.

ELECTRO-MECHANICAL GONG-STRIKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 451,121, dated April 28, 1891.

Application filed July 25, 1889. Serial No. 318,651. (No model.)

To all whom it may concern:

Be it known that I, THOMAS F. GAYNOR, a citizen of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Electro-Mechanical Gong-Striking Machines, of which the following is a specification.

My invention relates to that class of gong-strikers in which the power which propels the hammer which strikes the gong is obtained from a suspended weight or a wound-up spring, and is regulated by the action of the armature of an electro-magnet, which, through the intermediate escapement mechanism of the gong-striker, causes a blow to be struck upon the gong every time an electric impulse is given to the electro-magnet. In devices of this character it is customary to interpose a series of levers and catches between some part of the striker which makes a complete revolution or double oscillation and the escapement mechanism of the striker, that the leverage upon the escapement-pallets may be reduced to a minimum, so that the armature can trip the striker into action with as little expenditure of battery-power as possible. This method of compounding the leverage renders it necessary to minimize the movements of the catch parts of the levers to such an extent as to require great nicety of fit and adjustment in the pivot-bearings and at the escapement-points in such mechanism, and after a little use these points lose their accuracy and the striker becomes uncertain in its action and sometimes strikes false blows upon the gong.

Another method of escapement provided in gong-strikers is that in which the hammer-moving mechanism is so connected with the escapement mechanism that the hammer-lever must make a complete movement (or two full oscillations) always before the magnet can register another signal through the escapement mechanism, so that if a signal should be given through the magnet before the hammer-lever had returned to its normal position such a signal would not register and be lost.

Now the object of my invention is to obviate both of these objections in the construction of gong-strikers by providing a brake-lever by which the leverage upon the escapement-pallets can be regulated at pleasure and reduced to a minimum without the interposition of a system of compound levers and by making the escapement mechanism of the striker independent of the hammer-lever—that is, so far as not requiring a full backward oscillation of the hammer-lever before another signal can be registered is concerned. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 represents a front elevation of a gong-striker, its front plate being removed. Fig. 2 shows a side elevation of Fig. 1, the front plate being also shown. Figs. 3, 4, 5, 6, and 7 represent detail views of the escapement mechanism and brake mechanism of the striker, showing the parts in the different positions which they assume during the rotation of the pinion-shaft while the striker is in the act of striking a blow upon the gong. Fig. 8 shows an enlarged sectional view of one of the pillars which keep the frame-plates in position, showing the manner in which the hammer-lever is pivoted, together with the screw adjustment of one of the springs.

Similar letters refer to similar parts throughout the several views.

A represents a weight connected by a cord B, which passes over the pulleys C C′, to the drum D, upon which the cord is wound. The drum D is provided with a flange D′ and a ratchet-wheel D^2 and is secured to the main shaft E.

F represents a main gear-wheel which is loosely fitted upon the shaft E, and is provided with a pawl F′, which is pivoted to the gear-wheel by the pivot F^2, and also provided with a pawl-spring F^3, which is secured to the gear-wheel by screws F^4 F^5. The main wheel F engages with a pinion G, secured upon a pinion-shaft G′, which shaft is provided with a cam G^2, a pallet-lever G^3, and a roller-lever G^4. The pallet-lever G^3 is provided with pallets G^5 G^6, which are adapted to engage with the escapement-foot H upon the end of the escapement-lever H′. The escapement-lever H′ is secured upon the armature-carrier shaft I, to which the armature-carrier I′ is attached, which carries the armature I^2. The armature-

carrier shaft I is also provided with a tension-spring pin I^3, to which the tension-spring I^4 is attached. The lower end of the tension-spring I^4 is provided with an adjusting-screw I^5, which is provided with nuts I^6 I^7, the adjusting-screw being fitted in a hole in the pillar J, which is one of four pillars J J′ J^2 J^3, which hold the frame-plates K K′ together by means of screws, two of which may be seen at K^2 K^3 in Fig. 2.

L L′ represents an electro-magnet of the usual construction, the keeper L^2 of which is provided with an adjusting-screw L^3 and nuts L^4 L^5, the screw passing through a hole in the pillar J^2 and being connected to the keeper L^2, as seen in Fig. 1. The cam G^2 engages with a roller M, which is pivoted in the end M′ of a hammer-lever M^2. The hammer-lever M^2 is provided with a hub M^3, having a hole through it by which it is loosely fitted upon a bushing J^4, as seen in Fig. 8. The pillar J^3 extends through the frame-plate K and through the bushing J^4 to the outer end of the latter, where it is tapped to receive the screw J^5, which secures the hammer-lever M^2 in a pivoted position. The length of the hub M^3 of the hammer-lever M^2 is slightly shorter than the length of the bushing J^4, so that when the screw J^5 is screwed down tightly against the bushing J^4 it binds the front plate K against the shoulder J^6 of the pillar J^3, while it also allows a sufficient amount of end-play to the hub M^3 of the hammer-lever M^2 to allow the latter to freely oscillate upon the bushing J^4. The lower end M^4 of the hammer-lever M^2 is provided with a hammer M^5, which is secured thereto. The hammer-lever M^2 is also provided with a retracting-spring M^6, the end of which is connected to a clip M^7, which is fitted to the hammer-lever M^2. The retracting-spring M^6 is provided with an adjusting-screw M^8, which fits in a hole through the post M^9, and is provided with adjusting-nuts M^{10} M^{11}, by which a suitable spring-tension upon the hammer-lever is secured.

N represents part of a gong which is mounted upon a stud O, to which it is secured by the nut O′ in a suitable position to be struck by the hammer M^5. The stud O is secured to a board P (or the back of a case) by the screw O^2. A buffer O^3 is screwed to the stud O for the purpose of preventing unnecessary backward motion of the hammer, as is shown by the dotted lines in Figs. 1 and 2. The roller-lever G^4 is provided with a roller G^7, which rolls against the under surface of a brake-lever Q, which is pivoted upon a stud Q′, which is fitted to the frames K K′. The free end Q^2 of the brake-lever Q is connected through a pin Q^3 to a tension-spring Q^4, having an adjusting-screw Q^5, which is fitted to a hole through the pillar J^3 and provided with adjusting-nuts Q^6 Q^7, by which the tension of the spring Q^4 may be regulated.

Q^8 represents a stop-stud fitted to the frame K′ for the purpose of preventing unnecessary downward movement of the brake-lever Q. The front end E′ of the main shaft E is squared, so as to fit an ordinary winding-key. (Not shown.)

I^8 is an adjusting-screw passing through the pillar J′ and provided with a nut I^9, and is for the purpose of limiting the movement of the armature I^2.

L^7 L^8 represent the ends of the magnet-wire.

The action of the mechanism may be described as follows: The pressure of a suspended weight A, transmitted through the mechanism, causes one of the pallets of the pallet-lever G^3 to press against the escapement-foot H. If the electric circuit through the magnet be closed, the escapement mechanism will assume the position shown in Figs. 1 and 2, while if the electric circuit be open the escapement mechanism will assume the position shown in Fig. 4. If while the escapement mechanism be in the position shown in Fig. 4 an electric impulse be sent through the magnet L, it will cause the armature I^2, with its shaft I and escapement-lever H′, to assume the position shown in Figs. 1, 3, 5, and 6, which releases the pallet-lever and allows the pinion-shaft to revolve, carrying the cam around with it in the direction shown by the arrows in Figs. 3, 4, 5, and 6. The cam in its rotation by impinging against the roller on the end of the hammer-lever causes the hammer to move forward and strike the gong, as shown by the dotted lines in Fig. 1. The movement of the pallet-lever becomes arrested by one of the pallets coming against the foot of the lever shown in Fig. 1, until the circuit is broken, when it again assumes its normal position, as shown in Fig. 4. After the blow has been struck by the hammer upon the gong the hammer is again drawn back to its normal position, as shown in Fig. 1, by the tension of the retracting-spring M^6, attached to the hammer-lever. In the rotation of the shaft G^2 the roller G^7 rolls against the under surface of the brake-lever Q, which causes the latter to rise up from the stop-stud Q^8 to the position shown in Fig. 5, which is the highest point it reaches. After passing this point the brake-lever again falls down upon the pin Q^8, as shown in Fig. 6, after which the roller G^7 clears the brake-lever until it reaches the position shown in Fig. 3, where it again comes in contact with the brake-lever, which it lifts up again, passing through the position shown in Fig. 1, which it may momentarily assume on account of the temporary closure of the circuit through the magnet, if such should occur, until it assumes its normal position, as shown in Fig. 4. By this arrangement it will be observed that the roller G^7 is in the act of lifting the brake-lever Q from the time it reaches the position shown in Fig. 3 until it reaches the position shown in Fig. 5, which causes the forward pressure of the shaft mechanism to be almost entirely expended in lifting up said brake-lever Q, and thus minimizing the

pressure of the pallets G^5 and G^6 against the foot H of the escapement-lever H′, so that but a very small amount of battery-power is required to operate the escapement mechanism. By the proper adjustment of the tension of the spring Q^4 the pressure of the brake-lever Q upon the roller G^7 can be so regulated as to reduce the pressure of the pallets against the escapement-foot to a minimum degree. After the roller G^7 passes the position shown in Fig. 5 the lever Q accelerates the rotation of the cam G^2, that the latter may throw the hammer-lever through its roller M downward, causing the hammer to move forward and strike a forcible blow upon the gong. By having the hammer lever loosely pivoted upon the bushing J^4, and by its having no positive connection with the escapement mechanism, the pallet-lever G^3 is always at liberty to rotate when the escapement mechanism operates, so that no matter what position the hammer may be in with reference to the gong the cam will only be obliged to move it forward again against the gong, and thus register another blow. By this method of construction the mechanism is much better adapted to strike the blows in very rapid succession than if the hammer-lever mechanism and the pallet-lever mechanism were positively connected to each other and required a complete movement or two full oscillations of the hammer-lever before the magnet could register a signal through the escapement mechanism.

It is very important that the position of the foot H of the lever H′ in its movements may be accurately controlled with reference to the pallets G^5 G^6. This can be accomplished by the proper adjustment of the magnet-adjusting screw L^3 and the armature-adjusting screw L^8.

In order that the electro-magnet may be held in the most compact position with reference to the armature and escapement mechanism and be provided with means of adjustment for itself and the armature, the frame-plates are made of such a shape as to support and partly inclose the ends of the magnet, as seen in Figs. 1 and 2, the adjusting-screws being fitted to the pillars J′ and J^2, respectively, as already described. This method of construction gives a solidity, compactness, and ease of adjustment hitherto unattained in machines of this character.

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

1. The combination of the magnets, the two frame-plates having supports for the magnets, the pillars by which the frame-plates are secured together, an armature-adjusting screw fitted in one of said pillars, and a magnet-adjusting screw in another one of the pillars, all substantially as described.

2. In an electro-mechanical gong-striking machine having gear mechanism and a pinion-shaft which is propelled by said gear mechanism and which is provided with a pallet-lever, the combination, with said shaft, of a roller-lever and a brake-lever having a spring-tension adjustment, substantially as described.

3. The combination of the magnets, the two frame-plates which support the magnets, the pillars which secure the frame-plates together and being provided with the armature-adjusting screw and the magnet-adjusting screw, a shaft having a cam mechanism, and a hammer-lever pivoted upon one of the pillars, the end of which is adapted to play against the cam, all substantially as specified.

4. In an electro-mechanical gong-striking machine, the combination of an electro-magnet and its armature which are provided with adjusting-screws, the armature being provided with a pivot-shaft to which an escapement-lever is connected, two frame-plates which support the ends of the magnet while permitting of end adjustment of said magnet, as well as supporting the shaft mechanism of the gong-striking machine, pillars provided with screws, by means of which the frames are connected together, a main shaft having a winding-drum, a ratchet-wheel, a main gear provided with a pawl adapted to engage with said ratchet-wheel and being loosely pivoted upon said main shaft, a pinion-shaft provided with a pinion adapted to engage with the main gear aforesaid and being also provided with a cam, a pallet-lever, and a roller-lever, a brake-lever adapted to rest upon the roller-lever aforesaid and being provided with a spring-tension adjustment, a hammer-lever pivoted upon a bushing fitted to one of the frame-pillars and provided with a retracting-spring adjustment, and a hammer-buffer, all mounted upon a suitable support to which a gong is attached, substantially as described.

5. The means for reducing the pressure of the pallet-lever of an armature-escapement mechanism upon the armature-escapement lever, consisting of a brake-lever provided with a tension-adjustment device and adapted to impinge against an attachment to the pallet-lever shaft while the pallet-lever is in contact with the armature-escapement lever, substantially as described.

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Witnesses:
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WM. H. WOOD.