M. HIGUCHI.

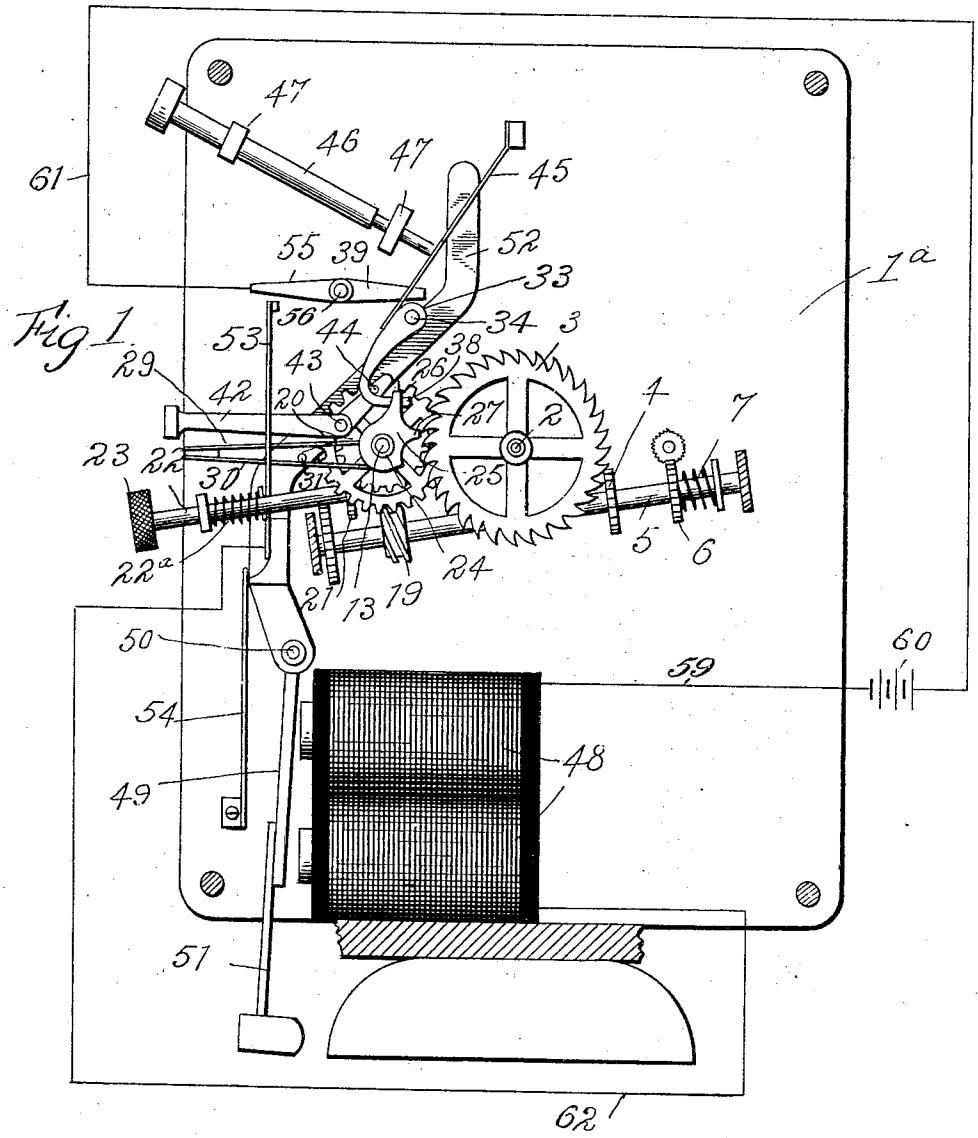
ELECTRIC CLOCK.

APPLICATION FILED DEC. 2, 1905.

898,648. Patented Sept. 15, 1908.

3 SHEETS—SHEET 1.

Fig 1.



Witnesses
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3 SHEETS—SHEET 2.

Fig. 2

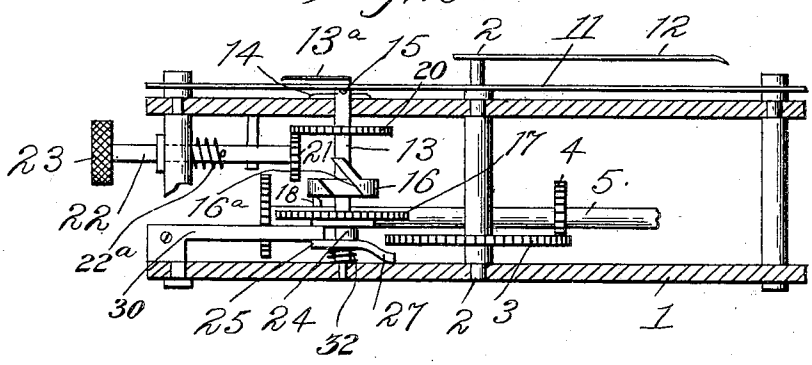
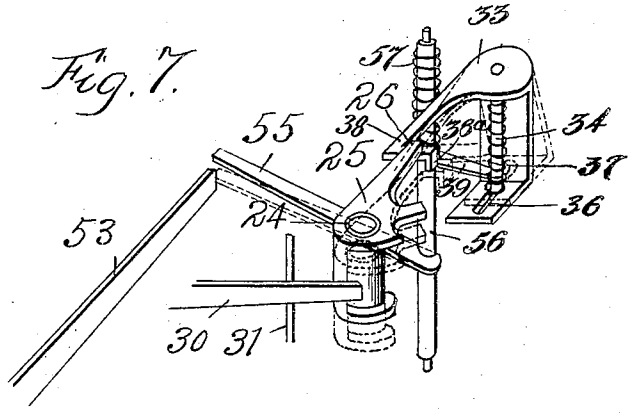


Fig. 7.



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3 SHEETS—SHEET 3.

Fig. 3

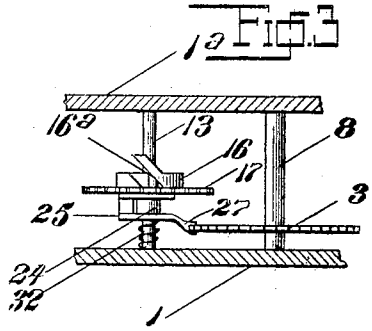


Fig. 4

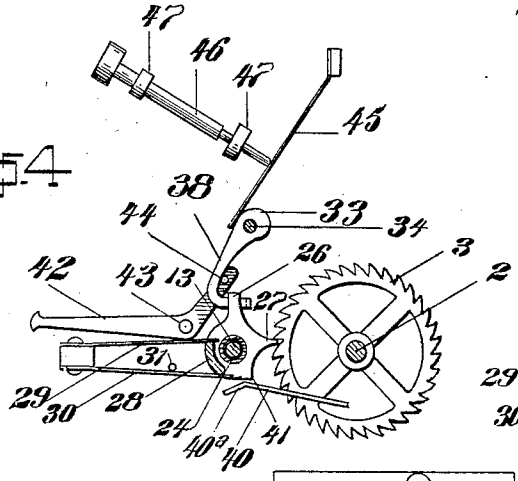


Fig. 5

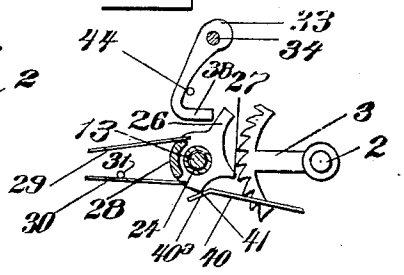


Fig. 8

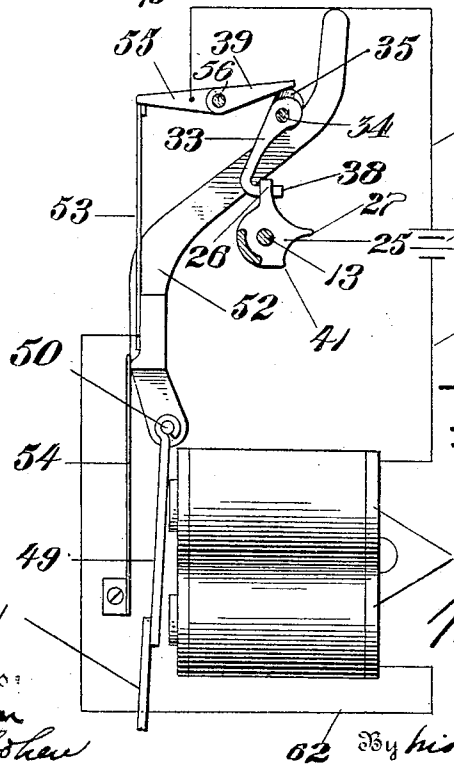


Fig. 9

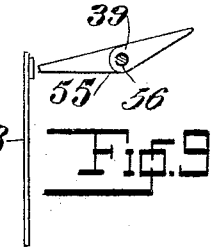
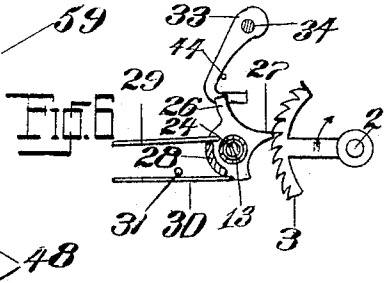


Fig. 6



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UNITED STATES PATENT OFFICE.

MONNOSUKE HIGUCHI, OF NEW YORK, N. Y.

ELECTRIC CLOCK.

No. 898,648. Specification of Letters Patent. Patented Sept. 15, 1908.

Original application filed November 3, 1903, Serial No. 179,661. Divided and this application filed December 2, 1905. Serial No. 290,008.

To all whom it may concern:

Be it known that I, MONNOSUKE HIGUCHI, a subject of the Emperor of Japan, and residing in the borough of Manhattan, in the city and State of New York, have invented certain new and useful Improvements in Electric Clocks, of which the following is a specification.

My present invention relates to electric clocks and more particularly to alarming mechanism for electric clocks.

The present application is a division of my application filed November 3, 1903, Serial Number 179,661 and entitled Electric clocks.

The object of my invention is to provide alarming mechanism which is adjustable as to length of ring which may be prevented from ringing and which may be stopped at any time after the same has commenced ringing and which is provided with an improved electrical actuating mechanism. Such improvements or mechanisms are hereinafter described in detail and shown in the accompanying drawings, in which like reference characters refer to like parts and in which,

Figure 1 is a general rear elevation, with the rear plate removed of the alarm mechanism. Fig. 2 is a sectional plan view of the alarm-controlling mechanism, showing the position of the parts previous to the alarm. Fig. 3 is a sectional plan view of the same, showing the position of the parts during the ringing of the alarm. Fig. 4 is a side elevation of the same. Fig. 5 is a side elevation of the same showing the position of the parts at completion of the ringing of the alarm. Fig. 6 is a like view showing position of parts upon reversal of clock hands during ringing of bell, or just thereafter. Fig. 7 is a detail perspective view showing the circuit controlling mechanism before operation in full lines and after operation in dotted lines. Fig. 8 is a side elevation of the ringing mechanism. Fig. 9 is a like view of a portion of the mechanism shown in Fig. 8 upon ringing of the bell.

Referring now in detail to the drawings: 1 is the rear plate of the clock and 1ª the front plate, suitably journaled in the plates 1 and 1ª is minute arbor 2 having rigidly mounted thereon a minute wheel 3 driven by the pinion 4 mounted rigidly on shaft 5. Shaft 5 may be driven by any suitable means, such as, for instance, by means of a worm gear 6, on shaft 5 transmitting motion to shaft 5 through means of a spring clutch 7. Minute arbor 2 extends through the clock frame and carries in a position over the dial 11 of the clock its minute hand 12.

Extending through the clock frame in a position parallel with and to one side of minute arbor 2 is a shaft 13 which is held normally against movement by a disk spring 14 and a pin 15. The spring 14 and the pin 15 are adapted to hold shaft 13 against movement except when shaft 13 moves by means hereinafter described to adjust the same.

Shaft 13 carries a cam disk 16 having a cam surface 16ª. Disk 16 is rigidly mounted on shaft 13 and rotates therewith, when shaft 13 is rotated; 17 is a worm gear loosely mounted upon the shaft 13 so that the same is capable of independent longitudinal and rotary movement on shaft 13. Gear 17 carries a cam projection 18 which rests at all times against the surface of the cam disk 16; worm gear 17 is driven by a worm 19 mounted on the shaft 5.

20 is a pinion rigidly mounted on the shaft 13 and engaged by a pinion 21 on shaft 22 extended to a point without the clock frame and having a thumb wheel 23.

22ª is a spring mounted on shaft 22 and tending to hold pinion 21 in engagement with pinion 20.

By rotating the thumb wheel 23 the shaft 22 is rotated and the pinion 21 through medium of the pinion 20 rotates the shaft 13 to adjust the cam disk 16, the position of which is indicated by the indicating hand 13ª of the clock dial or face.

24 is a sleeve loosely mounted upon shaft 13 and capable of independent rotary and longitudinal movement on said shaft 13 and has rigidly mounted thereon a latch 25, one side of said latch bearing against the pinion 17, the other side having, as shown by the position of Figs. 1, 4, 5 and 6, a vertical finger 26, operating directly upon a controller 33, and a horizontal finger 27, capable of being thrown into and out of engagement with the minute wheel 3. The two sides of latch 25, that is, the part bearing against the pinion 17 and the part having the fingers 26 and 27 are connected by a web 28 which is engaged by the free ends of springs 29 and 30 suitably mounted on the clock frame. The purpose of these springs is to hold the latch 25 in its

normal position, that is, so that the finger 26 will be in the position shown in Fig. 4. A pin 31 in the clock frame prevents the spring 30 from following the web of the latch when the latch moves to the position shown in Fig. 5.

32 is a spring mounted upon the shaft 13 between the rear plate 1 and the latch 25 and adapted when the cam projection 18 on the pinion 17 engages the cam surface 16[a] to force the latch 25 longitudinally along the shaft 13 until the horizontal finger 27 comes into engagement with the minutes wheel 3.

33 is a U-shaped controller so mounted upon a shaft 34 that the same is capable of moving in two directions concentrically around the shaft, and in a vertical plane coincident with the shaft. These movements are oscillating and tilting and are accomplished by the action of latch 25.

34 is a shaft secured in the clock frame and passing through a slot 36 in the shorter arm of the controller 33, and engaging pivotally the longer arm of said controller. Located between the arms of said controller on the shaft 34 is a spring 37 which tends to hold the controller in normal position, as shown in full lines in Fig. 7. The tilted position of these parts is shown in dotted lines in Fig. 7.

Controller 33 has an extension 38 at its lower end which extends across the path of the vertical finger 26 of the latch 25. The extremity of the extension 38 is formed with a rectangular lug or projection 38[a] equal in depth to the longitudinal sliding movement of the sleeve 24 and wheel 17 to bring the cam projection 18 into contact with the inclined surface 16[a], the function of which is to prevent the vertical finger 26 of the latch 25 from getting around back of extension 38. As the shaft 5 rotates, the worm gear 17 through means of the worm 19 is rotated until the cam projection 18 drops on to the inclined surface 16[a] by longitudinal displacement of the worm gear 17 by the latch 25 under influence of its spring 32. In moving on the shaft 13 the latch 25 through its finger 26 strikes the extension 38 of controller 33 and tilts the same elevating the slotted end 36 of the controller 33 to close the circuit in a manner hereinafter described. When the latch 25 is operated by the spring 32 to move the finger 27 into engagement with the minutes wheel 3, the minutes wheel 3 rotates the sleeve 24, and hence the latch 25, until the finger 26 slides off or out of engagement with the extension 38 on the controller 33 allowing the controller 33 to right itself and break the circuit, as hereinafter described.

In order to prevent the finger 27 from slipping backward over the teeth of the wheel 3 so that the controller 33 would be held an undesired length of time, a spring 40 is provided suitably mounted in the clock casing and having a bent end 40[a] adapted to engage a lug or projection 41 on the latch 25 so that when the wheel 3 has rotated the sleeve 24 until the finger is out of engagement with the controller 33, the lug or projection 41 will slide into engagement with the bent end 40[a], and the spring 40 will hold the latch 25 in a position disengaged from the wheel 3, until the cam projection 18 riding up the inclined surface 16[a] displaces the worm gear 17 and the latch 25 longitudinally and forces the lug 41 on the latch 25 sidewise out of engagement with the spring 40, whereupon the springs 29—30 are allowed to return the latch 25 and the sleeve 24 to normal position.

Through means hereinafter described, whenever the controller 33 is tilted in the manner already described, the electric circuits are closed and the alarm bell rung. The alarm will continue to ring therefore as long as the finger 26 is in engagement with the extension 38. It has already been seen how the minutes wheel 3 rotates the finger 26 out of engagement with extension 38. It will be obvious that by rotation of the controller 33 upon the shaft 34 in opposition to spring 37, the distance which extension 38 projects into the path of finger 26 and the length of time which the finger 26 will engage the extension 38 may be regulated so that the length of alarm ring may be regulated and predetermined. A device for thus regulating the alarm ring is herein provided. The same consists in a bell crank or other suitable lever 42 Figs. 1 and 4 projecting from the casing on which latter may be any suitable means for determining the movement of said lever 42. The lever 42 is pivoted at 43 to a suitable pin, stud or projection on the machine frame and carries at its engaging end a pin or projection 44 extending horizontally from the lever 42 and engaging the under side of the controller 33. By depression of the lever 42 it will be seen that the controller 33 is displaced so that the finger 26 can be made to travel a greater or less distance along the surface of the extension 38 since by operation of the lever 42 a greater or less part of the extension 38 can be thrown in the path of engagement with the finger 26. It is also desirable that a means be provided to entirely throw out the ringing of the alarm after the same has started. This can be accomplished by throwing the extension 38 entirely out of the path of engagement with the finger 26. This is accomplished by means of a spring 45 mounted on the clock frame and engaged by the push rod 46 mounted in bearings 47. Spring 45 bears against the upper edge of the controller 33 so that upon depression of the push rod 46 the spring 45 is forced against the upper edge of the controller 33, turning the controller 33 to such extent that the extension 38 is entirely thrown out of the path of engagement with the finger 26. Through

this means the ringing of the bell can be immediately stopped. By means of lever 42, the alarm may be previously prevented from ringing as well as the length of ring regulated. As shown in Fig. 6, when wheel 3 is reversed or rotated in the direction of the arrow, as in adjusting the hands of the clock, when finger 27 is in engagement with the teeth of the wheel 3, the finger 27 will move backwards in opposition to spring 30, this being permitted by springs 29 30 but immediately upon the finger 27 being disengaged from the teeth of wheel 3, such as by a sidewise movement of latch 25, the latch 25 and finger 27 are returned to normal position by springs 29, 30.

The intermediate circuit closing device will now be described.

48 is an electro-magnet and 49 an armature. Armature 49 is rigidly mounted on shaft 50 journaled in the clock frame. Suspended to armature 49 is clapper 51 which is adapted to strike the bell B of the clock. Mounted on the shaft 50 is an upwardly extending actuating arm 52 forming part of the time striking mechanism forming the subject matter of my divisional application filed September 15, 1905, Serial No. 278544, entitled "Electric clocks". The weight of the arm 52, since it extends considerably to one side of the armature 49, is sufficient to throw the armature 49 normally away from the magnet 48. Mounted on arm 52 is a contact piece 53.

54 is a spring on the clock casing which contacts at all times with arm 52 and holds armature 49 within the sphere of attraction of magnet 48.

Contact piece 53 extends upward into the plane of a vibrating contact arm 55 which it is adapted to engage and which is rigidly mounted on an oscillating arbor 56 controlled by a spring 57 coiled about arbor 56.

39 is an actuating arm rigidly mounted on arbor 56 and resting at its free end against the upper surface of the controller 33 above its slotted side.

59 is an electrical conductor connecting magnet 48 and battery 60.

61 is an electrical conductor connecting battery 60 with contact arm 55.

62 is an electrical conductor connecting contact piece 53 with magnet 48.

When the controller 33 is tilted as shown in Fig. 8 the arm 39 is displaced, the arbor 56 is oscillated, the arm 55 is lowered at its free end until it contacts with piece 53, the armature being in normal position, a circuit is closed through contact piece 53, conductor 62, magnet 48 conductor 59, battery 60, conductor 61 and contact arm 55 and the armature 49 is attracted to magnet 48, the clapper striking the bell. When the armature 49 is attracted to the magnet 48, the contact between the contact piece 53 and arm 55 is broken breaking the circuit, and at the same time the arm 55 is forced down a little more by action of latch 25 as shown in Fig. 9. As the armature 49 is attracted the circuit is broken, then results a series of rapid vibrations of the armature and hence the bell will be rung rapidly, until by the means already described the contact between contact arm 55 and contact piece 53 is broken, at which time the ringing ceases.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:—

1. In a clock, an electric alarm bell ringing mechanism, comprising a minute arbor and a separate indicator shaft, each independently operated, a latch on said indicator shaft, a circuit controller operated by said latch, a cam on the indicator shaft actuating the latch to place the controller in position to throw the bell ringing mechanism into operation, and said latch also operated by the minute arbor to release the circuit controller and throw the bell ringing mechanism out of operation.

2. In a clock, an electric alarm bell ringing mechanism, comprising a minute arbor, and a separate indicator shaft, each independently operated, a hand operated shaft geared to and capable of rotating said indicator shaft, a latch on said indicator shaft, a circuit controller operated by said latch, a cam on the indicator shaft actuating the latch to place the controller in position to throw the bell ringing mechanism into operation, and said latch also operated by the minute arbor to release the circuit controller and throw the bell ringing mechanism out of operation.

3. In a clock, an electric alarm bell ringing mechanism, comprising a minute arbor and a separate indicator shaft, each independently operated, a cam mounted on said indicator shaft, a dogging member rotatably mounted on said indicator shaft and controlled by said cam, a spring actuated latch controlled by said dogging member, a circuit controller operated by said latch when the cam and dogging member coact, to throw said bell ringing mechanism into operation, and said latch also capable of being operated by the minute arbor to throw the bell ringing mechanism out of operation.

4. In a clock, an electric alarm bell ringing mechanism, comprising a minute arbor, a separate indicator shaft capable of independent movement, a driving shaft operating said minute arbor, a cam rigidly mounted on said indicator shaft, a member freely mounted on said indicator shaft operated by the driving shaft and adapted to engage said cam, a spring latch operated by said cam, a circuit controller actuated by the latch to throw the bell ringing mechanism into operation, and means on the minute arbor for actuating said

latch to throw said bell ringing mechanism out of engagement.

5. In a clock, an electric bell ringing mechanism comprising a minute arbor, a separate indicator shaft, each independently operated, a cam rigidly mounted on said indicator shaft, a gear wheel rotatably mounted on said indicator shaft capable of axial movement and engaging said cam, a driving shaft operating the minute arbor and said gear wheel, a latch movable with said gear wheel, a controller actuated by said latch to throw the bell ringing mechanism into operation, means on the minute arbor engaging the latch to throw the bell ringing mechanism out of engagement, and means for rotating the gear wheel to place the latch and controller in normal position.

6. In a clock, an electric bell ringing mechanism comprising an alarm indicator shaft and a minute arbor, each independently controlled, a gear wheel capable of rotary and axial movement on said indicator shaft, bell ringing means, a spring actuated circuit controller capable of oscillatory movement, a latch controlling said circuit controller, means for moving said gear wheel axially to oscillate the circuit controller and throw the bell ringing mechanism into operation, means on the minute arbor engaging the said latch to throw the bell ringing means out of operation, and means for rotating said wheel to place the bell ringing means in normal position.

7. In a clock, the combination with an electric magnet and armature and a bell ringing device operated by the armature of an electrical circuit for energizing said magnet, a suitable source of energy for the circuit, an oscillating circuit maker and breaker, means actuated by the armature for actuating said circuit maker and breaker, a minute arbor, a driving shaft controlling said minute arbor, means intermittently operated by said driving shaft and intermediate to the circuit maker and breaker and the minute arbor for controlling said circuit maker and breaker.

8. In a clock, the combination with an electric magnet and armature and a bell ringing device operated by the armature of an electrical circuit for energizing said magnet, a suitable source of energy for the circuit, a circuit maker and breaker, a main driving shaft, means operated by the main driving shaft for automatically closing the circuit through the bell ringing means, and a hand mechanism adapted to operate the circuit closing means to vary the operating period of said bell ringing means.

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