F. I. GETTY.

MASTER CLOCK.

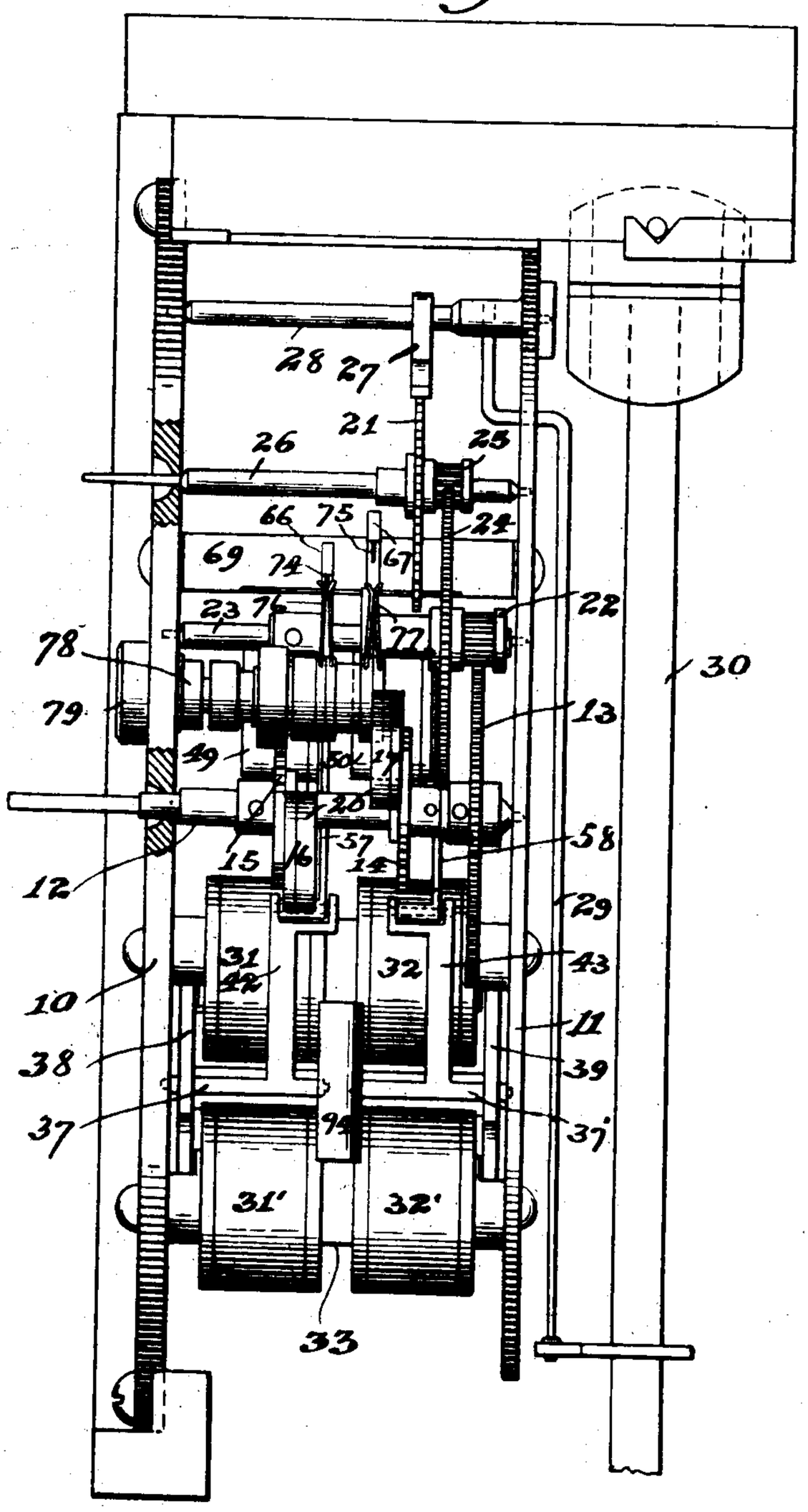
APPLICATION FILED JAN. 20, 1910.

961,950.

Patented June 21, 1910.

4 SHEETS—SHEET 1.

Fig. 1.



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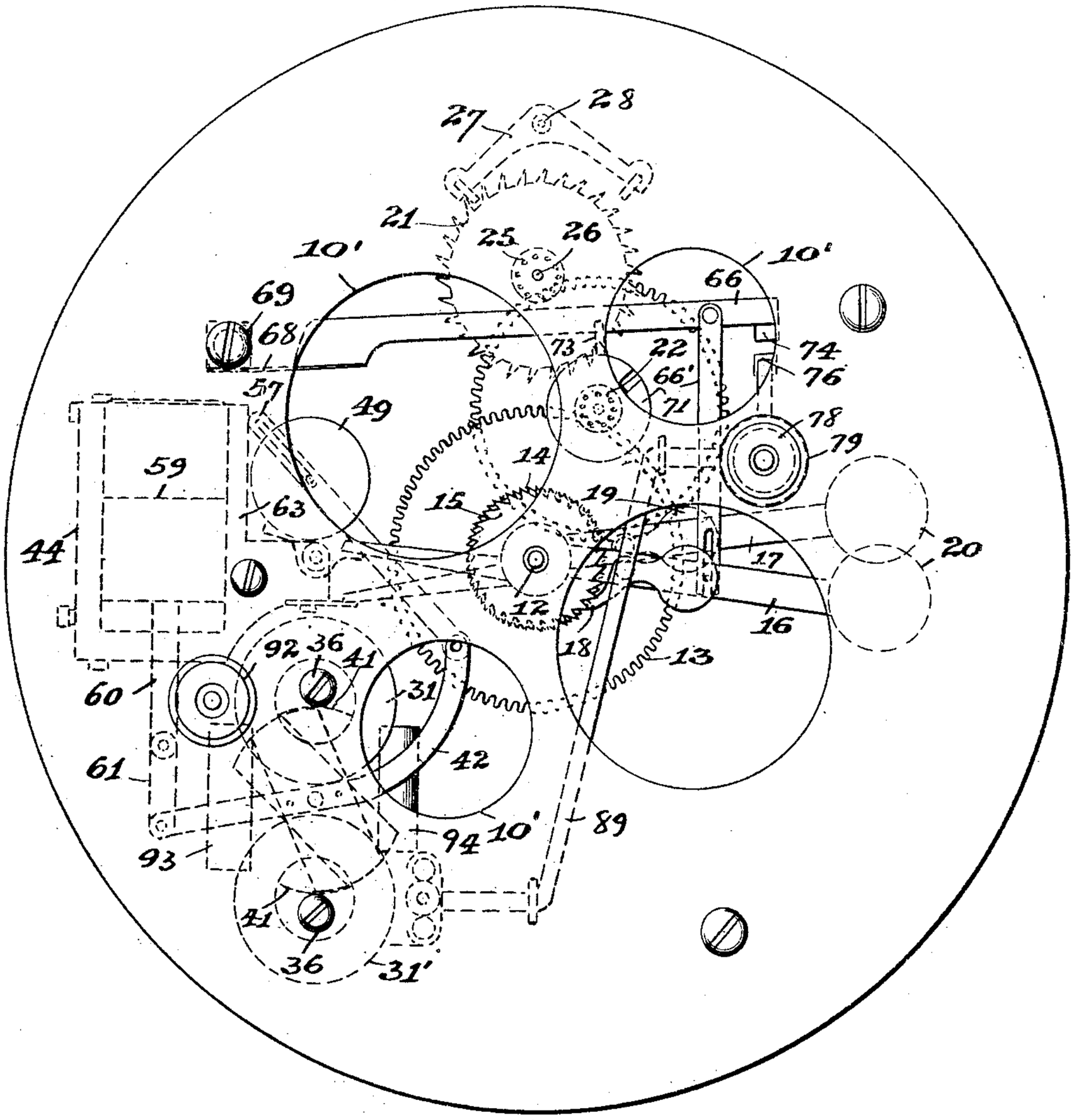
4 SHEETS—SHEET 2.

Fig. 2.



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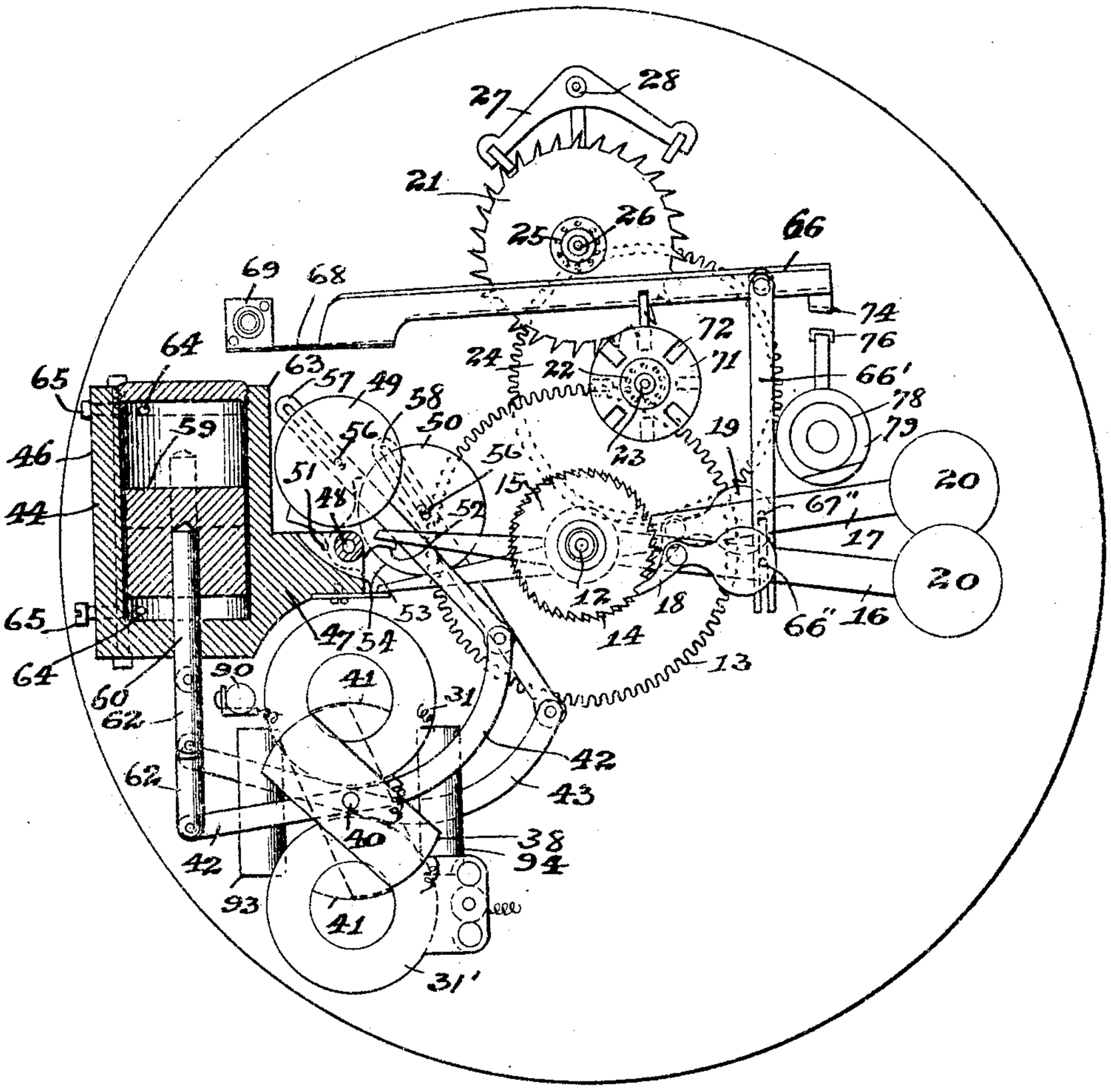
4 SHEETS—SHEET 3.

Fig. 3.



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4 SHEETS—SHEET 4.

Fig. 5.

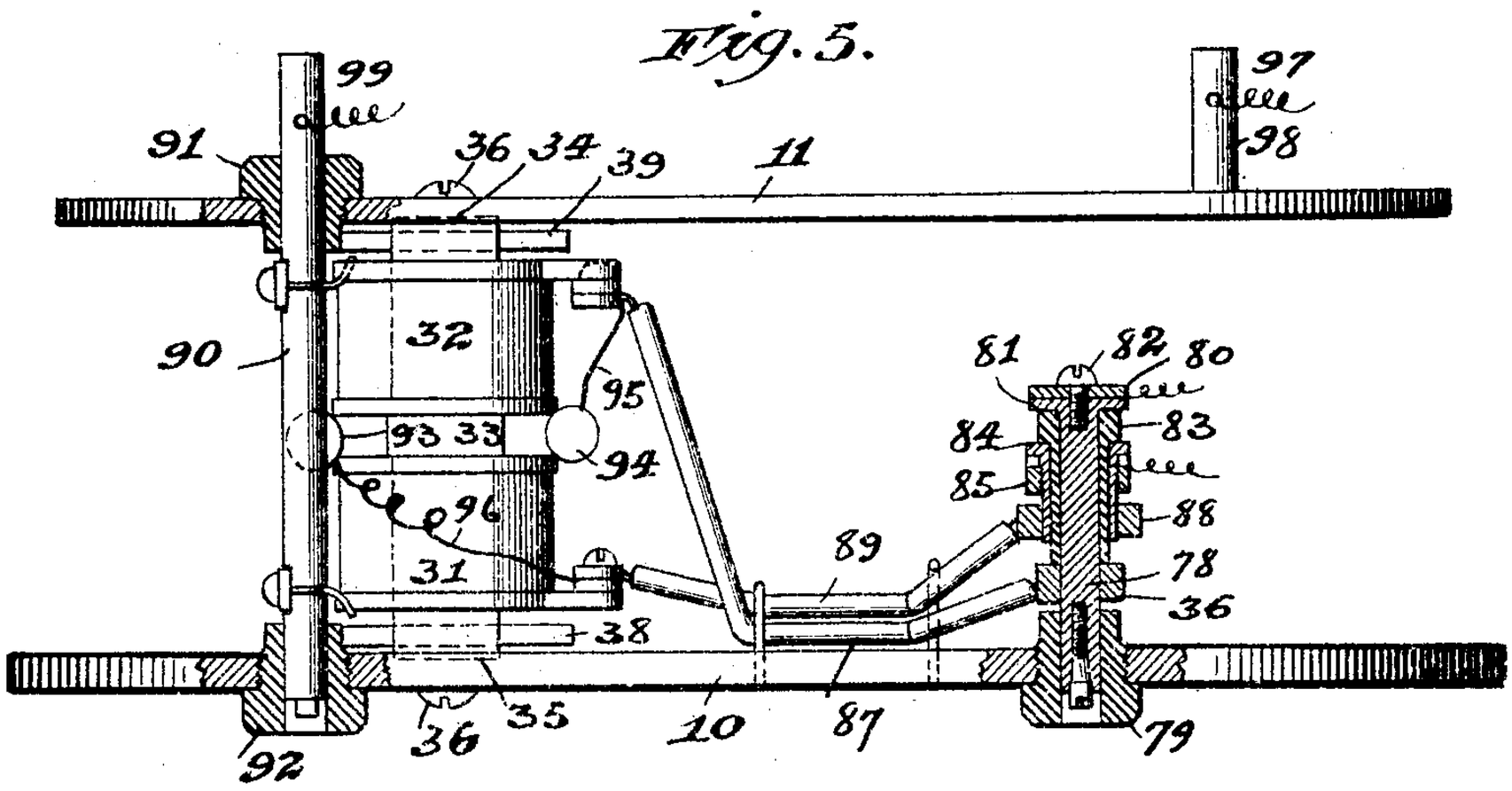
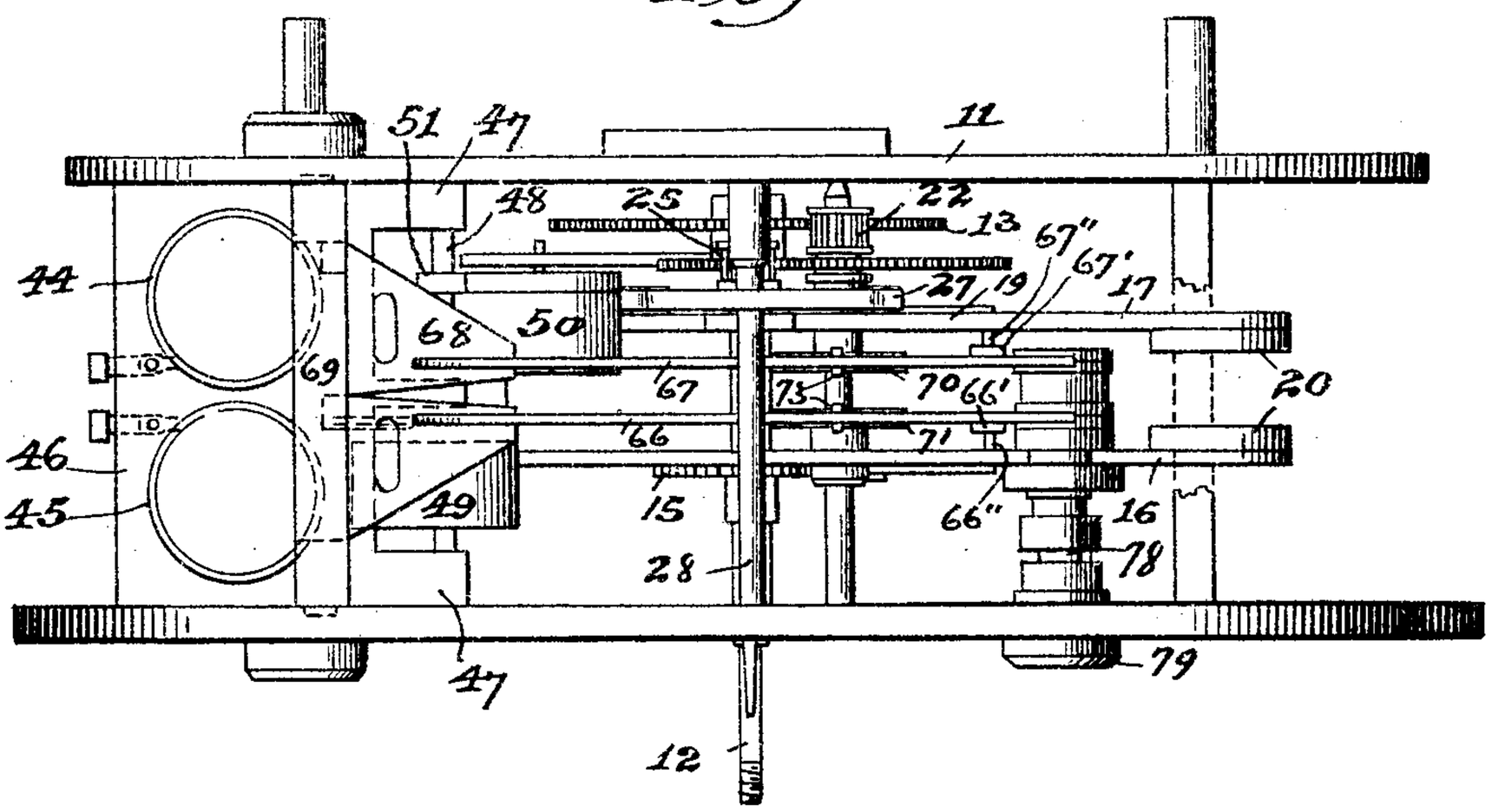


Fig. 4.



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UNITED STATES PATENT OFFICE.

FRED I. GETTY, OF JENNINGS, LOUISIANA, ASSIGNOR TO CHARLES F. GILLMANN, OF NEW YORK, N. Y.

MASTER-CLOCK.

961,950. Specification of Letters Patent. **Patented June 21, 1910.**

Application filed January 20, 1910. Serial No. 539,073.

To all whom it may concern:

Be it known that I, FRED I. GETTY, a resident of Jennings, in the parish of Calcasieu and State of Louisiana, have invented certain new and useful Improvements in Master-Clocks, of which the following is a specification.

This invention relates to improvements in master clocks, and refers more specifically to improvements in clocks of that type which receive their primary power from a source of electricity which serves to elevate a weight or weights, which in turn actuate the clock by gravity.

Among the salient objects of the invention are to provide a simple compact, reliable and positive mechanism which is organized to control the sending of current over an electrical circuit or circuits intermittently; to so organize the device that the mechanism for thus controlling the electrical circuit or circuits is an integral part of the clock itself as distinguished from an auxiliary attachment; to provide a construction in which the winding power generated by transmission of current through an electro-magnet serves to actuate an intermediate mechanism, which in turn supplies the power used to run the clock, thereby avoiding all of the objectionable features incident to actuating a clock mechanism directly by an electric magnet; to provide a construction in which means are provided for insuring a gradual movement of the parts actuated electrically, and the circuit is maintained during such gradual movement and automatically interrupted at the end of the same; to provide a construction in which the running of the clock mechanism operates a trip mechanism at the end of a definite interval, which in turn effects the closing of the electrical circuit and a consequent re-winding, as distinguished from a mechanism in which the closing of the circuit is brought about by the movement of a part connected and moving with the clock mechanism; to provide an organization in which the weights which directly actuate the clock mechanism are taken out of driving engagement only during the brief instant necessary for a freely falling weight to fall a short distance; to provide an organization, the motive elements of which are of duplex construction and arranged to operate alternatively; to provide in a construction of the character referred to an improved form of duplex electro-magnet; to provide a construction in which the interval during which the electric circuit remains closed may be varied by adjustment, and in general to provide improved features of construction and arrangement in an organization of the character referred to.

To the above ends the invention consists in the matters hereinafter described and more particularly pointed out in the appended claims, and the invention will be more readily understood from the following description by reference to the accompanying drawings forming a part thereof and in which—

Figure 1 is a view in side elevation of the parts of a clock mechanism embodying my invention, certain parts of the frame structure being broken away to more clearly disclose the construction. Fig. 2 is a front face view of the same, with the principal parts shown in dotted lines behind the front frame plate. Fig. 3 is a view generally similar to Fig. 2 but with the face plate removed and certain parts shown in section. Fig. 4 is a top plan view of the mechanism, and Fig. 5 is a detail showing more particularly the construction and arrangement of the magnets and their circuit connections.

Referring to the drawings, 10 and 11 respectively designate the front and back face or frame plates between which the principal parts of the mechanism are mounted; these frame plates desirably and as herein shown taking the form of circular disks, which in the case of the front plate is partly cut out or provided with openings as indicated at 10′. Extending through and journaled in said frame plates is a main shaft or minute hand arbor 12 provided with a rigidly connected gear 13, and a pair of similarly connected ratchet wheels 14 and 15, which latter are secured at some distance apart upon said shaft, for a purpose which will hereinafter appear. Upon the main shaft 12 adjacent to the respective ratchet wheels 14 and 15 are journaled a pair of weighted actuating levers 16 and 17 which are apertured at points intermediate their lengths to receive said main shaft or arbor, and extend approximately horizontally. Each actuating lever is provided adjacent to the periphery of its respective ratchet wheel with a pivoted pawl, as 18 and 19, which pawls are severally mounted upon the respective levers and

weighted so as to be normally held by gravity yieldingly in engagement with their respective ratchets. The levers 16 and 17 have a limited oscillatory movement, their outer weighted ends 20 being alternately raised in a manner hereinafter described and allowed to descend by gravity, thereby imparting rotation to the main shaft through said ratchet wheels. The gear 13 mounted upon the main shaft forms the primary member of a train of gears which transmit motion to the escapement wheel 21 is a familiar manner. Said train of gears comprises a pinion or lantern wheel 22, which is actuated by the gear 13 and is mounted upon an arbor 23 journaled between the frame plates, and a second gear 24 mounted upon said arbor 23, which in turn actuates a second pinion or lantern wheel 25 mounted upon an arbor 26, which carries the escapement 21 hereinbefore referred to. Above the escapement wheel is mounted the escapement pallet 27 upon a rock shaft 28 which carries the pendulum fork or clutch 29 and imparts movement to the pendulum 30, all in a usual manner and as shown clearly in the drawings.

Describing now the re-winding mechanism whereby the gravity levers are raised from time to time, 31, 31′ and 32, 32′ designate the pairs of spools of two electro-magnets which are mounted between the front and back frame plates; said magnets having their poles disposed in opposite directions so that their base ends are contiguous to each other, and a single base or heel plate 33 is made to serve for both.

In the preferred construction shown the inner faces of the frame plates 10 and 11 are slightly recessed, as indicated at 34 and 35, Fig. 5, to receive the ends of the pole pieces, and securing screws are inserted through the respective frame plates and into the ends of the pole pieces, as indicated at 36, thereby securing the magnet spools rigidly in position. The heel piece 33 is suitably united with the source of the magnets, and therefore held interposed between the two magnets.

37 and 37′ (see Fig. 1) designate rock bars having their respective ends journaled in the face plates 10 and 11, and their inner ends journaled in the heel piece 33; said rock bars being desirably and as herein shown arranged in axial alinement with each other. These rock bars serve to support the armatures 38 and 39 of the respective magnets; said armatures being centrally apertured as indicated at 40, Figs. 2 and 3, to receive rock bars which extend thereto but being fixed rigidly thereon so that the rock bars are respectively oscillated positively with the armatures. The armatures are thus mounted to oscillate in planes at right angles to the pole pieces; the latter being recessed in their approximate sides, as indicated at 41, to secure a more efficient coöperation in a well understood manner. Upon each rock bar is rigidly mounted a lever, as 42 and 43, which levers are connected with the respective rock bars at points intermediate the lengths of the levers; one end of each lever being extended inwardly toward the central part of the clock mechanism, and being curved upwardly as shown clearly in Figs. 2 and 3, while its opposite end is extended outwardly to a point approximately in axial alinement with a vertically disposed dash-pot cylinder severally indicated at 44 and 45. The two dash-pot cylinders are conveniently and as herein shown, formed within a single casting designated as a whole 46, which is suitably shaped and bored out to provide the dash-pot cylinders; said casting being secured rigidly between the front and back frame plates, as best seen in Fig. 4, and provided at its inner side with a pair of horizontal extensions or lugs 47, which serve to support a cross-bar or rod 48, upon which are mounted two circular weights 49 and 50. Each of said weights is provided at its periphery with a pivot ear or lug 51 (see Fig. 3) which is engaged with the cross-bar 48, said lugs being provided with extensions or projecting portions, as indicated at 52 and 53, Fig. 3, which serve to limit the downward oscillation of the weight by engagement with upright faces or shoulders 54 formed upon the ends of the lugs 47. Each weight is likewise provided with an axially disposed stud 56, which studs are respectively engaged by the slotted ends of a pair of links 57 and 58, the opposite ends of which are severally and pivotally connected with the curved end of the levers 42 and 43.

Within each dash-pot is arranged a weighted piston 59, with which is connected a piston stem 60 which extends downwardly to the lower end of the dash-pot cylinder, and is flexibly connected with the end of the corresponding lever 42 or 43 by means of a link, as 61 and 62. The relative arrangement of the parts connected with and actuated with the armatures of the respective magnets are such that the weighted pistons 59 over-balance the circular weights 49 and 50, and normally hold the latter oscillated upwardly to their upper elements of movement, in which position the said circular weights rest with their peripheries against upright faced portions 63 on the dash-pot casting. The weights 49 and 50 are severally arranged in vertical alinement with the left-hand ends of the weighted levers 16 and 17, which levers project into the path of said weights so that when the latter descend they engage the levers and lift their opposite ends upwardly until arrested. It will be noted that when raised to their upper limits of movement, the weights occupy positions

with their center of gravity almost vertically above the pivotal axes of their connecting ears, but with their said centers of gravity slightly to the left of a line extending vertically through their pivotal axes, so that they are retained by gravity in their upraised position. The length of the actuating links 57 and 58, and the construction of the slots therein which engage the studs 56 of the weights are such that when the armature of the respective magnets approach their limits of movement in closing, the upper ends of the slots of the links engage the studs of the weights and pull the latter over and downwardly out of equilibrium, whereupon they are free to drop upon the ends of the weighted levers 16 and 17 in the manner hereinbefore described. As will hereinafter appear, the weights 49 and 50 are actuated alternatively.

By reason of the connections described it will be obvious that as the two armatures are brought into close position by the energizing of the magnets, the weighted pistons 59 will be raised, and upon deënergizing of the magnets they will be permitted to descend, and will in operation lift the secondary weights 49 and 50.

In order to insure a more gradual movement of the weighted pistons, both in their upward and downward movements, I provide vent passages 64 leading from the upper end of each cylinder through the wall thereof downwardly to, and communicating with the lower end of the cylinder, as indicated clearly in Fig. 3. These passages afford a more or less free flow of the air contained on one side or the other of the pistons to the opposite side thereof during the movement of the pistons, and in order to regulate such flow I provide throttle screws 65 which are carried in through the side walls of the respective cylinders and have their ends arranged to intersect the said air passages 64, whereby the latter may be restricted more or less by advancing or retracting the throttle screws. It is to be noted in this connection that the dash-pots are practically sealed against access of air, and by providing communicating passages between their opposite ends, there is no tendency to draw in the air, so that accumulation of dust and dirt within the dash-pots which would tend to interfere with their uniform operation, is entirely avoided.

Describing next the mechanism whereby the energizing currents are controlled, 66 and 67 designate a pair of contact levers flexibly connected by means of plate spring strips 68 with a cross-bar 69 extending between the main frame plates, as clearly shown in Figs. 3 and 4; said contact levers being arranged to extend parallel with each other and approximately horizontal. At points in vertical alinement with the respective levers 66 and 67, trip wheels, as 70 and 71, are mounted upon the arbor 23, which is actuated from the main gear 13 as hereinbefore described. Each trip wheel is provided in its periphery with four notches 72, spaced at equal angles apart; the notches of one trip wheel being exactly alternated with those of the other, as indicated in Fig. 3. The peripheral portions of the trip wheels intervening between the notches are smooth and circular, and at points vertical above the centers of the respective trip wheels, the respective levers 66 and 67 are provided with wipers 73 which normally rest upon the respective trip wheels and hold the levers elevated, but are suitably shaped to drop into the notches 72 as the latter are brought into register therewith by the rotation of the wheels. Upon the end of each lever is mounted a vertically disposed contact plate, as 74 and 75, which are severally arranged to engage between pairs of spring contact springs 76 and 77 mounted upon a suitable support designated as a whole 78. The support 78 conveniently takes the form of an elongated metal stud seated in the frame plate 10 and arranged to project inwardly therefrom; said stud being insulated from the frame plate by means of a bushing 79. The pair of spring contact strips 77 are mounted in direct metallic contact with the stud 78, said strips being to this end seated in washers 80 and 81, which are secured by means of a screw 82 upon said stud. The pair of spring contact strips 77, however, are insulated from said stud 78 by an insulating sleeve 83 mounted upon the stud and a pair of washers or collars 84 and 85 carrying the respective members of said strips being mounted upon said sleeve, as indicated clearly in Fig. 5.

86 designates a metallic collar mounted upon the body of the stud 78, with which is connected a conductor 87 which leads to the winding of one of the magnets, and 88 designates a second contact collar mounted upon the contact member 84, and connected with a second conductor 89, which leads to the winding of the other magnet. The opposite terminal of each magnet winding is connected with a contact bar 90 (see Fig. 5) arranged to extend through the frame plates adjacent to the magnet spools, and insulated from said frame plates by means of insulating bushings 91 and 92. In order to lessen sparking, a shunt coil, as 93 and 94, is provided for the respective magnets; these shunt coils being connected with the conductors 95 and 96, and with the contact bar 90 at their opposite ends by means of conductors, as shown.

In order to lift the respective contact levers 66 and 67 out of engagement with the spring contact strips, and also out of locking engagement with the notches of the trip

wheels, each lever is provided with a pivoted downward depending link, as 66′ and 67′, which links are provided at their lower ends with slots, engaged with studs 66″ and 67″, upon the respective weighted levers 16 and 17; the arrangement being such that as the weighted levers are raised they lift the respective contact levers positively, but permit the weighted levers to return without drawing downward the contact levers.

The circuits through the mechanism and magnets may be traced as follows: The main metallic frame of the clock mechanism is placed in electrical connection with a suitable source of current, as, for instance, through the conductor 97 connected with the stud 98, and therefore places the contact levers 66 and 67 in circuit by reason of their metallic connections with the main frame. From the respective contact levers 66 and 67 the circuit is through the contact strip 76 or 77, and thence to 87 and 89, through the windings of the respective magnets and to the contact bar 90. Shunt circuits also extend through the shunt coils 93 and 94 to the contact bar 90. From the latter the current is led to external circuit controlled by the master clock through a conductor 99.

The operation of the mechanism has, it is thought, been made plain in connection with the foregoing description, but may be briefly recapitulated as follows: Assuming that the clock is connected in circuit with a suitable source of current, it will be noted that the gravity levers 16 and 17 are disposed at an angle apart equal to one-half their complete angular travel, and that the trip wheels are so disposed that the circuits through the respective magnets will be closed and the levers raised in exact alternation. Accordingly, as the lowermost one of the two gravity levers approaches the limit of its downward movement, that notch of one of the trip wheels which controls this particular lever comes into register with the wiper of the corresponding contact lever, and the latter drops, thereby closing the circuit through that one of the magnets controlling the weights which actuates the gravity lever in question. The energizing of this magnet draws its armature into, or more nearly into alinement with the pole pieces, and accordingly transmits a downward movement to the curved end of the lever, as 42, connected with this armature. As the curved lever approaches the limit of its downward movement, its slotted upper end comes into positive bearing with the stud of the secondary weight and pulls the latter over far enough to carry it out of equilibrium, whereupon it falls freely, engaging the end of the weighted lever during its descent and raising the latter to its upper limit of movement. The same closing movement of the magnet which starts downwardly the secondary weight serves also to raise the over-balancing weight connected with the opposite end of the curved lever to its upper limit. As the gravity lever reaches its upper limit of movement, the contact lever corresponding thereto is positively raised through the medium of the link 66′ thus opening the circuit and deënergizing the magnet, whereupon the over-balancing weight is free to descend and immediately starts downwardly. Almost immediately after the over-balancing weight begins to descend, the secondary weight is engaged and forced upwardly by the link and lever connections extending between the over-balancing weight and secondary weight, so that it follows that the gravity is free to act upon the clock movement almost instantly after it has been returned to its uppermost position. When the gravity lever last raised has descended through one-half its travel, the other gravity lever will have reached its lower limit of movement, and will be raised by the other duplex set of mechanism in precisely the same manner. It follows, therefore, that both of the weighted levers are acting upon the clock movement at all times except during the brief intervals during which they are being raised and from the time they have reached their uppermost limits of movement until the respective over-balancing weights have begun to descend.

It will be understood from the foregoing that I fully attain the several objects of the invention enumerated, and produce an extremely reliable and uniformly running mechanism free from any of the serious objections which have heretofore pertained to electrically actuated gravity clocks.

While I have herein shown and described a preferred embodiment of the invention, yet it will be understood that the details of construction may be modified without departing from the spirit thereof, and I do not, therefore, limit myself to the details shown herein except to the extent that they are made the subject of specific claims.

I claim as my invention:

1. In a clock, the combination with the clock movement, and a primary weighted lever arranged to directly actuate said clock movement by gravity, of a secondary weight adapted to over-balance and raise the primary weighted lever, when released and permitted to descend, an electro-magnet operatively engaging the said secondary weight to lift the former to a normally uplifted position, an electric circuit including said magnet, and clock controlled contact devices for closing said circuit at the end of a predetermined interval of time.

2. In a clock, the combination with the clock movement, and a weighted lever arranged to drive said movement, of a secondary weight adapted to act upon said lever

to raise the weighted end thereof as said secondary weight descends, an over-balancing weight, lever connections between said secondary and over-balancing weights whereby the descent of one uplifts the other, an electro-magnet, operative connections between said electro-magnet and said over-balancing weight whereby the latter is raised during the closing movement of the armature of the magnet, and the secondary weight thereby caused to descend, an electric-circuit including said magnet, and contact devices controlled by said clock mechanism, whereby said electric circuit is closed at the end of a predetermined interval.

3. In a clock, the combination with the clock movement, and a weighted lever arranged to drive said movement, of a secondary weight pivotally mounted to oscillate in a definite vertical plane, and arranged to act upon said lever to raise the weighted end thereof, an over-balancing weight, link and lever connections between said secondary and over-balancing weights, a rocking support constituting the fulcrum upon which said lever connections are mounted, a magnet having an oscillatory armature operatively connected with said rocking support, an electric circuit including said magnet and contact devices controlled by said clock movement.

4. In a clock, the combination with the clock movement, and a primary weighted lever arranged to drive said movement, of a secondary weight adapted to raise said weighted lever, an over-balancing weight operatively connected to raise said secondary weight, mechanism arranged to raise said over-balancing weight, means arranged to retard the descent of said over-balancing weight under the action of gravity, and a clock controlled trip mechanism controlling the mechanism which lifts the over-balancing weight, substantially as described.

5. In a clock, the combination with the clock movement, a primary actuating weight and an over-balancing weight, of means for retarding the movement of said over-balancing weight comprising a dash-pot cylinder within which said weight is arranged to move, and a restricted passage extending from one end of said dash-pot to the other, whereby the controlling fluid is permitted to pass gradually around the weight.

6. In a clock, the combination with the clock movement, a primary actuating weight and an over-balancing weight, of means for retarding the movement of said over-balancing weight comprising a dash-pot cylinder within which said weight is arranged to move, and a throttle controlled passage extending from one end of said dash-pot to the other, whereby the controlling fluid is permitted to pass gradually around the weight.

7. In a clock, the combination with the clock movement, and a weighted lever arranged to drive said movement, of a secondary weight pivotally mounted to oscillate in a vertical plane, means supporting said secondary weight with its center of gravity above its pivotal axis, an electro-magnet, operative connections between said magnet and said secondary weight, whereby the closing movement of the magnet moves the weight out of equilibrium, and a clock controlled circuit including said magnet.

8. In a clock, the combination with a weighted lever arranged to directly actuate said movement, a secondary weight, mechanism for actuating said secondary weight to cause it to descend upon the weighted lever at regular intervals, a trip wheel forming a part of, and moving with said clock movement, a contact lever operatively engaging said trip wheel, a contact device carried by said contact lever, coöperating stationary contact devices arranged in the path of said lever, and direct connections between said weighted lever and said contact lever, whereby the raising of the weighted lever operates to open a circuit controlled by said contact lever.

9. In a clock of the character described, the combination with the main train of the clock movement, of a trip wheel moving with said main train and provided with a series of peripheral radially disposed notches, a yieldably mounted contact lever provided with a wiper bearing yieldingly against the periphery of said trip wheel and adapted to enter the notches thereof when the latter are brought into register therewith, a fixed contact device and a coöperating contact device mounted upon said contact lever, a weight arranged to directly actuate said clock movement, a lost motion connection connecting said contact lever with said weight, whereby the raising of the latter operates to move the contact lever into open position positively, but the weight is free to descend independently of contact lever, and electrically actuated mechanism controlled by said contact devices and operating to raise said weight at predetermined intervals.

10. In an electrically actuated clock, the combination with the train of the clock movement, of means for actuating said movement comprising independently acting duplex gravity levers and ratchet mechanisms, and means for raising said levers alternately at predetermined intervals comprising independently operating secondary weights, independently operating electro-magnets operatively connected to raise said weights, an electric circuit including both of said magnets and clock controlled contacts for directing current through said magnets, substantially as described.

11. In a clock, the combination with the

clock movement and a weight which directly actuates said movement, of a secondary weight adapted to intermittently over-balance and raise said primary weight, an electro-magnet operating to move said secondary weight, said magnet comprising four spools arranged in two pairs in axial register with each other, a heel piece interposed between said pairs and common to both magnets, core pieces for each of the respective spools, severally connected with said heel piece, and oscillatory armatures pivotally mounted between the ends of the respective pole pieces, the movement of which in one direction operates to return said secondary weight at the end of a predetermined interval.

12. In a clock of the character described, the combination with the main train of the clock movement, of a pair of trip wheels moving with said main train and each provided with a series of peripheral radially disposed notches, the notches of one trip wheel being alternated with respect to those of the other in angular relation, a yieldably mounted contact lever for each trip wheel and provided with a wiper bearing yieldingly against the periphery of said wheel, a fixed contact device for, and a coöperating contact device upon each contact lever, duplex weights arranged to directly co-act with said clock movement, lost motion connections between said several contact levers and the respective weights whereby the raising of either weight operates to move the respective contact lever into open position positively, but the weight is free to descend independently of the contact lever, secondary weights arranged to severally act upon said primary weights to lift the latter, duplex magnets severally operatively connected with the respective primary weights, and an electric circuit including both of said magnets and controlled by said contact device, substantially as described.

13. In a clock, the combination with the clock movement, of a primary weight; a secondary weight adapted to raise said primary weight, an over-balancing weight operatively connected to raise said secondary weight, means for lifting said over-balancing weight and means retarding the movement of said over-balancing weight.

In witness hereof, I hereunto subscribe my name this 14 day of January, A. D., 1910.

FRED I. GETTY.

Witnesses:
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No citations