May 7, 1935. W. J. VAN OSDEL 2,000,307

ALTERNATING CURRENT CLOCK

Filed July 21, 1931 3 Sheets-Sheet 1

Fig. 1.

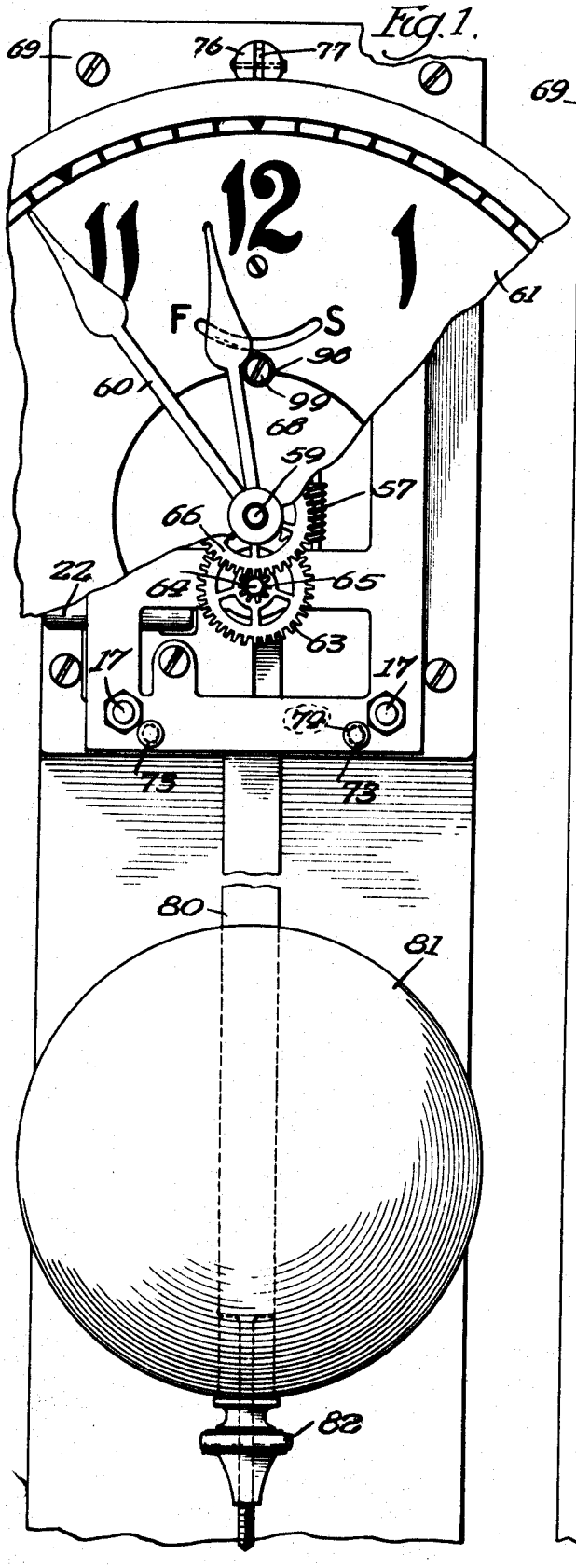

Fig. 2

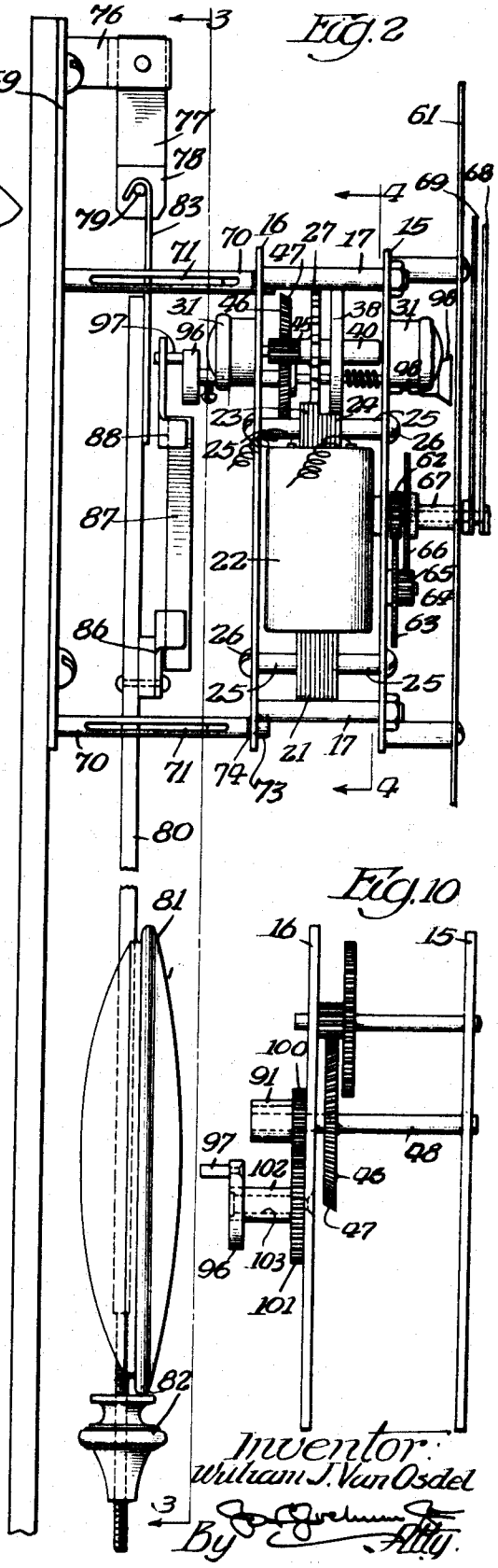

Fig. 10

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Fig. 4

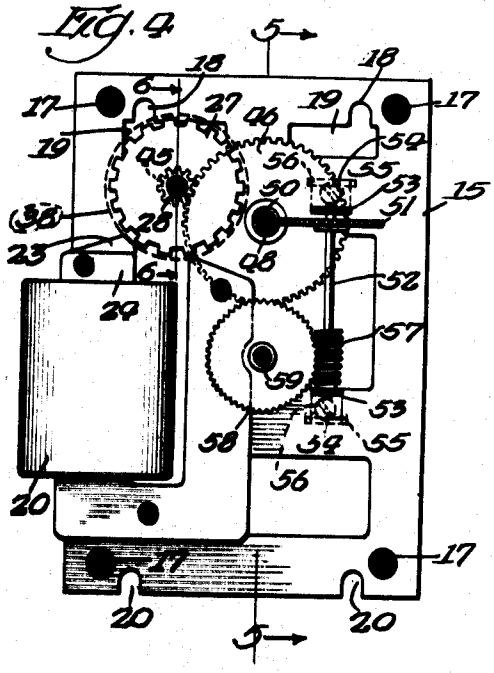

Fig. 3

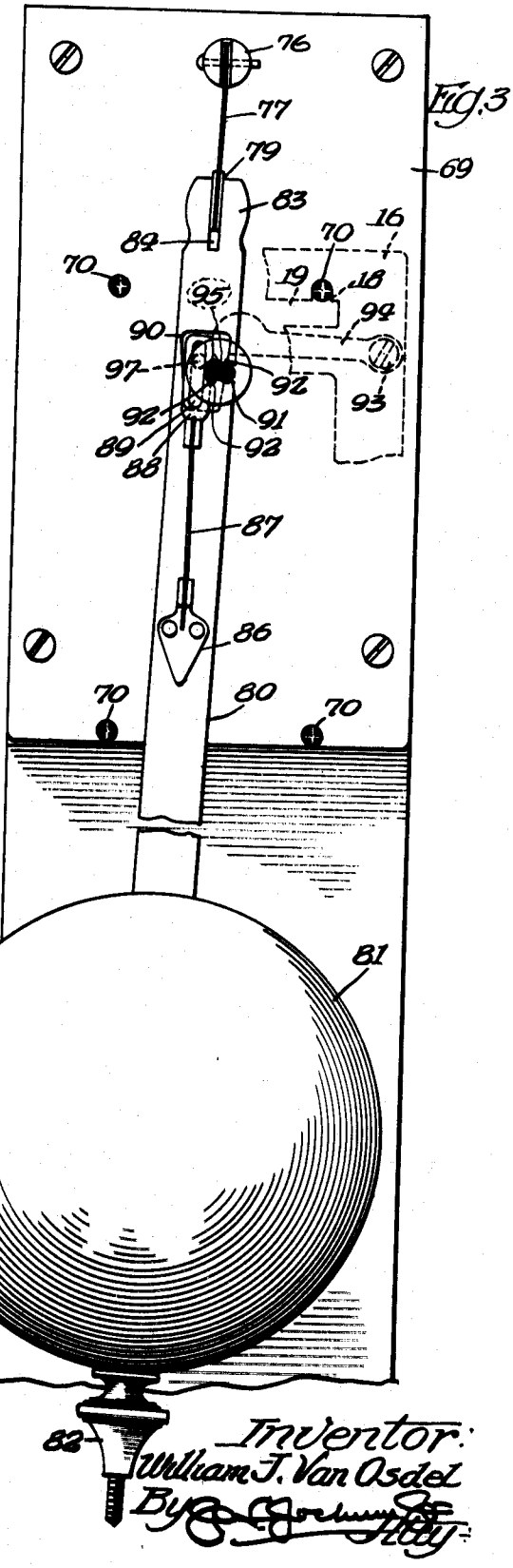

Fig. 5

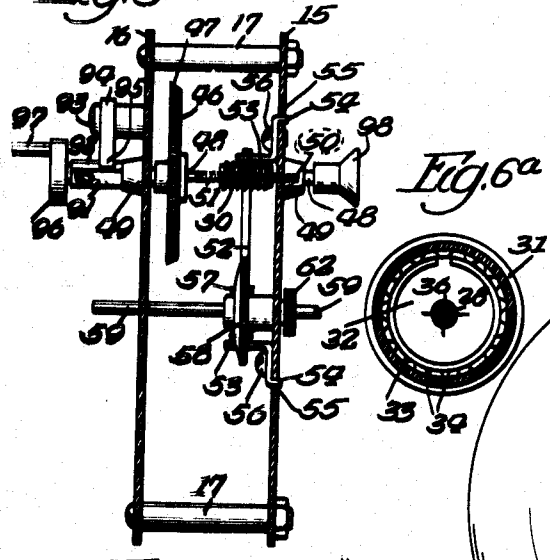

Fig. 6a

Fig. 6

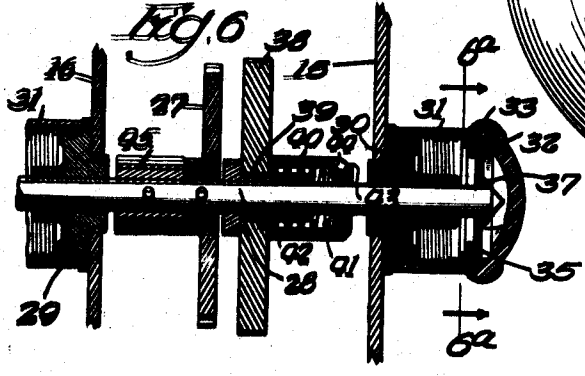

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Fig. 7

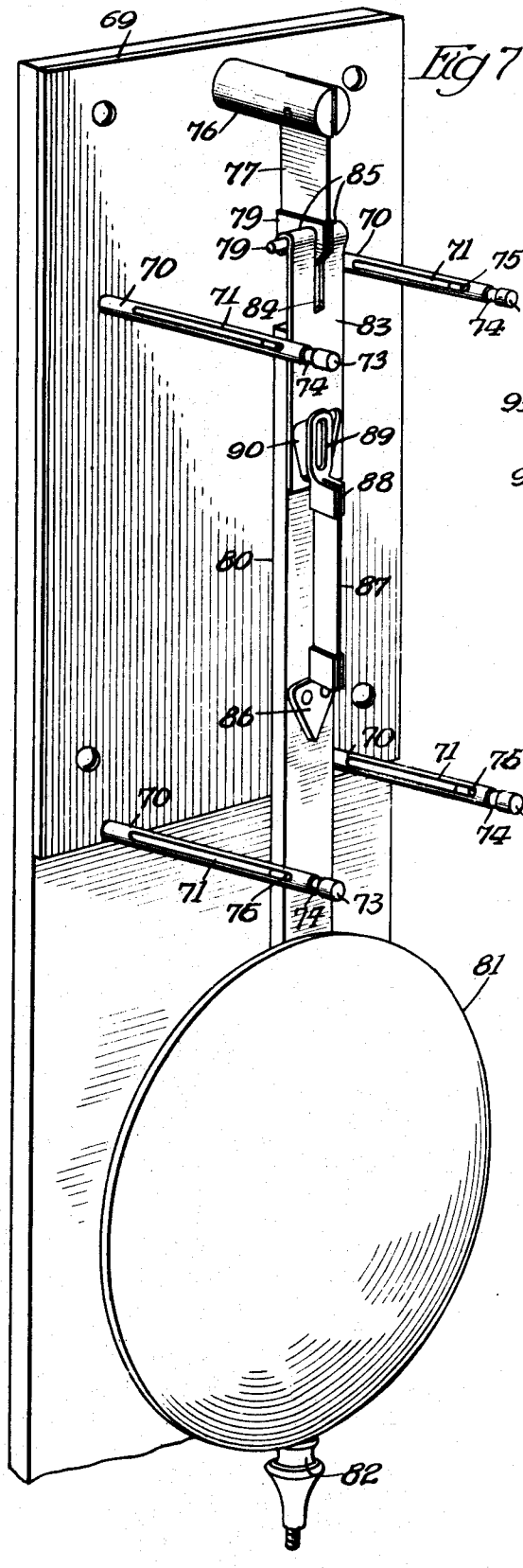
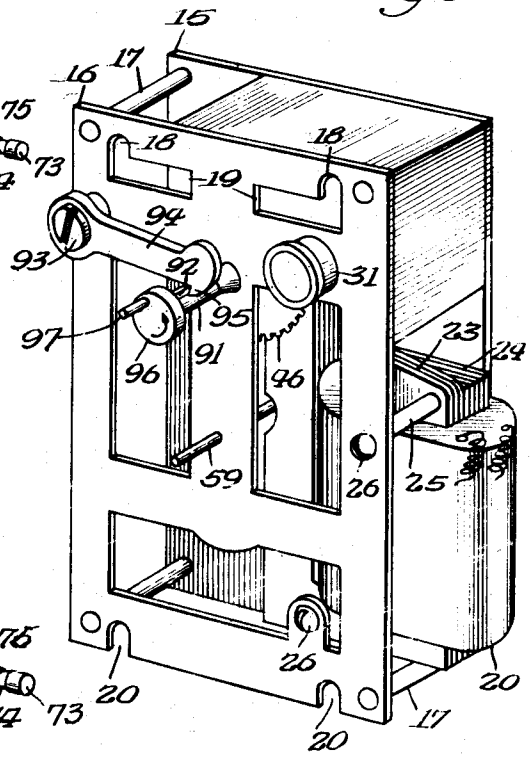


Fig. 8



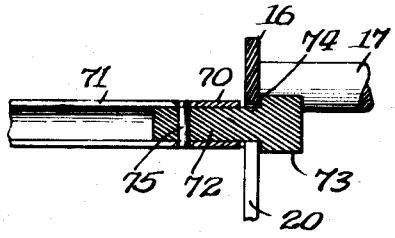


Fig. 9

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UNITED STATES PATENT OFFICE

2,000,307

ALTERNATING CURRENT CLOCK

William J. Van Osdel, Chicago, Ill.

Application July 21, 1931, Serial No. 552,220

8 Claims. (Cl. 58—26)

This invention relates in general to electric clocks and is more particularly adapted to be actuated directly by the existing commercial alternating current systems, whereby the usual lighting system, and power currents, may be employed for actuating the clock to indicate the correct time, which is regulated from a station on the alternating current system, and one of the objects of the invention is to provide an improved synchronous motor clock of this character having associated therewith a pendulum, and a ticking mechanism, thereby providing an audible signal in the clock.

A further object is to provide in a clock of this character an improved gear train whereby the number of parts will be reduced and the mechanism greatly simplified.

A further object is to provide improved means for supporting the clock movement whereby the entire movement may be readily detached from the support and removed from the clock case as a unitary structure, and as readily replaced into operative position.

A further object is to provide an improved form of magnet core so shaped as to cause the motor armature or rotor to run in a predetermined position with respect to the core, and an improved manner of mounting the core, whereby the magnet core will be clamped between and secured to both of the frames of the clock movement, thereby reducing any hum in the operation of the mechanism, as vibration of any free parts will be obviated.

A further object is to provide means whereby the motor mechanism may be started through the clock dial.

To the attainment of these ends and the accomplishment of other new and useful objects as will appear, the invention consists in the features of novelty in substantially the construction, combination and arrangement of the several parts hereinafter more fully described and claimed and shown in the accompanying drawings illustrating this invention and in which

Figure 1 is a view partly in front elevaton, partly broken away and partly in section, of a clock mechanism of this character and showing a portion of the dial of the clock, all constructed and arranged according to the principles of this invention.

Figure 2 is a left hand end elevation of Figure 1, with parts omitted.

Figure 3 is a detail sectional view taken on line 3—3, Figure 2.

Figure 4 is a detail sectional view taken on line 4—4, Figure 2, with parts omitted.

Figure 5 is a sectional view taken on line 5—5, Figure 4.

Figure 6 is a detail sectional view on an enlarged scale, showing the manner of securing the balance spring and the manner of journaling or mounting one of the ends of the shaft of the rotor.

Figure 6ª is a sectional view taken on line 6ª—6ª, Figure 6.

Figure 7 is a detail perspective view of the pendulum and a supporting means for the clock movement.

Figure 8 is a detail perspective view of the clock movement detached from its support.

Figure 9 is an enlarged detail sectional view showing the manner of connecting the supporting cushions for the clock movement to the supports.

Figure 10 is a detailed elevation, with parts omitted, of a modified form of the invention.

The clock mechanism or movement is formed as a unitary structure and consists essentially of front and rear plates 15—16 secured together in spaced relation in any desired or suitable manner, such as by means of bars or rods 17 and between which plates the clock movement is arranged. The rear plate 16 is provided with openings 18 therethorugh adjacent one end thereof which have communication with slots 19, and in the lower edge of the plate 16 are arranged recesses 20 opening thorugh the edge of the plate, for purposes to be hereinafter set forth.

Arranged between the plates 15 and 16 is a magnet 21 about which a coil 22 is wrapped and the coil is supplied with a current from any suitable source, such as the line supply. The magnet 21 is preferably formed of two legs, and the coil is wrapped about one of the legs, a portion of the leg projecting above the coil and one portion 23 of the end of the magnet is elevated or arranged at a higher elevation than the remaining portion 24 of the magnet, for a purpose to be set forth.

The magnet poles are firmly secured in position by being clamped between the plates 15 and 16 through the medium of spacer members 25, and through which spacer members and the plates 15—16, as well as through the pole piece, fastening members 26 pass. With this arrangement it will be manifest that the parts will be firmly secured against vibration and thereby the production of a hum in the operation of the mechanism will be avoided.

A rotatable member 27 is arranged to operate adjacent the raised portion 23 of the pole piece 21

and by reason of the raised portion, this rotatable part will be always maintained centrally with respect to the end of the pole.

The rotatable member 27 is mounted upon a shaft 28, being journaled in suitable bearings 29—30, and over each of which bearings a cap 31 is threaded so as to form lubrication spaces into which the ends of the shaft 28 project. Disposed within the cap 31 is a washer 32 of a diameter slightly greater than the internal diameter of the cap so that when the washer is placed within the cap the peripheral edge 33 thereof will be turned upwardly and this edge 33 is provided with notches or recesses 34 so as to permit the washer to be bent over at its periphery, and also prevent the periphery from puckering. The washer is held in position in any suitable manner, preferably by means of a split spring ring 35. The washer is provided with an aperture therethrough at its diametric center, and portions of the washer adjacent the aperture are split as at 36 so that when the end of the shaft 28 is inserted into the opening the portions of the washer encompassing the opening will be deflected as at 37 to form a feeding wick for the lubricant.

An inertia member 38 is mounted loosely upon the shaft 28 in proximity to the rotor 27, the former being held in position preferably by being mounted upon a collar 39 which loosely encompasses the shaft 28. A cap 40 is sleeved upon and secured to the shaft 28 and extends over the collar 39 and is of an internal diameter considerably greater than the external diameter of the collar, the collar 39 terminating short of the bottom of the cap.

A coil spring 41 encompasses the hub 39, and as the hub terminates short of the closed end of the cap, some of the coils 41 will be disposed beyond the hub 39. One end of the spring 41 is anchored as at 42 to the inertia member 38, and the other end 43 of the spring is secured to the cap 40 by being inserted into a slot 44 in the cap.

It will therefore be manifest that during the oscillatory movements of the inertia member 38 about the shaft 28, the spring 40 will be first contracted and then expanded and by reason of the fact that a portion of the spring 41 encompasses the hub 39, it will be manifest that the spring when it is under tension or otherwise will not be capable of being deflected laterally, which latter would tend to impair the effectiveness of the spring.

Connected with the shaft 28 is a gear pinion 45 which meshes with a gear 46, the teeth of which latter gear are beveled as at 47, so that the teeth will gradually be brought into mesh during the rotation of the gears and thereby reduce to a minimum the noise caused by the teeth of the two gears coming into contact.

The gear 46 is mounted upon a shaft 48 journaled in suitable bearings 49 in the frame members 15—16, and carried by the shaft 48 is a worm 50 which meshes with a worm gear 51 secured to a vertical drive shaft 52. The shaft 52 is mounted in bearings 53 secured to the plate 15 of the movement, and one extremity of each of the bearings is deflected as at 54 to project into slots 55 in the frame member 15, the bearings 53 being secured in position against adjustment by means of fastening screws 56.

Connected with the vertical drive shaft 52 is a worm 57 which meshes with a gear 58 secured to the shaft 59, and to which latter shaft the minute hand 60 is connected. By reason of the slots 55, it will be manifest that the bearings 53 may be adjusted in directions to cause the vertical shaft 52 and the worm 57 thereon to be moved toward or away from the shaft 59 and with respect to the gear 58 for adjustment purposes, after which the screws 56 may be tightened so that the parts will be held against further movement.

The minute hand 60 moves over a dial 61 and connected to the shaft 59 is a gear 62 which meshes with a gear 63 rotatable upon a journal 64. Connected with the gear 63 is a pinion gear 65 which meshes with a gear 66 carried by a sleeve 67 that is telescoped over the shaft 59, and to which sleeve 67 the hour hand 68 is connected so that when the rotor 27 is operated motion will be transmitted therefrom through the pinion gear 45 to the gear 46, thence to the shaft 48, worm 50, worm gear 51, vertical shaft 52, worm 57, worm gear 58, to the shaft 59, thereby operating the minute hand 60. At the same time the gear 62 connected to the shaft 59 will rotate the hour hand through the medium of the intermeshing train of gears 62—63—65 and 66.

All of the above described mechanism is formed as a single unit and is adapted to be applied and removed as a unit. To that end the slots 18—19 and 20 are provided. The numeral 69 designates a suitable supporting structure which is provided with a plurality of laterally projecting posts or supports 70, preferably of a tubular construction, having slots 71 in their body portions to form yielding supports. In the ends of the tubular supports 70 are preferably inserted cushion devices 72, preferably in the form of rubber plugs having heads 73. The plugs are inserted into the tubular heads so that the shoulders 73 are spaced from the adjacent extremities of the tubular members to form recesses 74, and the plugs are held in this position by means of suitable fastening devices 75, preferably in the form of pins passing through the slots 71 and through the body portion of the plugs.

The clock movement is placed in position by inserting the upper pair of supports 70 in the slots 19 and then positioning the recesses 20 over the lower pair of supports 70, after which the entire movement may be lowered so as to cause the slots 18 to receive the upper support 70. The plate 16 is of a thickness to fit within the recess 74 formed between the head 73 of the plug and the end of the support 70, as shown more clearly in Figure 9.

It will therefore be manifest that the clock movement will not only be removably supported in position, but it will be cushioned with respect to the support 69.

Carried by the support 69 is a post or projection 76 to which one end of a flat or leaf spring 77 is anchored, and connected to the spring is a head 78 carrying laterally projecting pins 79 extending on opposite sides thereof. A pendulum 80 having a weight 81 may be adjustably carried by one end thereof through the medium of an adjusting nut 82, the upper end of the pendulum being provided with an extending portion or member 83 secured thereto and which member 83 is bifurcated as at 84 to provide spaced hooks 85 that are adapted to engage over the pins or projections 79, the bifurcation 84 receiving the head 79. By this construction it will be manifest that the pendulum will be mounted for swinging movement with respect to the projection or support 76.

Connected to the pendulum at any suitable point as at 86, is a flat spring 87 and connected to the upper end of the spring is a head 88 provided with a slot 89 therethrough and extending

vertically with respect thereto. This slot 89 may, if desired, be arranged adjacent an opening 90 in the pendulum, for a purpose to be set forth.

Connected with the shaft 48 to rotate therewith is a member 91 having teeth or shoulders 92 in its periphery to form projections and pivotally mounted upon the member 16 of the clock movement and by one end as at 93 for free and easy swinging pivotal movement, is an arm 94 having a finger or shoulder 95 adapted to co-operate with the teeth or shoulders 92 on the member 91, and these teeth or shoulders 92 together with the finger 95 of the arm 94 are so arranged with respect to each other that when the member 91 is rotated in the direction indicated by the arrows in Figures 3 and 8, the teeth or projections 92 will raise the end of the arm 94 about its pivot 93 and then allow the arm to drop against the member 91 so as to produce a ticking sound. These shoulders or projections 92 are so arranged that a ticking sound will be imparted by the mechanism upon each beat of the pendulum 80, thereby providing an audible signal in the clock.

The pendulum 80 is swung backwardly and forwardly by the rotation of the shaft 48, and to that end there may be provided a crank, preferably formed by means of a disc 96 provided with a laterally projecting pin 97. This pin is adapted to project into the slot or opening 89 in the head 88 of the spring 87 and also into the opening 90 in the pendulum 80, so that when the shaft 48 is rotated it will be manifest that the crank formed by the disc 96 and pin 97 will oscillate the pendulum through the medium of the spring 87, and the pin 97 will not strike the walls of the opening 90 in the pendulum 80.

The weight 81 of the pendulum is preferably comparatively light, as the lighter the weight the sooner the pendulum will come in step with the crank throw. When the clock is started the pendulum will swing very irregularly, but will soon adjust itself to get into step with the mechanism. The spring 87 must be sufficiently flexible so as to allow the motor to run when the pendulum 80 and weight 81 are at rest.

It will therefore be manifest that after the clock mechanism has been started, the rotary member 27 will not only be maintained in position with respect to the pull 23 of the raised pole pieces, but the operation of the rotary member 27 will drive the shaft 48 and thereby swing the pendulum backwardly and forwardly, and at the same time motion will be transmitted to the hour and minute hands. Furthermore, the pendulum will not only form a visual signal but will also provide an audible signal and will produce in a clock of this character the "ticking movement" which is very desirable.

To start the clock the shaft 48 is provided with a socket or seat 98, access to which may be had through the dial 61, and in the bottom of the socket is provided a slot 99 adapted to receive the end of a starting tool. When the starting tool is inserted in the socket 98 the tool may be operated by the operator, and this will start the rotor 27 into operation.

The finger 95 on the arm 94 and the shoulders or projections 92 on the member 91 are so arranged with respect to each other that they will co-operate to form a locking means to prevent the operator from rotating the shaft 48 in the wrong direction when starting the clock mechanism.

In order to provide a means whereby the popular style spring driven clock mechanism now on the market, can be imitated, it is necessary to provide a gear arrangement whereby a slower or faster swing of the pendulum may be produced, and in that instance there may be provided on the shaft 48 which carries the element 91 of the tick producing mechanism, a gear 100 of any desired diameter, which is arranged on the outside of the plate or member 16 of the clock movement. This gear 100 meshes with a gear 101 having a hub 102 journaled upon a suitable trunnion 103. To the hub 102 (see particularly Figure 10) is connected the member 96 which carries the pin 97 that enters the slot 89 at the top of the spring 87. Obviously, in this instance the position of the slot and head 88 with respect to the pendulum and spring 87 must be correspondingly arranged.

It will be apparent that in order to have access to the clock mechanism it is not necessary to dismantle any of the parts except to remove the hands 60—68 and loosen the dial 61. The entire mechanism may then be removed from the clock case, as a unit by detaching the plate or member 16 of the movement from the supports or projections 71. Obviously the member 91 and projections or teeth 92 thereon may be of any desired configuration or number, suitable for the purpose and may be in the form of cams.

While the preferred forms of the invention have been herein shown and described, it is to be understood that various changes may be made in the details of construction and in the combination and arrangement of the several parts, within the scope of the claims, without departing from the spirit of this invention.

What is claimed as new is:—

1. In a synchronizing electric clock system, an oscillating pendulum, and means for producing an audible signal in timed relation with the oscillation of the pendulum, the said means being adapted to be rendered inactive at will and while the remaining mechanism of the clock system remains intact.

2. In a synchronizing electric clock system, an operating motor embodying a rotor, an oscillating pendulum, a rotatable cam device connected with the rotor, and a member co-operating with the cam device and freely movable about a pivot to cause an audible signal in timed relation with the oscillation of the pendulum, the said member being adapted to be moved into an inactive position with respect to said cam device to eliminate at will said audible signal.

3. In a synchronizing electric clock system, an operating motor embodying a rotor, an oscillating pendulum, a rotatable cam device connected with the rotor, and a member cooperating with the cam device and freely movable about a pivot to cause an audible signal in timed relation with the oscillation of the pendulum, the said cam device and said member co-operating to lock the rotor against rotation in the wrong direction, said audible signal being adapted to be rendered inactive at will while the remaining mechanism of the clock system remains intact.

4. In a synchronous clock system, an operating motor embodying a rotor, and means embodying co-operating elements, one of which is connected with the rotor, for causing an audible striking sound to simulate the ticking of a clock, as the rotor is actuated, said elements adapted to be rendered inactive, one with respect to the

other, to eliminate said audible signal at will.

5. In a synchronous clock system, an operating motor embodying a rotor, and means for causing an audible striking sound to simulate the ticking of a clock, as the rotor is actuated, the said means embodying co-operating elements one of which is connected with the rotor and the other is fixed against bodily movement, one of said elements adapted to be rendered inactive at will with respect to the co-operating element to eliminate the audible signal, said elements also co-operating to maintain the rotor against rotation in the wrong direction when the rotor is started.

6. In a synchronous clock system, an operating motor embodying a rotor, and means embodying co-operating elements, one of which is connected with the rotor, for causing an audible striking sound to simulate the ticking of a clock as the rotor is actuated, said co-operating elements being adapted to be rendered inactive one with respect to the other, whereby said audible signal may be eliminated while the remaining mechanism of the clock system remains intact.

7. In a time keeping device of the class described, a constantly rotatable element provided with one or more peripheral shoulders, and a member separate therefrom and mounted for free movement about a fixed pivot, adapted to engage and rest upon the periphery of said element and co-operating therewith to cause an audible signal simulating the ticking of a clock, said member adapted to be moved out of engagement with said element to eliminate at will the said audible signal.

8. In a time keeping device of the class described, a constantly rotatable element provided with one or more peripheral shoulders, and a member separate therefrom and mounted for free movement about a fixed pivot, adapted to engage and rest upon the periphery of said element and co-operating therewith to cause an audible signal simulating the ticking of a clock, said member adapted to be moved out of engagement with said element to eliminate at will the said audible signal, the said member and element also co-operating to maintain the said element against retrograde movement.

WILLIAM J. VAN OSDEL.