Feb. 2, 1937. D. PERLMAN 2,069,622

TIMEPIECE

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Fig. 1.

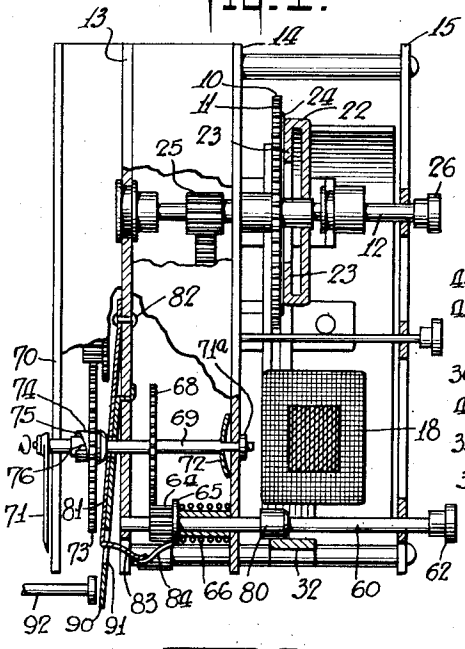


Fig. 2.

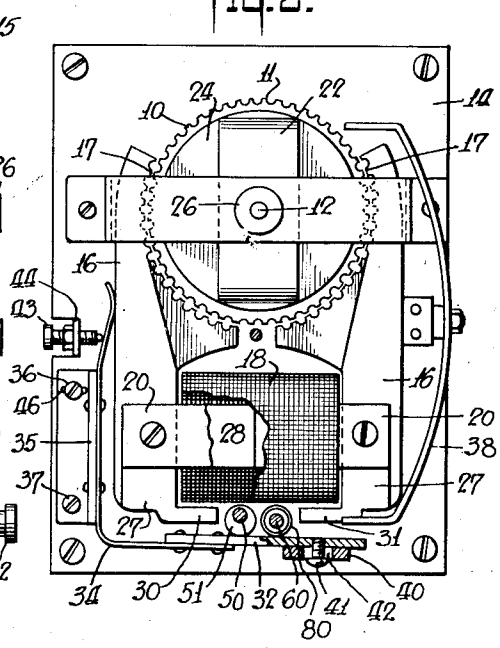


Fig. 3.

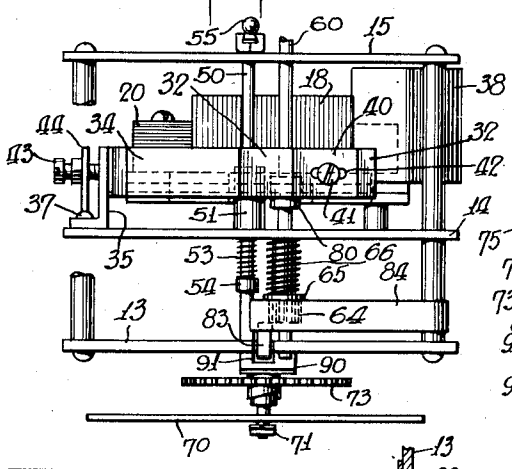


Fig. 5.

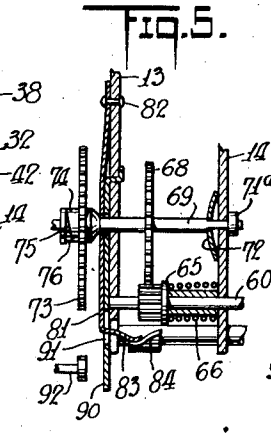


Fig. 6.

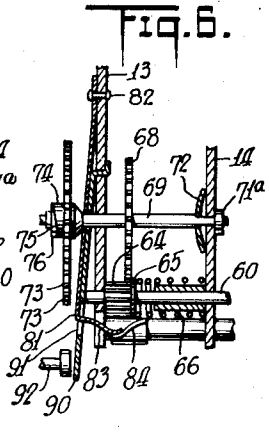
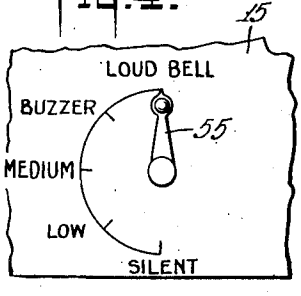


Fig. 4.



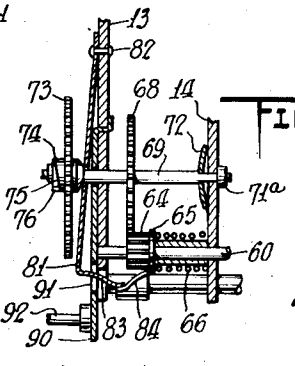


Fig. 7.

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Fig. 8.

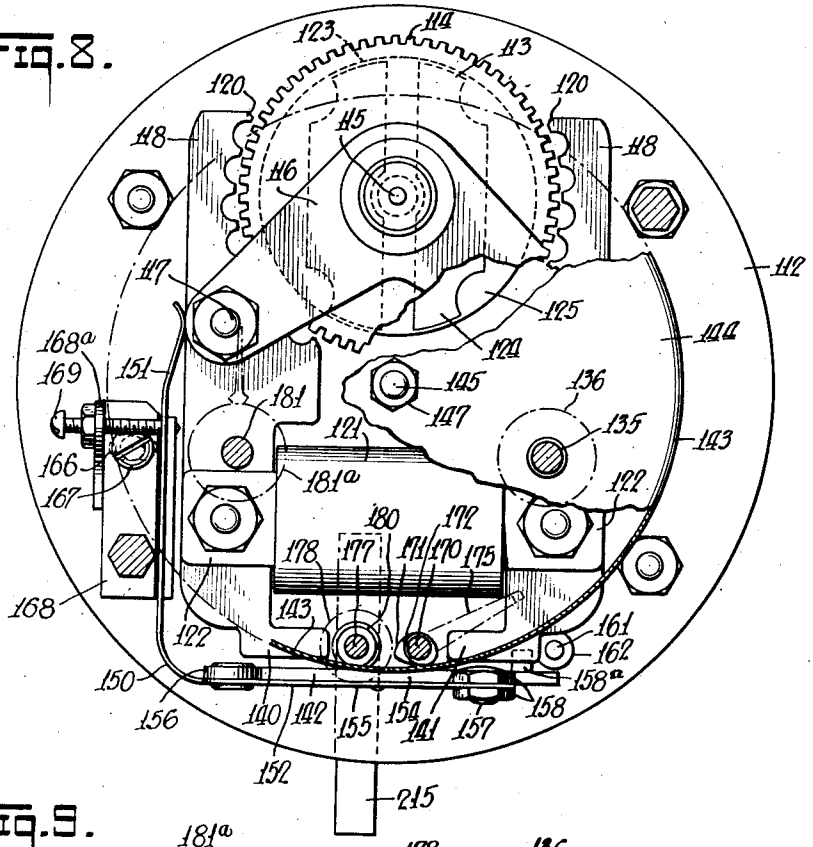
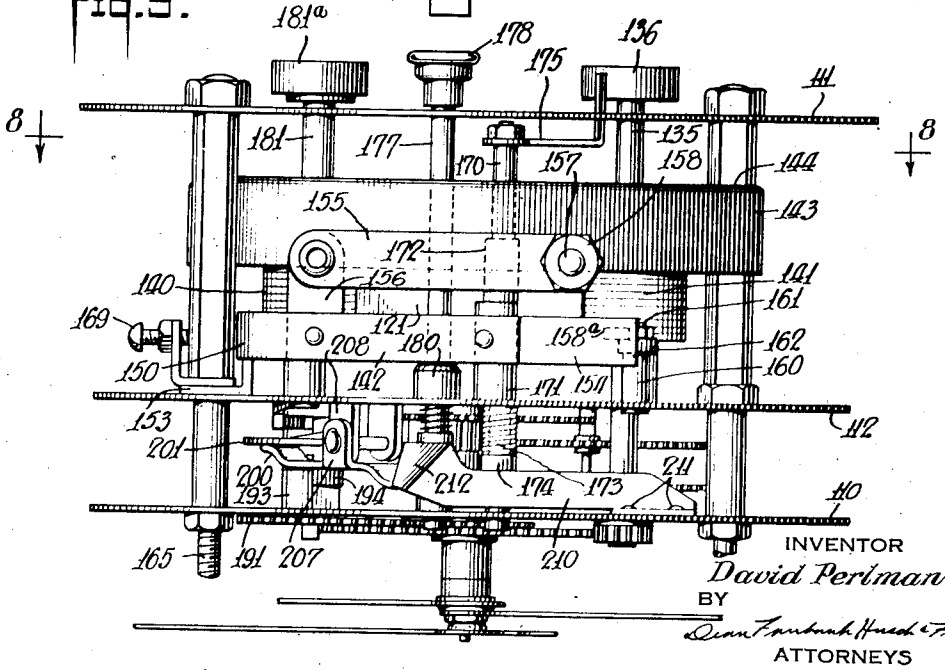


Fig. 9.



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FIG. 10.

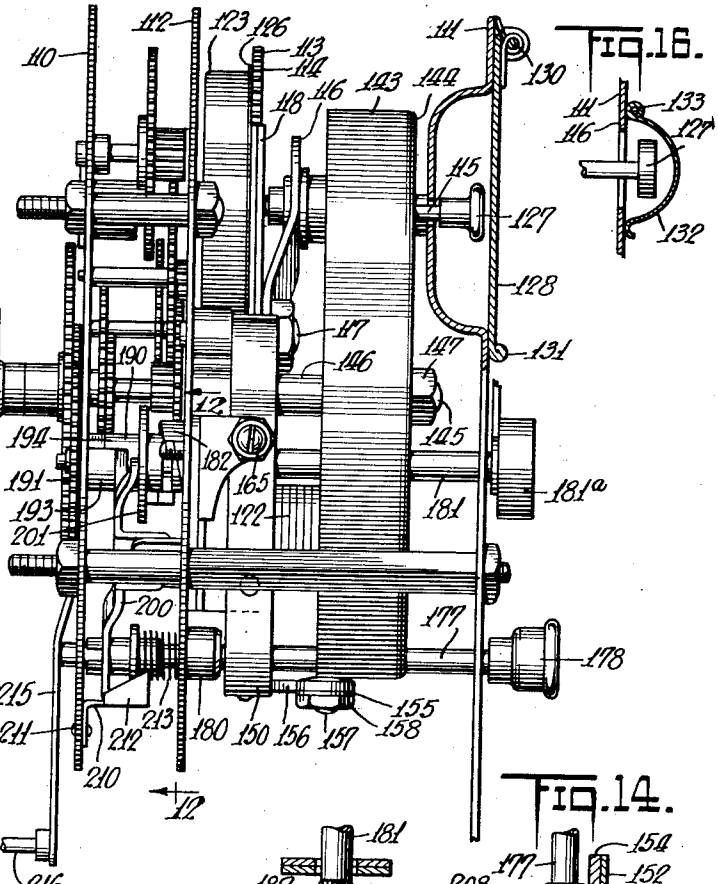


FIG. 16.

FIG. 11.

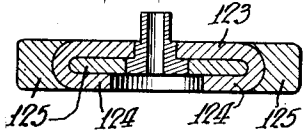


FIG. 12.

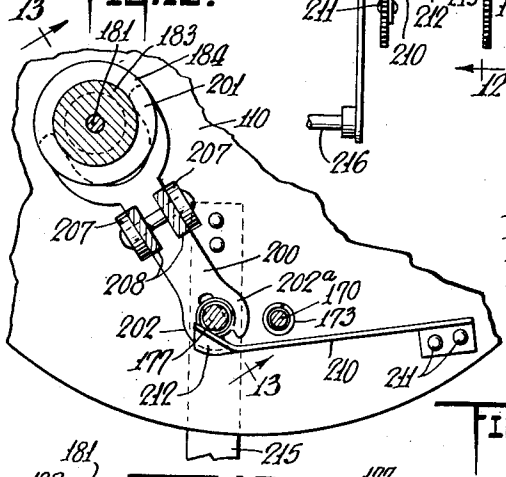


FIG. 14.

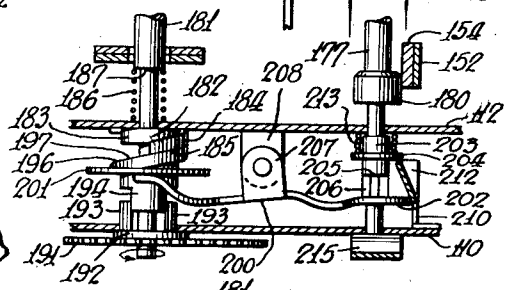


FIG. 15.

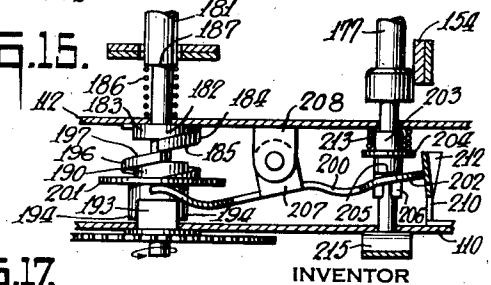


FIG. 13.

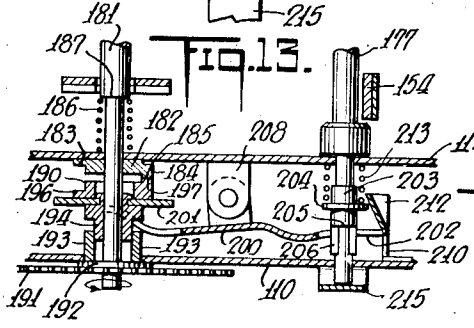
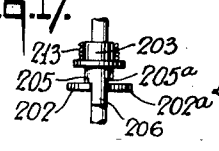


FIG. 17.



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2,069,622

TIMEPIECE

David Perlman, New York, N. Y.

Application January 28, 1932, Serial No. 589,390

6 Claims. (Cl. 177—7)

The present application is a continuation in part of an application on electric alarm clock, Serial No. 534,493, filed May 2, 1931, now Patent Number 1,913,948, June 13, 1933.

One object of the present invention is to provide new and improved means for controlling and operating the alarm system of a time piece.

Another object is to provide an electrically operated time piece having an alarm system, the timing mechanism of the time piece being operated from a motor, magnetically energized by a coil which also serves to operate said alarm system.

A further object is to provide an alarm clock having new and improved means for varying the tonal qualities of the alarm.

Another object is to provide a time piece having an electrically operated alarm system which includes a vibratile armature, and new and improved means for tuning said armature into selective frequencies of vibrations lower than the frequency of the electric current which serves to energize said armature but in synchronous harmonic relationship therewith.

Another object is to provide an electrically operated time piece having a manually startable synchronous motor, the shaft of which is protected against accidental interference.

Still another object of the present invention is to provide new and improved means controlled by the timing mechanism of the time piece, for setting the alarm of the clock to ring at a predetermined time, and new and improved manually operated means whereby the alarm may be stopped at any time, and the alarm reset to operate substantially after a period of time.

The invention also consists in certain new and important features of construction and combinations of parts hereinafter set forth and claimed.

Although the novel features which are believed to be characteristic of this invention will be particularly pointed out in the appended claims, the invention itself, and the manner of its organization may be better understood by referring to the following description taken in connection with the accompanying drawings forming a part thereof, in which—

Fig. 1 is a side elevation, partly in section, of a form of time piece embodying my invention.

Fig. 2 is a rear elevational view, partly in section, of a time piece shown in Fig. 1.

Fig. 3 is a bottom plan view of the time piece shown in Fig. 1.

Fig. 4 shows details of the rear plate markings and cooperating rod lever by means of which the tonal qualities of the alarm may be selectively adjusted.

Figs. 5, 6 and 7 are sectional views showing details of the alarm setting mechanism in different positions.

Fig. 8 is a rear elevational view, partly in section, of another form of the time piece embodying the present invention, and taken on line 8—8 of Fig. 9.

Fig. 9 is a bottom plan view of the time piece shown in Fig. 8.

Fig. 10 is a side elevation, partly in section, of the time piece shown in Fig. 8.

Fig. 11 shows details of the magnetic flyweight constituting part of the synchronous motor of the time piece of Fig. 8.

Fig. 12 is a section taken on line 12—12 of Fig. 10.

Figs. 13, 14 and 15 are sectional views showing details of the alarm setting mechanism of Fig. 8 in different operating positions, and taken on line 13—13 of Fig. 12.

Fig. 16 is a detail of a modified construction for protecting the shaft of the rotor of the time piece from accidental interferences, and

Fig. 17 is a detail view of a portion of the mechanism shown in Fig. 15.

Like reference characters denote like parts in the several figures of the drawings.

In the following description and in the claims parts will be identified by specific means for convenience, but they are intended to be as generic in their application to similar parts as the art will permit.

The invention is shown in Figs. 1–7 as adapted for use in an electrically operated time piece, the motive power therefor being advantageously obtained from a manually startable synchronous motor. This motor includes a rotor 10 having salient pole pieces 11, and mounted on a shaft 12 supported by spaced plates 13 and 14 forming part of the frame structure of the time piece. The rotor 10 is disposed between a pair of spaced stators 16 having salient pole pieces 17 extending into the air gap between said rotor and stators. The stators 16 are preferably laminated, and are magnetically energized by a coil 18 in circuit with the alternating current delivered from a commercial source, the core of said coil being formed by a lamination of sheets 20 bridged between oppositely disposed stators 16.

In order to prevent the rotor 10 from turning intermittently faster and slower than the true average synchronous speed, as a result of electrical disturbances and variations, and in order to bring the rotor 10 more effectively into synchronous speed after being manually started, there is provided a magnetic flyweight 22 loosely mounted on the shaft 12, and having spaced pole ends 23 magnetically attracted to the face of the rotor 10 so as to be rotatable therewith. In order to prevent too strong an attraction between the magnetic flyweight 22 and the rotor 10,

and to permit relative rotation between said members when the rotor is retarded or accelerated, there is interposed between said members a nonmagnetic membrane 24.

The rotor shaft 12 has mounted thereon a pinion 25 meshing with the first gear of the gear train which drives the hands of the clock, details of said gear train being eliminated for the sake of simplicity. The synchronous motor is started by twirling the shaft 12, a twirling knob 26 being provided for that purpose at the rear end of said shaft.

As an important feature of the present invention, the alarm system of the time piece is magnetically energized for operation by the same coil 18 which serves to drive the synchronous motor. For that purpose, the stators 16 are extended downwardly as shown in Fig. 2, and have detachably connected to the lower ends thereof a series of U-shaped sheets 27 arranged in lamination, and having one set of arms 28 thereof extending into the interior of the coil 18 to form a core for said coil, the other set of arms of said sheets 27 forming spaced pole members 30 and 31 in combination with the lower portions of said stators. By means of this arrangement, the magnetic strength of these pole members 30 and 31 may be easily varied by increasing or decreasing the number of laminations constituting said members.

The pole members 30 and 31 are adapted to magnetically attract a vibratile armature plate 32 connected to one arm of an angularly shaped leaf spring 34, and forming part of a hammer for striking the alarm. The other arm of this spring 34 is connected to a bracket 35 secured to the plate 14 by any suitable means, as for instance screws 36 and 37. The outer end of the armature plate 32 is adapted to intermittently strike an alarm bell 38 under the magnetic influence of the pole members 30 and 31.

Since the frequency of the electric current which energizes the pole members 30 and 31, may be too high for effective audible ringing of the alarm, it may be desired to adjust and tune the vibrations of the armature to a low frequency having synchronous harmonic relationship with the frequency of the electric current. For that purpose, there is connected to the outer free end of the armature plate 32 a slider 40 connected to said plate by a screw 41 passing through an elongated slot 42 in said slider, whereby said slider may be adjusted in position lengthwise of said armature plate. This slider 40 not only serves as a weight for striking the bell 38, but also serves as a means for adjusting the frequency of vibration of the armature plate 32.

For effecting further adjustments of the frequency of vibration of the armature plate 32, the outer end of that arm of the leaf spring 34 connected to the bracket 35, extends beyond said bracket and is engaged by a screw 43 passing through a bracket 44. The angular position of the armature plate 32 with respect to the pole members 30 and 31 may be varied in response to the pressure action of the screw 43, the screw 36 for that purpose passing through an elongated slot 46 in the bracket 35. By means of this arrangement, the angular position of the bracket 35 is roughly adjusted about the screw 37, fine adjustments being effected through the pressure action of the screw 43 on the outer end of the leaf spring 34. This adjustment causes a corresponding adjustment in frequency of vibration of the armature plate 32.

In order to selectively adjust the quality and intensity of the alarm ringing, there is provided a rod 50 journalled in the plates 14 and 15 and carrying a cam 51 disposed in the path of vibration of the armature plate 32. This cam 51 is so constructed and so mounted that when the high portion of the cam is facing the armature plate 32 as shown in Fig. 2, this plate is entirely blocked from vibration, and when the cam is turned 180° from this position, the outer end of the plate is free to strike the bell 38 with unimpeded force. In some intermediate positions, the armature plate 32 in its vibration action strikes the cam 51 and produces a buzzer sound against said cam.

To prevent the cam 51 from being turned over by the continuous hammering of the armature plate 32, said cam is frictionally locked to one side of the plate 14 by means of a spring 53 encircling the rod 50 and having the ends thereof engaging the other side of the plate, and a collar 54 secured to said rod. The rear end of the rod 50 has connected thereto a lever 55 which serves as a means for rotating the rod in any selective position, and which may also serve as a pointer for indicatively cooperating with dial markings on the plate, as shown in Fig. 4.

For setting the alarm to ring at a predetermined time, there is provided a rod 60 journalled between the two plates 14 and 15 and carrying at the rear end thereof a knob 62. The front end of the rod 60 passes through the plate 13, and at times projects beyond the front face of said plate, as will be hereinafter discussed. The portion of the rod 60 extending between the two plates 13 and 14 carries a pinion 64 having a flange 65 at one end thereof presenting a shoulder. The rod 60 is slidably mounted and urged to the left as shown in Figs. 1, and 5–7, by a spring 66 encircling the rod 60 and disposed between the flange 65 and the plate 14.

The pinion 64 meshes with a gear 68 fixed to a shaft 69, one end of which passes through the plate 14. The other end of this shaft extends through a dial plate 70 and has a hand 71 for indicating the setting of the alarm operation.

The shaft 69 is held in position against axial movement in one direction with respect to the plate 14, by any suitable means, as for instance a nut 71a threaded on to the rear end of said shaft 69, and is yieldably held in position against movement in the opposite direction by a curved spring member 72 mounted on said shaft so as to engage shoulders on said shaft, and having the ends thereof engaging the front face of the plate 14. This spring member 72 also serves to frictionally lock the shaft 69 against rotation.

Loosely mounted on the shaft 69 is a gear 73 which is driven through a chain of gears from the main timing mechanism in the direction indicated in Fig. 1, and which has a hub 74 extending from both sides of said gear, the front portion of the hub 74 being provided with a helical cam surface 75. Fixed to the shaft 69 so as to be rotatable therewith, is a pin 76 which rides on this cam surface 75. The position of this pin 76 is set by turning the knob 62, the rotational movement of which is transmitted through the intermeshing gears 64 and 68 to the shaft 69 and in turn to the pin 76.

When the alarm is not operating, the armature 32 is blocked against vibration by a member 80 fixed to the rod 60 and having one end thereof bevelled to provide a cam surface. This cam

surface is adapted to engage one edge of the armature 32 and move said armature away from the pole members 30 and 31 when the rod 60 is shifted to the right as viewed in Fig. 1. This movement of the armature 32 is continued until the member 80 is shifted into blocking position with respect to said armature, as shown in said Fig. 1.

Means are provided for automatically shifting the rod 60 so as to move the member 80 out of the path of the armature 32 at a predetermined time as determined by the setting of the cam pin 76. For that purpose, there is mounted on the front face of the plate 13 a leaf spring 81, one end of which is connected to the plate by any suitable means, as for instance rivet 82, the other end of said spring having an angular extension 83. This spring 81 is provided with an aperture for receiving the shaft 69, and is yieldably urged in a clockwise direction against the hub 74, so as to maintain the cam surface 75 of the hub in engagement with the cam pin 76.

The rod 60 is held in position for blocking the armature plate 32 by a leaf spring 84, one end of which is secured to the frame structure of the time piece, the other end being yieldably urged against the flange 65, so that when said rod is pulled to the right as viewed in Fig. 1, the free end of the spring 84 will snap into engagement with said flange and hold said rod in position, with the member 80 blocking the armature plate 32 against vibration. The spring 84 has the free end thereof angularly inclined with respect to the rod 60 and engaged by the angular extension 83 of the leaf spring 81. The outer end of the angular extension 83 is advantageously slightly offset to present a curved surface to the angularly inclined portion of the spring 84.

In as much as the cam pin 76 is held against axial movement, and since the hub 74 is loosely mounted on the shaft 69, it is seen that as the gear 73 is rotated by the timing mechanism in the direction indicated in Fig. 1, the hub 74 will be moved axially towards the right, as viewed in Fig. 1, by the action of the cam pin 76 on the cam surface 75. This movement of the hub 74 to the right serves to move the spring 81 in a counterclockwise direction, as viewed in Fig. 1. This counterclockwise movement of the spring 81 causes its angular extension 83 engaging the inclined portion of the spring 84, to shift said spring 84 away from engagement with the flange 65 until said flange is freed from the restraining action of said spring 84 as shown in Fig. 5. However, it is seen that in this position, the spring 81 will have moved into position to engage the front end of the rod 60 and hold said rod from shifting to the left a sufficient distance to withdraw the member 80 from blocking position with respect to the armature plate 32.

In Fig. 5, the gear wheel 73 is shown in a position wherein the highest portion of the cam surface 75 is in engagement with the cam pin 76. At the next instant when this high portion of the cam surface over-rides the pin, the hub 74 will instantly shift to the left under the resilient action of the spring 81, so that the cam pin 76 will be in engagement with the lowest portion of the cam surface 75 as shown in Fig. 6. This operation permits the spring 81 to move clockwise so that the rod 60 is permitted to move to the left under the action of the spring 66 as shown in Fig. 6, the leaf spring 84 at this instant being held outside of the path of the flange 65 by the angular extension 83 of the spring 81. The axial movement of the rod 60 serves to shift the member 80 out of the path of the armature plate 32 so that said armature is free to vibrate under the action of the pole members 30 and 31.

While the spring 81 is moving clockwise, its angular extension 83 is moving away from the spring 84, thereby permitting said spring 84 to approach the rod 60 until the position shown in Fig. 6 is attained.

If it is desired to reset the alarm for another twenty-four-hour period, all that is necessary is to shift the rod 60 to the right as viewed in Fig. 1, to snap the free end of the leaf spring 84 into engagement with the flange 65, and to move the member 80 into blocking position with the armature plate 32.

If it is desired to reset the alarm from the front of the time piece, there is provided a plate 90 mounted at one end to the front face of the frame plate 13, and having an aperture 91 for the passage therethrough of the angular extension 83 of the spring 81. This plate 90 is yieldably mounted so as to be constantly urged into engagement with the spring 81 and has the free end thereof engaged by a slidable member or plunger 92 which is axially shiftable by hand to the right as shown in Fig. 1. When the member 92 is shifted to the right, it engages the plate 90 and causes said plate to swing in a counterclockwise direction, thereby pushing the rod 60 to the right into reset position as viewed in Fig. 7. The aperture 91 is sufficiently large to permit this movement of the plate 90 without interfering with the position of the spring 81.

In Figs. 8–15, there is shown another form of the present invention the time piece in this form being supported in a suitable frame structure which includes, for instance, a front frame plate 110, a rear frame plate 111, and an intermediately disposed frame plate 112. The time piece is electrically operated advantageously by a manually startable synchronous motor which includes a rotor 113 having salient pole pieces 114 and an angularly shaped yoke 116. The ends of this yoke 116 are supported on a pair of post members 117 secured to the intermediate frame plate 112. The rotor 113 is disposed between a pair of spaced stators 118, having salient pole pieces 120 extending into the air gap between said rotor and said stators. The stators 118 are preferably formed from a plurality of laminated sheets and are magnetically energized by a coil 121 in circuit with the alternating circuit delivered from a commercial source. The core of the coil 121 is formed by a lamination of sheets 122 bridged between the oppositely disposed stators 118.

In order to prevent the rotor 113 from turning intermittently faster and slower than the true average synchronous speed, there is provided a magnetized flyweight bar 123 loosely mounted on the shaft 115, and bent to form spaced pole ends 124 magnetically attracted to the face of the rotor 113, so as to be rotatable therewith. In order to produce a more balanced flyweight and increase its weight without increasing its magnetic power, the bar 123 is filled in and surrounded by non-magnetic material such as lead 125 forming therewith a solid metal flywheel, as shown in Fig. 11. To prevent too strong an attraction between the magnetic flyweight 123 and the rotor 113, and to prevent relative rotation between said members when the rotor is retarded or accelerated, there is interposed between said members a non-magnetic membrane 126.

The synchronous motor is started by twirling

the shaft 115, the rear end of said shaft, for that purpose, extending beyond the rear frame plate 111, and having a twirling knob 127 secued thereto. This rear plate 111 has a depression for receiving this knob 127, so that said knob does not project beyond the general surface of said rear plate, this knob being thereby protected against accidental contact which would stop or interfere with the operation of the motor. To further protect the knob 127 against accidental contact, there is provided a cover 128 hinged at 130 to the rear plate 111, and having a projecting lip 131 by means of which said cover may be lifted to obtain access to the knob 127. The depression in the rear plate 111 is sufficiently wide so as not to interfere with the free twirling manipulation of the knob 127.

Fig. 16 shows another way in which the knob may be protected against accidental contact, the rear plate 111, in this form, being flat throughout, and a cup-shaped cover 132 being provided which is hinged to said rear plate at 133 and which encloses the knob 127 when in closed position as shown.

The shaft 115 serves to drive the timing mechanism by the usual train of gears, details of which have been eliminated for the purpose of simplification. The timing is effected through a time setting shaft 135 having a manipulating knob 136 at the rear end thereof.

The alarm system is electrically operated from the same coil 121 which operates the synchronous motor, and for that purpose, the stators 118 extend downwardly to form spaced pole members 140 and 141. These pole members 140 and 141 serve to magnetically energize a bell armature 142 having a hammer which strikes a bell 143 cylindrically shaped and having an end wall 144 facing the rear of the time piece. The bell 143 is supported in position by any suitable means, as for instance a bolt 145 connected to the frame plate 112, and passing through the center of the bell wall 143. A sleeve 146 encircles the bolt 145 and has the rear end thereof abutting the bell wall 144. The rear end of the bolt 145 has a nut 147 threaded thereon, for holding said bell in position against the end of the sleeve 146.

The armature for striking the bell 143 comprises a leaf spring 150 having two angularly extending arms 151 and 152, the arm 151 being secured to the bracket 153 connected to the frame structure of the time piece. The other arm 152 has connected thereto a heavy armature plate 154 adapted to be energized by the pole members 140 and 141. In order to obtain a more effective and louder sounding of the bell 143, the hammer which strikes the bell is resiliently mounted with respect to the armature plate 154, said hammer for that purpose including a flexible strip of metal 155 attached to the armature plate 154 by means of a rigid connecting plate 156. The free end of the strip 155 has connected thereto a weight for striking the bell, said weight advantageously taking the form of a bolt 157 passing through said strip 155, and having a nut 158 threaded on to said bolt. Since this weight is usually left undisturbed, once the proper adjustment thereof is attained, the bolt 157 may be in the form of a rivet, the end of which is upset against the nut 158 to effect permanent attachment.

By means of the present arrangement, the free end of the strip 155, due to its flexible mounting, will be urged towards the bell 143 with great force, said free end of said strip continuing its movement toward the bell even after the armature plate 154 has reached its extreme position towards the pole members 140 and 141. The strip 155 will rebound more effectively from its bell striking position and flex with respect to the armature plate 154 from extreme positions of the latter, so that said strip will have greater amplitude of vibrations, than the armature plate 154, but the same frequency, thereby increasing the intensity of the ring.

In order to prevent the armature plate 154 from striking any metal parts while under the vibrating action of the pole members 140 and 141, a flexible member preferably in the form of a rubber member is interposed in the vibrating path of said armature plate. This rubber member may be mounted as shown in Fig. 9, by interposing a strip of rubber 158a between a pair of adjacent laminations of the pole member 141, or, if desired, a post 160 may be provided connected to the plate 112, and having a reduced portion 161 for receiving a rubber washer 162 lying in the path of vibration of the armature plate 154. These rubber members not only serve to prevent the clashing of the armature plate 154 with any metallic members when under the vibrating action of the magnet, but also serve to rebound said armature plate into inactive position.

To regulate the frequency of vibration of the armature plate 154, means are provided for swinging the bracket 153 upon which said spring is mounted. This bracket 153 is pivotally held near one end thereof by a bolt 165 constituting part of the frame structure of the machine. The bracket 153 near the other end thereof is provided with an elongated slot 166 through which passes a screw 167. Mounted against the bracket 153 is a second bracket 168 having an angular extension 168a through which passes an adjusting screw 169, the end of which impinges against the spring arm 151. The bracket 168 is held in position by the bolt 165 and the screw 167 The hole of this bracket 168 through which the screw 167 passes, is just large enough to receive said screw so that no material movement of said bracket is effected. In order to effect adjustments in the amplitude of vibration of the armature plate 154, the screw 167 is loosened and the adjusting screw 169 turned so as to swing the bracket 153 about the bolt 165 as a pivot.

The frequency of vibration of the armature plate 154 may be reduced by attatching weights in the form of washers to the bolt 157, or may be reduced through the addition of weights to the armature plate 154 itself. Fine adjustments of the frequency of vibration of the armature plate 154 may be effected through the manipulation of the adjusting screw 169.

In order to selectively adjust the quality and intensity of the alarm ring, there is provided a rod 170 journalled between the plates 111 and 112, and carrying a cam 171 disposed in the path of vibration of the armature plate 154. This cam 171 is so constructed and so mounted that when the high portion of the cam is facing the armature plate 154 as shown in Fig. 8, this plate is entirely blocked from vibration, and when the cam is turned 180° from this position, the bolt 157 strikes the bell 143 with unimpeded force. Between these two extreme positions of the cam 171 is a position in which a buzzing sound is produced, the rod 170 for that purpose having mounted thereon a second cam 172 having a high portion which may be rotated to move into engagement with the cylindrical wall of the bell 143 between said two extreme positions. This

cam 172 serves to muffle or deaden the ring of the bell 143 and produces a loud buzzer sound. The cams 171 and 172 are so rotatably disposed relatively that at first cam 172, by rotating the shaft 170 by means of the adjusting lever 175, engages the bell to cause a deadening of the sound produced by the bell. As the adjusting lever 175 is further rotated, a still higher eccentric section of the cam 172 engages the bell, thus causing an added muffling effect of the sound produced by the bell. If the regulating lever 175 is rotated still further, no further muffling of the bell takes place, but the vibrating path of the armature plate 154 is now restricted by the cam 171, thus causing a reduction of the striking intensity of the armature and consequently a decrease of the intensity of the sound produced by the bell, until a point is reached where a loud buzzer noise only is produced. When the regulator 175 is further advanced cam 171 has a sufficient portion thereof in the path of vibration of the armature plate 154, so that said plate strikes said cam 171 during its vibration, thereby preventing the bolt 157 from striking the bell 143, and effecting a low buzzer sound.

To prevent the cams 171 and 172 from being accidentally turned over by the continuous vibration of the armature plate 154, the cam 171 is frictionally locked to one side of the plate 112 by means of a spring 173 encircling the rod 170 and having the ends thereof engaging the other side of the plate, and a collar 174 secured to said rod.

The rear end of the rod 170 has connected thereto a lever 175 which serves as a means for turning the rod in any selective position, and which may also serve as a pointer for indicatively cooperating with the dial markings on the rear plate 111.

For setting and resetting the alarm, and for stopping the operation of the alarm, there is provided improved means including a rod 177 supported by the frame plates 110, 111 and 112 and loosely mounted thereon to slide axially in said plates, with the front end thereof at times projecting beyond the plate 110 as shown in Figs. 10 and 13. The rear end of this rod 177 is provided with a knob 178 by means of which said rod may be manipulated.

When the alarm is not operating, the armature plate 154 is blocked against vibration as shown in Figs. 14 and 15, by a block member 180 fixed to the rod 177 and having the end thereof nearest said plate bevelled to provide a cam surface. This cam surface is adapted to ride over the edge of the armature plate 154 and move said plate away from the pole members 140 and 141 when the rod 177 is shifted to the right as viewed in Fig. 10. This movement of the armature plate 154 is continued until the block member 180 is shifted in blocking position with respect to said plate as shown in Figs. 14 and 15.

Means are provided for automatically shifting the rod 177 so as to move the member 180 out of the path of the armature plate 154 at a predetermined time. The setting of this time is effected through the rotation of the rod 181 journalled between the two frame plates 111 and 112 and having a knob 181*a* in the rear end thereof to permit easy manipulation thereof. The front end of the rod 181 carries a cam member 182 comprising a cylindrical member 183 having a projection 184 which presents a helical cam surface 185.

The cam member 182 is frictionally locked into contact with the front face of the frame plate 112 by means of a spring 186, one end of which engages the rear face of said plate, and the other abutting a shoulder 187 formed by an enlargement of the rod 181. The rotation of this rod 181 serves to rotate the cam member 182 carried thereby into any predetermined position in accordance with the time selected for the ringing of the alarm.

Cooperating with the cam member 182 is a cam member 190 loosely mounted upon the rod 181 for slidable movement therealong, said cam member 190 being turned by the timing mechanism through a gear train including a gear 191 connected to a plate 192 having a pair of spaced dogs 193 which engage a projection 194, at one end of the cam member 190. This arrangement permits the rotation of the cam member 190 with the gear 191 while permitting said cam member to slide along the rod 181.

The cam member 190 is provided with a main cylindrical body having a projection 196 which presents a helical cam surface 197 adapted to slide in contact with the helical cam surface 185 of the cam member 182. It is seen, therefore, that after the cam member 182 has been set for the ringing of the alarm at any selective time, it will remain in that position. However, the cam member 190 will be continuously driven by the timing mechanism in the direction indicated, with its cam surface 197 in contact with the cam-surface 185.

The two cam surfaces 185 and 197 are urged into contact with each other by yieldable means which serve to shift the rod 177 to withdraw the block member 180 from contact with the armature plate 154 when the two cam members 182 and 190 have reached a predetermined relationship. For that purpose, there is provided a link 200, one end of which is bifurcated to straddle the cam member 190, and to contact with a flange 201 secured to said cam member. The other end of the link 200 is also bifurcated to form a pair of spaced prongs 202 and 202*a* which straddle the rod 177.

Fixed to the rod 177 is a sleeve member 203 having a collar 204. One end of the sleeve member 203 is planed on opposite sides to form a pair of shoulders 205 and 205*a*, and a reduced portion 206, passing between the prongs 202 and 202*a*. The link 200 is pivoted intermediate its ends, and for that purpose is provided with a pair of spaced lugs 207 pivotally engaging a pair of spaced lugs 208 struck out or otherwise secured to the plate 112.

Engaging the collar 204 so as to hold the rod 177 in position to block the armature 154, is a leaf spring 210, one end of which is attached by any suitable means, as for instance rivets 211, to the rear surface of the frame plate 110, the free end of said spring being offset to form an angular extension 212 presenting an inclined surface with respect to the sleeve 203, this angular extension being yieldably urged by its resiliency towards said sleeve, and adapted to snap into engagement with the collar 204 when the rod 177 is pulled into its extreme upper position for resetting operations as shown in Fig. 14. The sleeve 203 is urged downwardly as viewed in Fig. 14, along the rod 177 by means of a coil spring 213, disposed between the collar 204 and the front surface of the plate 112.

In the operation of the alarm setting mechanism, as the cam surface 197 of the cam member 190 rides over the cam surface 185 of the cam

member 182 in the direction indicated in Figs. 13–15, said cam member 190 is moved downwardly as viewed in said figures, so that the link 200 is turned in a counterclockwise direction. The prong 202 being in engagement with the angular extension 212 of the spring 210, causes that extension to be moved away outwardly from engagement with the collar 204. The movement of the link 200 is continued until the cam member 190 is at its lowermost position as shown in Fig. 15. Just at that moment, the parts of the mechanism are so arranged that the angular extension 212 of the spring 210 will be entirely out of the axial path of the collar 204 so that the sleeve 203, under the action of the spring 213 will be moved downwardly until the shoulders 205 and 205a on said sleeve engage the prongs 202 and 202a respectively, of the link 200. However, the movement of this sleeve 203 will be very slight, and not sufficient to entirely remove the member 180 from blocking engagement with the armature plate 154. If desired, the shoulders 205 and 205a may lie in different planes, as shown in Fig. 17, and the prong 202a of the link 200 bent or adjusted to engage the shoulder 205a. By means of this arrangement, the movement of the sleeve 203 from the position shown in Fig. 14 to the position shown in Fig. 15 wherein this sleeve is released from the restraining influence of the leaf spring 210, can be adjusted.

At the next instant of movement of the cam member 190 in the direction indicated, the end of the cam surface 197 will over-ride the end of the cam surface 185. Under these conditions, the rod 177 will be free to move under the action of the spring 213, into the position shown in Fig. 13, with the block member 180 out of the path of vibration of the armature plate 154. This movement of the rod 177 is transmitted through the link 200 to the cam member 190 which is moved thereby into its uppermost position shown in Fig. 13. As the link 200 is moved in a clockwise direction by the downward movement of the rod 177, the end of the prong 202 slides along the inclined surface of the spring extension 210 so that said extension is free to move towards the sleeve 203 under the influence of its resilient mounting, until it rests in the position shown in Fig. 13. Under these conditions, the armature plate 154 is free to vibrate.

The setting of the alarm for another twenty-four hours can then be reestablished merely by pulling the rod 177 to permit the edge of the spring extension 210 to snap into engagement with the collar 204, so that said rod will be held in position with the member 180 blocking the armature plate 154 as shown in Fig. 14, until the predetermined time as determined by the setting of the cam member 182 is reached.

The setting of the alarm may be achieved by pulling the rod 177 by the knob 178 at the rear end thereof, or if desired means are provided for setting the alarm from the front of the time piece. For that purpose, a spring lever 215 is provided fastened at one end to the front face of the frame plate 110, and normally urged into position shown in Fig. 10, with the portion thereof opposite the front end of the rod 177 spaced from the surface of said frame plate. A push rod 216 is provided engaging the spring lever 215 and adapted to move said lever so that said lever engages the front end of the rod 177 and shifts it into the position shown in Fig. 14.

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

1. A clock including an alarm mechanism, said mechanism comprising an alarm bell, a vibratile hammer adapted to strike said bell, means for adjusting the vibrating amplitude of said hammer to regulate the intensity of the sound of said bell, further adjusting means for deadening the sound produced by said bell, and a unitary control element for both said adjusting means for successively effecting a muffling and decrease of the intensity of the sound of said bell.

2. In an alarm mechanism, a bell, a vibratile hammer disposed in a position to strike said bell, actuating means for vibrating said hammer, a shaft mounted for rotation, a first cam mounted upon said shaft having an eccentric portion adapted to be moved into the path of vibration of said hammer for regulating the force with which said hammer strikes said bell, a second cam mounted upon said shaft having an eccentric portion adapted to be moved into engagement with said bell to cause a deadening of the sound of said bell, said cams being relatively displaced to effect a successive muffling and decrease of the intensity of the sound of said bell by rotation of said shaft.

3. In an alarm mechanism, a bell, a vibratile hammer disposed to strike said bell, means for vibrating said hammer, a rod, and a pair of cams mounted upon said rod, said rod being rotatable so that the eccentric portion of one of said cams may be moved into the path of vibration of said hammer to vary its amplitude of vibration, said other cam having an eccentric portion relatively displaced with respect to the eccentric portion of said first cam and adapted to engage said bell to deaden the sound of said bell.

4. In an alarm mechanism, a bell, a vibrating element adapted to strike said bell, adjusting means for limiting the amplitude of vibration of said element, further means adapted to engage said bell to effect a gradually increasing deadening of the sound of said bell, and a unitary controlling organ for said first and second means for causing a successive muffling and decrease of the intensity of the sound of said bell.

5. In an alarm mechanism, a bell, a vibrating element adapted to strike said bell, a first cam having an eccentric portion adapted to be moved into the path of vibration of said element for gradually decreasing the force with which that element strikes said bell, a second cam having an eccentric portion adapted to be moved into engagement with said bell to cause a gradually increasing deadening of the sound of said bell, a common actuating organ for said cams, said cams being displaced relatively to effect a successive gradual deadening and decrease of intensity of the sound of said bell by the operation of said organ.

6. In an alarm mechanism, a bell, a vibratile hammer adapted to strike said bell, means for vibrating said hammer, a combined sound deadening means for said bell and amplitude regulating means for said hammer, and a unitary actuating organ therefor, said sound deadening means and amplitude regulating means being designed and disposed relatively to said actuating organ to effect a successive gradual muffling and decrease of intensity of the sound of said bell by the operation of said organ.

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