

Dec. 13, 1949

W. P. GALLAGHER

2,491,103

CLOCK

Filed Jan. 10, 1946

6 Sheets-Sheet 1

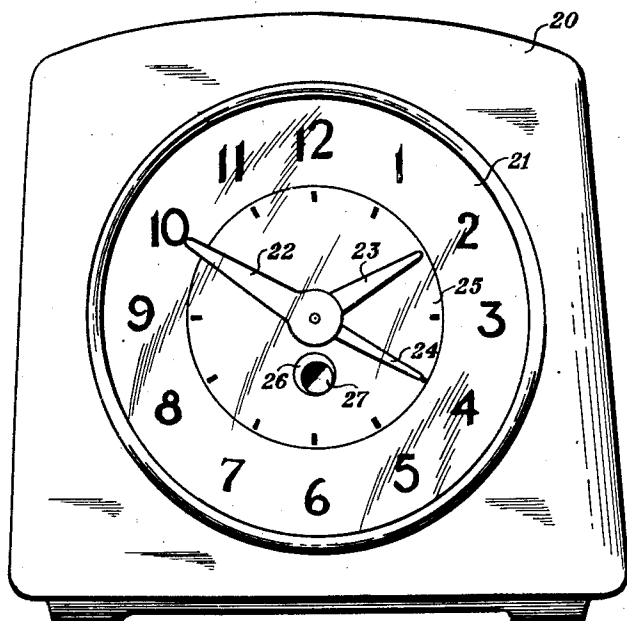


Fig. 1

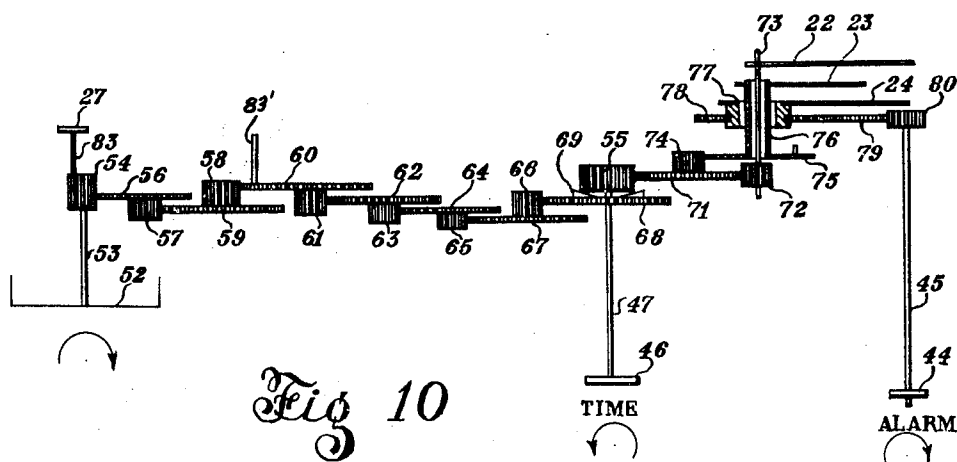


Fig. 10

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6 Sheets-Sheet 2

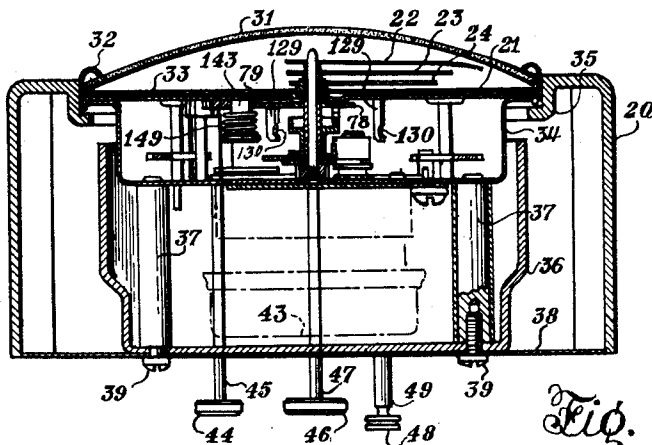


Fig. 2

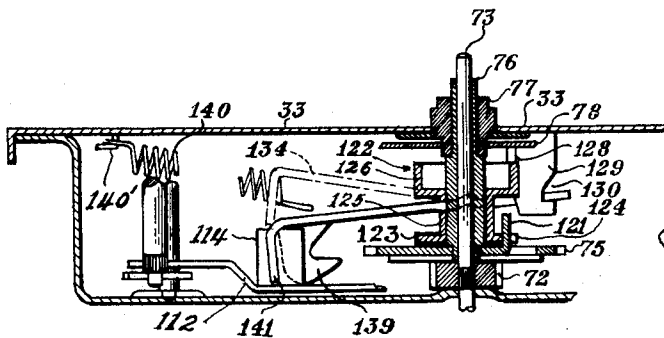


Fig. 3

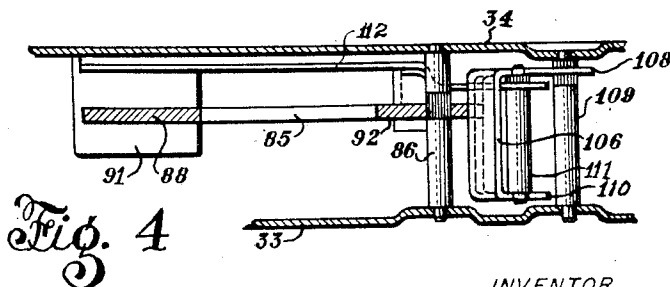


Fig. 4

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6 Sheets-Sheet 3

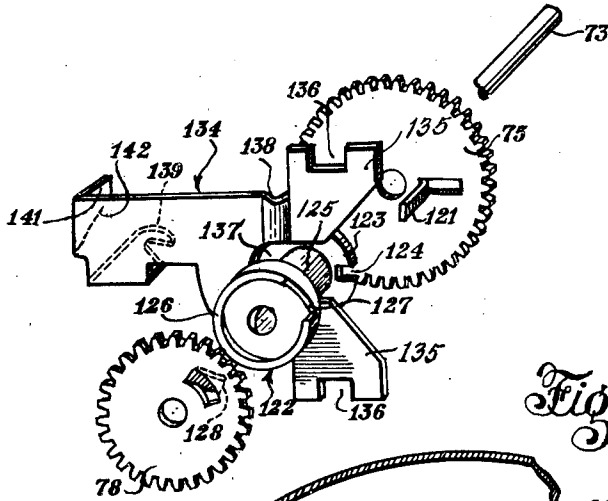


Fig. 5

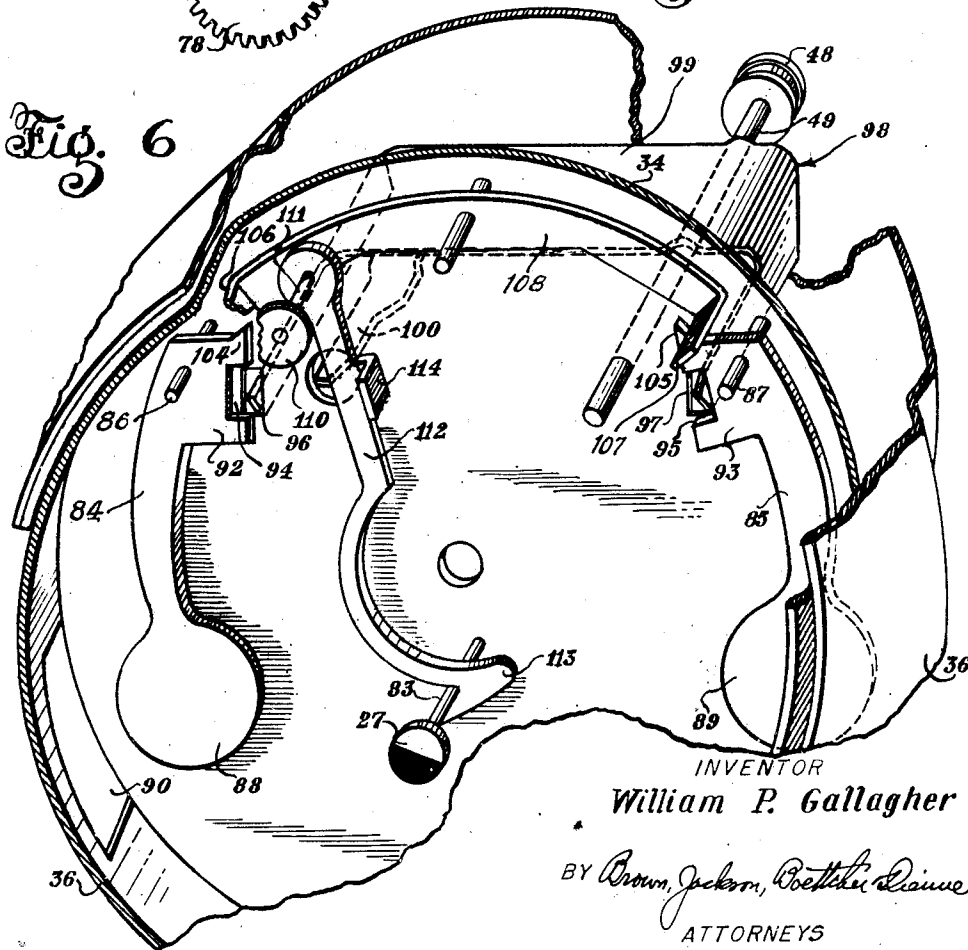


Fig. 6

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CLOCK

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6 Sheets-Sheet 4

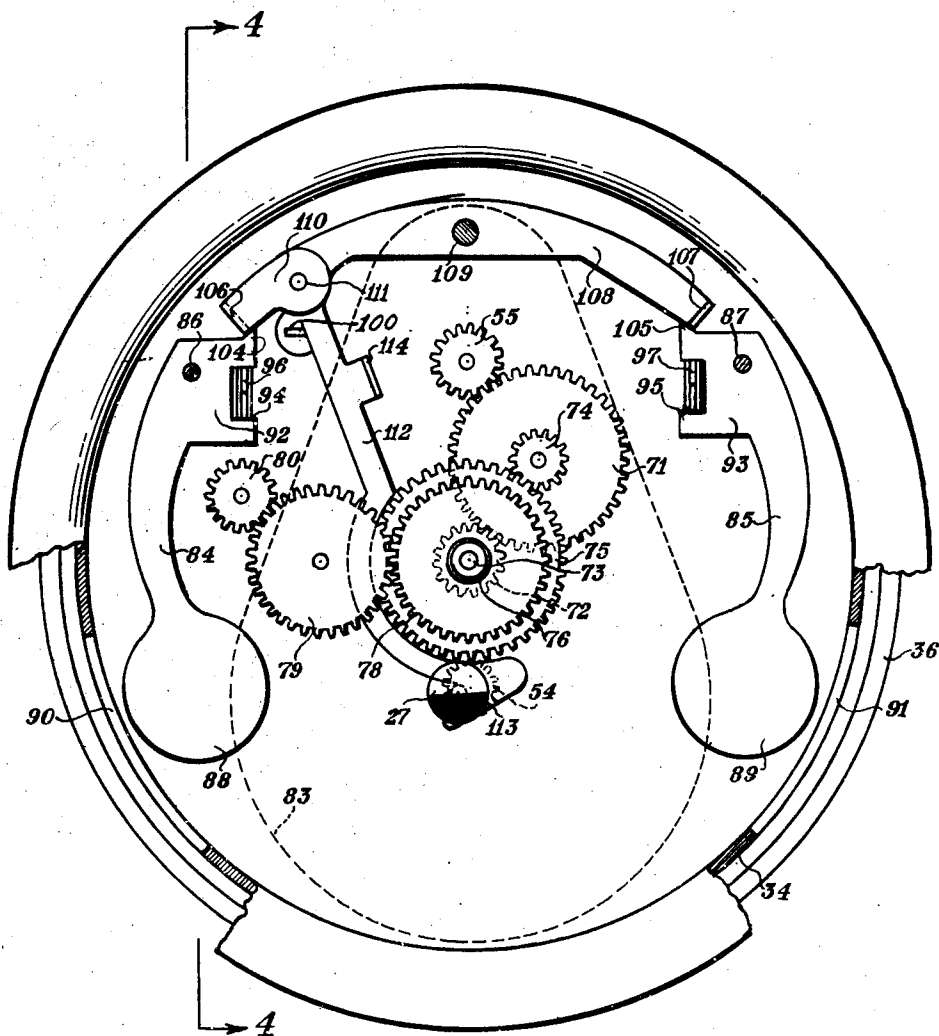


Fig. 7

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CLOCK

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6 Sheets-Sheet 5

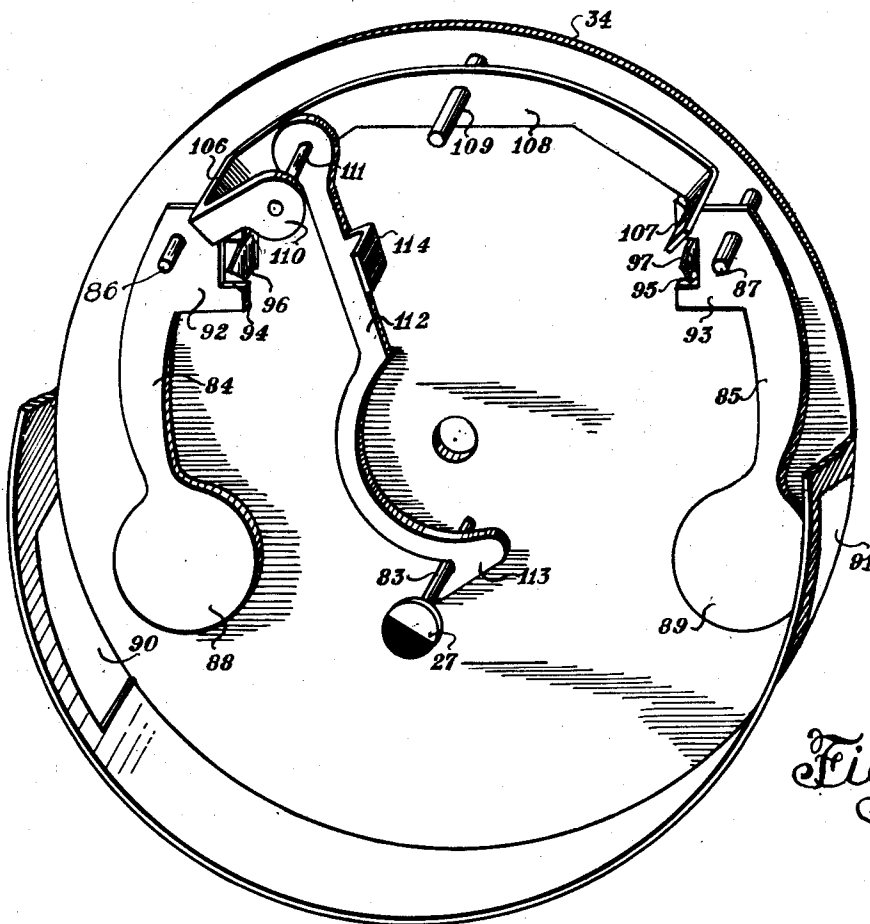


Fig. 8

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CLOCK

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6 Sheets-Sheet 6

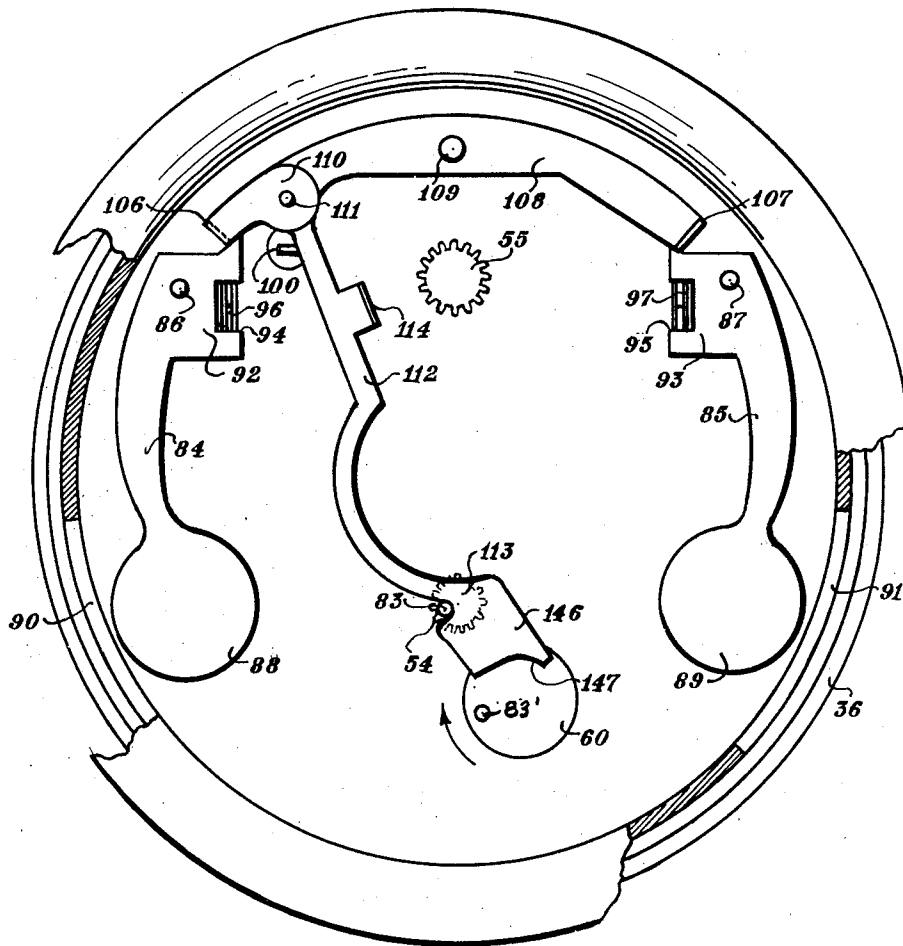


Fig. 9

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UNITED STATES PATENT OFFICE

2,491,103

CLOCK

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Application January 10, 1946, Serial No. 640,245

8 Claims. (Cl. 58—38)

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My invention relates, generally, to clocks and it has particular relation to improvements in and the operation of signalling and operation indicating means of household clocks, such as electrically driven clocks.

An object of my invention, generally stated, is to provide a new and improved clock which shall be simple and efficient in operation and which may be readily and economically manufactured.

Another object is to provide for indicating that the motor of the clock is operating.

A further object is to operate an alarm mechanism using power supplied by the clock motor.

Still another object is to derive power for operating various signalling and indicating means from selected points along the gear train interconnecting the motor and the time indicating means.

A further object is to translate the rotary movement of one of the gears of the gear train into reciprocatory movement for operating the alarm mechanism.

Another object is to operate alternately a pair of clappers or hammers to strike a bell for ringing the same.

A further object is to employ a selected one of the gears of the gear train to effect intermittent operation of the alarm mechanism or so called telephone ringing thereof.

Still another object is to lock the clappers or hammers against movement and to interrupt the driving connection between them and the gear train.

A still further object is to place the gear train in driving connection with the clappers or hammers at a predetermined time so as to thereupon operate the alarm.

Other objects of my invention will, in part, be obvious and in part appear hereinafter.

My invention, accordingly, is disclosed in the embodiments thereof shown in the accompanying drawings and it comprises the features of construction, combination of elements and arrangement of parts which will be exemplified in the constructions hereinafter set forth and the scope of the application of which will be indicated in the appended claims.

For a more complete understanding of the nature and scope of my invention, reference may be had to the following detailed description, taken in connection with the accompanying drawings, in which:

Figure 1 is a view, in front elevation, of an electric clock in which the present invention is incorporated;

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Figure 2 is a detail sectional view looking upwardly through the clock mechanism along a plane containing the minute hand shaft;

Figure 3 is a view, partly in side elevation and partly in section showing the alarm release mechanism.

Figure 4 is a detail sectional view along the line 4—4 of Figure 7;

Figure 5 is a perspective view of the alarm release mechanism, the parts being shown spaced from each other in order to more clearly show the details of construction;

Figure 6 is a perspective view of the alarm mechanism and shows the manual alarm release;

Figure 7 is a view, in front elevation, of the clock with the top plate removed and shows the alarm mechanism and some of the gears in the gear train associated therewith;

Figure 8 is a perspective view of certain of the movable elements of the alarm mechanism;

Figure 9 is a view, in front elevation of the clock, similar to that shown in Figure 7 with certain of the gears being omitted and showing a modification of the construction whereby intermittent or telephone ringing of the alarm is effected; and

Figure 10 is a view illustrating, schematically, the gear train interconnecting the motor and the time indicating mechanism and showing how power may be derived from various points along the gear train for performing certain indicating and signalling functions.

Referring now particularly to Figure 1 of the drawings, it will be noted that the reference character 20 designates the case of a clock having a conventional face 21 carrying the numerals 1 through 12. There are provided and mounted for concentric rotation, as will appear hereinafter, a minute hand 22, an hour hand 23 and an alarm set hand 24. The alarm hand 24 is adjustable relative to a scale 25 for setting the alarm to operate at the time there indicated. In the face of the clock there is provided an opening 26 through which an indicator 27 projects. The indicator 27 is in the form of a disc and is provided for indicating by its movement that the motor is operating. Half of the indicator disc 27 may be colored, red for example, and, as will hereinafter appear, it is arranged to rotate eccentrically in the opening 26 whereby the indication is given in a more striking fashion.

As shown in Figure 2 of the drawings the case 20 carries a transparent cover 31 over the face 21 and it is secured in place by a rim 32. The face 21 is carried by a top plate 33 which covers a

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cup-shaped base plate 34. The face 21, top plate 33 and base plate 34 may be mounted on a suitable depending flange 35, as shown. Concentric with the base plate 34 is a cup-shaped bell 36 which is supported in spaced relation with respect to the base plate 34 by means of bell mounting studs 37. A cover 38 closes the rear of the case 20 and may be secured in place by suitable screws 39 which also serve to hold the bell 36 in place.

Mounted on the rear of the base plate 34 is a motor which is indicated, generally at 43 and is shown by broken lines. It will be understood that any suitable type of motor 43 may be employed and that the particular motor construction forms no part of the present invention. For example a motor of the type shown in Haydon Patent No. 2,353,305 may be employed. However, it will be understood that other types of electric motors can be used and it will also be understood that a spring motor can be used without departing from the spirit and scope of this invention.

The manual controls for the clock will now be referred to briefly. As shown in Figure 2 there is provided an alarm set knob 44 which is carried by a shaft 45, that is arranged to be rotated thereby for setting the position of the alarm hand 24 in a manner which will be indicated in detail hereinafter. There is also provided a time set knob 46 which operates through a shaft 47 for adjusting the positions of the minute and hour hands 22 and 23. An alarm release knob 48 is carried by a shaft 49. As will be set forth hereinafter, the shaft 49 is arranged to be moved longitudinally of its axis rather than for rotary movement in order to release the alarm or to shut the alarm off as the case may be.

Reference may now be had to Figure 10 of the drawings where the gear train and parts associated therewith are shown diagrammatically. The motor 43, Figure 2, includes a rotor 52 that is mounted on a shaft 53 which carries a rotor pinion 54.

The pinion 54 directly driven by the rotor 52 rotates at a relatively high speed. For example it may rotate at a speed of 450 R. P. M. It is necessary to reduce this speed for driving the minute and hour hands 22 and 23. This is accomplished by having the pinion 54 drive a motor pinion 55 through a reduction gear train comprising the gear wheels and pinions 56 through 68. The connection between the gear wheel 68 and the pinion 55 may be by a friction spring 69 which permits adjustment of the minute and hour hands 22 and 23 by the time set knob 46 without transmitting motion through the gear train.

The motor pinion 55 engages a gear wheel 71 which in turn drives a pinion 72 that is carried by a shaft 73 on which the minute hand 22 is mounted. The gear wheel 71 has a pinion 74 rotatable therewith which drives a gear wheel 75 that is mounted on an hour hand gear hub 76. As shown, the hub 76 surrounds the minute hand shaft 73.

Surrounding the hour hand gear hub 76 is an alarm hand gear hub 77 to which a gear wheel 78 is secured. The gear wheel 78 is rotatable to adjust the position of the alarm hand 24 that is carried by the hub 77 through a gear wheel 79 and a pinion 80 that is mounted, as shown, on the shaft 45.

It will be observed that the indicator disc 27 which, as previously described, indicates by its movement that the motor 43 is operating, is

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mounted on the pin or crank 83 which in turn is mounted eccentrically on the rotor pinion 54. It is this mounting which provides the eccentric movement of the indicator disc 27, previously described. As will be hereinafter set forth in more detail, the crank 83 also serves to operate the alarm mechanism.

The gear wheel 60, Figure 10, may be provided with a pin or crank 83' which is eccentrically mounted thereon. As will hereinafter appear, the pin or crank 83' is provided for intermittent or telephone ringing of the alarm which may be desired in some cases. The gear reduction between the motor pinion 54 and the gear wheel 60 may be such that the latter rotates at a speed of 7.5 R. P. M. when the rotor pinion 54 operates at a speed of 450 R. P. M.

Referring now particularly to Figures 4, 6, 7 and 8 of the drawings, the details of construction and the functioning of the alarm mechanism are more clearly illustrated. It is first pointed out with respect to Figure 7 that the broken outline indicated at 83 shows the gear housing carried by the base plate 34 on the rear side thereof and which forms a part of the housing for the motor 43. It will be recalled that a bell 36 is provided concentric with the base plate 34. The manner in which the bell 36 may be rung in accordance with the present invention will now be described.

There is provided a pair of hammers or clappers 84 and 85 which are rockably mounted on pins 86 and 87 extending between the base plate 34 and the top plate 33. It will be understood that, normally, the base plate 34 will be located in a vertical position and, therefore, that the clappers 84 and 85 will normally hang in the positions shown in Figures 7 and 8 of the drawings. The clappers 84 and 85 form levers of the first class and have the lower or weight arms terminating in striker portions 88 and 89. These portions, as shown, are generally cylindrical in shape and are arranged to swing through apertures 90 and 91, respectively, in the sides of the base plate 34 to strike the inner surface of the bell 36 immediately there adjacent. The arrangement is such that the striker portions 88 and 89 are caused to engage alternately the bell 36 so as to provide for continuous ringing thereof during the operation of the alarm mechanism.

The upper portions of the clappers 84 and 85 include integrally formed extensions 92 and 93 containing generally rectangular openings 94 and 95. As shown more clearly in Figure 6 of the drawings, tines 96 and 97 of a fork, shown generally at 98, are arranged to interfit with the rectangular openings 94 and 95. The purpose of this construction is to hold or lock the clappers 84 and 85 in place to prevent their rattling during shipment or handling. It will be noted that the tines 96 and 97 of the fork 98 are integrally formed with a base portion 99 which may be secured, as by spot welding, to the shaft 49, previously referred to, which carries the alarm release knob 48. A third tine 100 is also integrally formed with the base portion 99 and, as will be presently described, is arranged to release the alarm mechanism for operation or to shut it off depending upon whether the alarm release knob 48 has been withdrawn or moved to its innermost position.

The ends of the power arms of the clappers 84 and 85 are indicated at 104 and 105, respectively. These are in the form of portions extending angularly upwardly and are arranged to be struck or engaged by inturned ends 106 and 107 of yoke 108 that is rockably mounted on a pin 109 extend-

ing between the base plate 34 and the top plate 33.

The intumed end 106 is provided with a rearwardly extending section 110 which supports one end of a pin 111, the other end of the pin being supported by the central portion of the yoke 108, as shown. Rockably mounted on the pin 111 is an arm or connecting rod 112 having a fork-shaped lower end portion 113 which, as shown, is arranged to engage the crank 83 carried by the rotor pinion 54, Figure 10.

It will be understood that when the fork-shaped lower end portion 113 of the connecting rod 112 is in engagement with the crank 83 and the latter is rotated, this rotary motion will be translated into reciprocatory movement of the connecting rod or arm 112. In turn, this reciprocatory movement is translated into rocking movement of the yoke 108 so that the end portions 106 and 107 thereof alternately strike the extensions 104 and 105 of the clappers 84 and 85 so that they, in turn, strike the inner surface of the bell 36. It will be understood that the movement of the end portions 106 and 107 of the yoke 108 toward the power arms 104 and 105 of the clappers 84 and 85 is somewhat less than the movement of these arms away from the end portions 106 and 107. As a result when the end portions 106 and 107 of the yoke 108 have reached the limits of their travel, the clappers 84 and 85 swing freely therefrom and into engagement with the bell 36. There is then no damping action as there might otherwise be if the end portions 106 and 107 remained in engagement with the clappers 84 and 85 throughout the entire movement of the latter.

As shown more clearly in Figures 6 and 7 of the drawings, the tine 109, when moved to the innermost position, engages the arm or connecting rod 112 and moves the forked lower end 113 thereof out of operative engagement with the crank 83. Thus as long as the alarm knob 48 and the fork 98 movable therewith occupies the innermost position, the clappers 84 and 85 are locked and the connecting rod or arm 112 is held out of engagement with the crank 83. When the knob 48 and the fork 98 are withdrawn, the clappers 84 and 85 are free to swing and the arm or connecting rod 112, if not otherwise held, is free to move so that the fork-shaped lower end 113 can engage the crank 83.

It remains now to describe how the connecting rod or arm 112 is released at a predetermined time, as indicated by the alarm hand 24, Figure 1, to effect operation of the alarm mechanism at the desired time. In order to provide for such release the arm or connecting rod 112 is provided with an integrally formed upstanding lug portion 114. This lug 114 is arranged to cooperate with the alarm release mechanism the details of construction of which are more clearly shown in Figures 2, 3 and 5 of the drawings.

It will be observed that the gear wheel 75 is provided with an integrally formed upstruck lug 121 which is arranged to cooperate with and drive an alarm set sleeve shown generally at 122. Sleeve 122 includes an integrally formed radially extending lower flange 123 having a notch 124 therein. The lug 121 on the gear wheel 75 interfits with the notch 124 and serves to provide the driving engagement therebetween. The sleeve 122 is provided with a central hub portion 125 which is journaled on the hour hand gear hub 76. The arrangement is such that the hour hand gear hub 76 is rotatable with the sleeve 122 while the latter is at the same time

movable longitudinally with respect to the hub 76 for releasing the alarm mechanism as will be presently described.

The sleeve 122 has an integrally formed cup-shaped upper end portion 126 with a V-shaped notch 127 therein. The notch 127 is arranged to cooperate with a detent 128 integrally formed with and struck up from the gear wheel 78. Prior to entrance of the detent 128 into the notch 127, the former rides along the upper rim of the cup-shaped portion 126 and holds the sleeve 122 in the retracted position shown in full lines in Figure 3 of the drawings.

There is provided a pair of arms 129 which are struck out of the top plate 33 and, as shown in Figures 2 and 3 of the drawings, extend toward the base plate 34. These arms 129 are provided with notches 130 on their under sides for receiving an alarm release lever, shown generally at 134.

The alarm release lever 134 has a pair of integrally formed arms 135 containing notches 136 which interfit with the notches 130 in the arms 129, thereby rockably mounting the lever 134. The lever 134 has a centrally located circular slot 137 which straddles the hub portion 125 of the alarm set sleeve 122. An integrally formed raised portion 138 of the lever 134 forms a bearing surface which engages the under side of the cup-shaped upper end portion 126 of the sleeve 122. A hook 139 is integrally formed with the alarm release lever 134 near its outer end for receiving one end of a coil tension spring 140, Figure 3. The other end of the coil tension spring 140 is held by a hook 140' integrally formed with and stuck from the top plate 33.

Also integrally formed with the outer end of the alarm release lever 134 is a detent 141 which has an inclined face 142 for engaging the lug 114 on the arm or connecting rod 112 and moving the latter so that the forked lower end 113 is out of engagement with the crank 83.

It will be understood that the position of the detent 128 extending from the gear wheel 78 will be determined by the position of the alarm hand 124 since they are rotatable together as a unit by turning the alarm set knob 44. Until the detent 128 registers with the notch 127 in the alarm set sleeve 122, the latter is held in the retracted position against the biasing force of the coil tension spring 140 which acts through the alarm release lever 134 to urge the alarm set sleeve 122 toward the top plate 33. Since the sleeve 122 is mechanically connected to the gear wheel 75 by the lug 121 and the gear wheel 75 is movable with the hour hand 23, it follows that the detent 128 will register with the slot 127 when the alarm set sleeve 122 is moved to the position corresponding to the setting of the alarm hand 24. Prior to registration of the detent 128 with the notch 127, the detent 141 engages the lug 114 and holds the arm or connecting rod 112 in the non-operative position.

Now when the detent 128 registers with the notch 127, the coil tension spring 140 swings the alarm release lever 134 to the position shown by the broken lines in Figure 3 of the drawings. The detent 141 is moved out of the path of the lug 114 and, if the tine 109 has been withdrawn, the arm or connecting rod 112 will move under the influence of gravity so as to position the forked-shaped end 113 in operative engagement with the crank 83. Thereupon the clappers 88 and 89 alternately engage the bell 36 as previously described. The alarm will continue to ring un-

til the time 100 is again inserted so as to move the arm or connecting rod 112 to a non-operative position or the gear wheel 75 carrying the lug 121 has been rotated to such position that the alarm set sleeve 122 moves the notch 127 out of register with the detent 128 and the latter again rides upon the uppermost edge of the cup-shaped portion 126 of the sleeve 122.

With a view to placing a friction load on the alarm set gear train comprising the gears 78, 79 and 80, the intermediate gear 79 is mounted on a shaft 143 which carries a coil compression spring 149, Figure 2. The spring 149 serves to impose a friction load on the gear 79. This serves to provide a limited amount of resistance to manual turning of the alarm set knob 44, which is desirable, and also serves to hold the alarm hand 24 in any position that it may be set.

It will be understood that the parts making up the clock mechanism described herein may be made of any suitable material. The clappers or hammers 84 and 85, the yoke 108 and the arm or connecting rod 112 may be formed of cold rolled steel. Likewise the alarm release lever 134 may be formed of this same material.

The hammers or clappers 84 and 85, together with the weighted lower end striker portions 88 and 89, are so designed as to swing or strike alternately the bell 36 in timed relation to the movement of the yoke 108 as rocked by the arm or connecting rod 112. That is, their weight is such and it is so distributed with respect to the pins 86 and 87 that the alternate striking thereof by the ends 106 and 107 of the yoke 108 is just sufficient to overcome the friction and mechanical losses incident to the movement of the hammers or clappers 84 and 85. They swing free of the ends 106 and 107 and strike the bell 36 undamped by the yoke 108, as previously described.

It may be desirable to provide for intermittent ringing of the bell 36 to provide what is known as repeat or telephone ringing. It will be recalled that the gear wheel 60, Figure 10, in the gear train interconnecting the rotor pinion 54 and the motor pinion 55 is provided with a crank 83'. The function of the crank 83' is illustrated more clearly in Figure 9 of the drawings to which reference now will be had.

As shown in Figure 9 the arm or connecting rod 112 may be provided with an integrally formed extension 146 having a cam surface 147. The cam surface 147 is positioned in the path of the crank 83' so that, when this engagement takes place, the arm or connecting rod 112 is lifted out of engagement with the crank 83. During the time when the arm or connecting rod 112 is out of engagement with the crank 83, the hammers or clappers 84 and 85 cease to strike the bell 36. When the crank 84 moves out of engagement with the cam surface 147, the arm or connecting rod 112 again engages the crank 83 and the ringing is resumed. The relation between the movement of the crank 83' in engagement with the cam surface 147 may be such that the ringing period and the non-ringing period are approximately equal in time.

Since certain further changes can be made in the foregoing constructions and different embodiments of the invention can be made without departing from the spirit and scope thereof, it is intended that all matter shown in the accompanying drawings or set forth hereinbefore shall be interpreted as illustrative and not in a limiting sense.

I claim as my invention:

1. In an alarm clock, in combination, a base plate disposed to be mounted normally in a vertical position, bell means adjacent said base plate, a pair of clappers rockably mounted at their upper ends on said base plate and arranged to strike said bell means, a yoke rockably mounted intermediate its ends on said base plate and adapted operatively to engage said clappers, means for rocking said yoke to cause said clappers alternately to strike said bell means, means for setting said rocking means to operate at a predetermined time, and means for releasing said rocking means for operation.

2. In an alarm clock, in combination, a base plate disposed to be mounted normally in a vertical position, motor means carried by said base plate, time indicating means carried by said base plate, a reduction gear train interconnecting said motor means and said time indicating means, bell means adjacent said base plate, a pair of clappers rockably mounted at their upper ends on said base plate and arranged to strike said bell means, a yoke rockably mounted intermediate its ends on said base plate and adapted operatively to engage said clappers, a crank carried by one of the gears of said gear train, and an arm interconnecting said yoke and said crank for rocking the former to cause said clappers alternately to strike said bell means.

3. An alarm clock, in combination, a base plate disposed to be mounted normally in a vertical position, motor means carried by said base plate, time indicating means carried by said base plate, a reduction gear train interconnecting said motor means and said time indicating means, bell means adjacent said base plate, a pair of clappers rockably mounted at their upper ends on said base plate and arranged to strike said bell means, a yoke rockably mounted intermediate its ends on said base plate and adapted operatively to engage said clappers, a crank carried by one of the gears of said gear train, an arm interconnecting said yoke and said crank for rocking the former to cause said clappers alternately to strike said bell means, means for releasing said arm for operative engagement with said crank, and additional means for releasing said arm for such operative engagement at a predetermined time.

4. In an alarm clock, in combination, a base plate disposed to be mounted normally in a vertical position, motor means carried by said base plate, time indicating means carried by said base plate, a reduction gear train interconnecting said motor means and said time indicating means, bell means adjacent said base plate, a pair of clappers rockably mounted at their upper ends on said base plate and arranged to strike said bell means, a yoke rockably mounted intermediate its ends on said base plate and adapted operatively to engage said clappers, a crank carried by one of the gears of said gear train, an arm interconnecting said yoke and said crank for rocking the former to cause said clappers alternately to strike said bell means, and means operated by another gear of said gear train for periodically disconnecting said arm from said crank whereby said bell means is rung intermittently.

5. In an alarm clock, in combination, a circular vertically disposed base plate, a bell concentric with said base plate, a pair of clappers rockably mounted at their upper ends on said base plate with their lower ends arranged to strike

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the interior of said bell, a yoke rockably mounted intermediate its ends on said base plate for alternately engaging the upper ends of said clappers to cause the same alternately to strike said bell, a crank, means for rotating said crank, an arm operatively interconnecting said yoke and said crank, and means for periodically interrupting the operative connection between said yoke and said crank whereby said bell is rung intermittently.

6. In an alarm clock, in combination, a circular vertically disposed base plate, a bell concentric with said base plate, a pair of clappers rockably mounted at their upper ends on said base plate with their lower ends arranged to strike the interior of said bell, a yoke rockably mounted intermediate its ends on said base plate for alternately engaging the upper ends of said clappers to cause the same alternately to strike said bell, a crank, means for rotating said crank, an arm operatively interconnecting said yoke and said crank, and means for periodically disconnecting said arm from said crank whereby said bell is rung intermittently.

7. In an alarm clock, in combination, a circular vertically disposed base plate, a bell concentric with said base plate, a pair of clappers rockably mounted at their upper ends on said base plate with their lower ends arranged to strike the interior of said bell, a yoke rockably mounted intermediate its ends on said base plate for alternately engaging the upper ends of said clappers to cause the same alternately to strike said bell, a crank, means for rotating said crank, an arm operatively interconnecting said yoke and said crank, and means for simultaneously locking said clappers against movement and said arm out of engagement with said crank.

8. In an alarm clock, in combination, a circular

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vertically disposed base plate, a bell concentric with said base plate, a pair of clappers rockably mounted at their upper ends on said base plate with their lower ends arranged to strike the interior of said bell, a yoke rockably mounted intermediate its ends on said base plate for alternately engaging the upper ends of said clappers to cause the same alternately to strike said bell, a crank, means for rotating said crank, an arm operatively interconnecting said yoke and said crank, means for releasing said clappers for striking said bell, means for releasing said arm into operative engagement with said crank, and additional means for releasing said arm for said operative engagement with said crank at a predetermined time.

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