Jan. 29, 1957 A. W. FOWLER 2,779,151

ELECTRIC CHIME CLOCK

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Fig. 1.

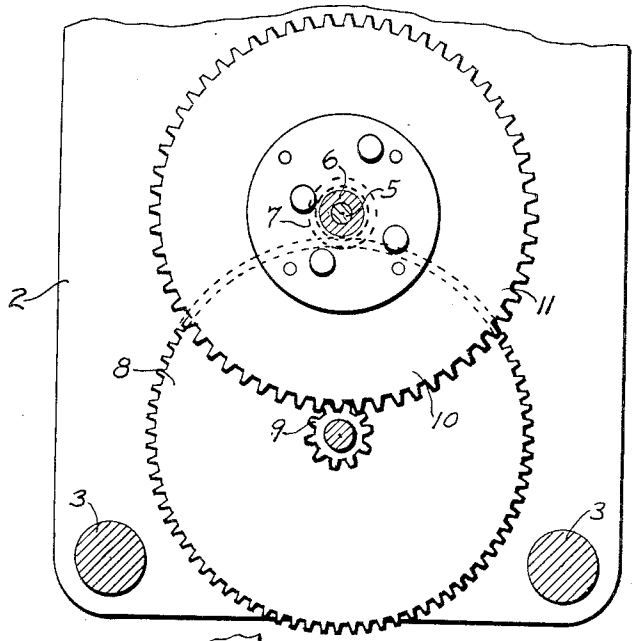
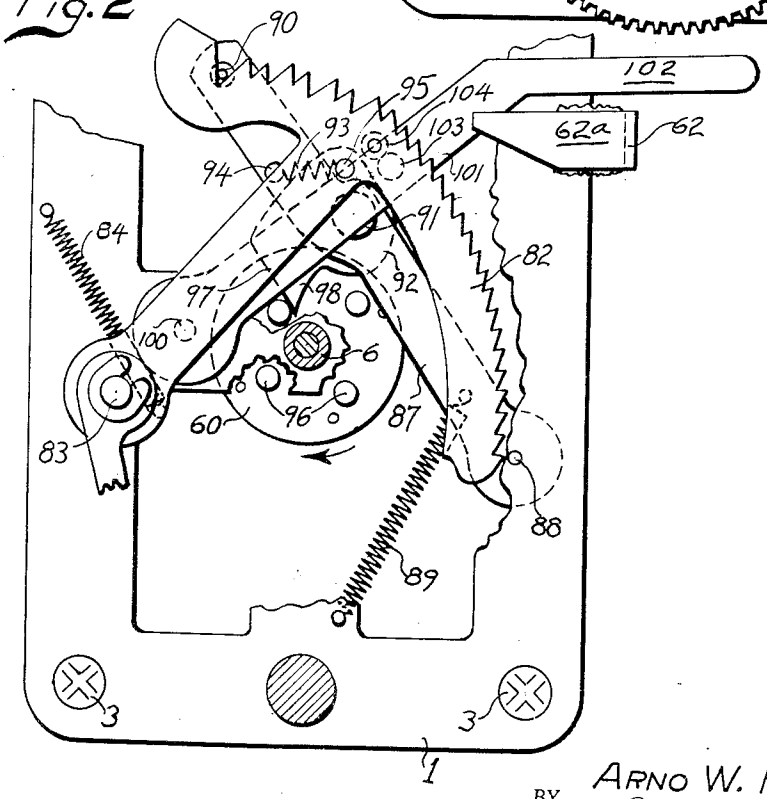


Fig. 2



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Fig 3

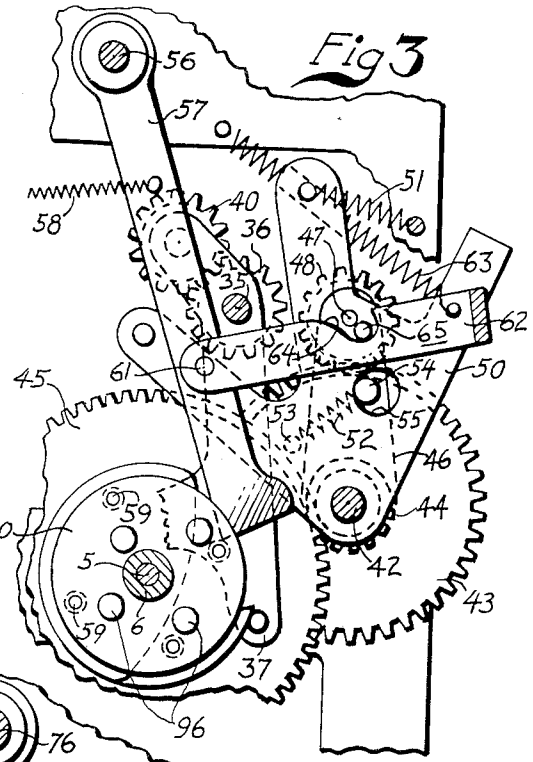
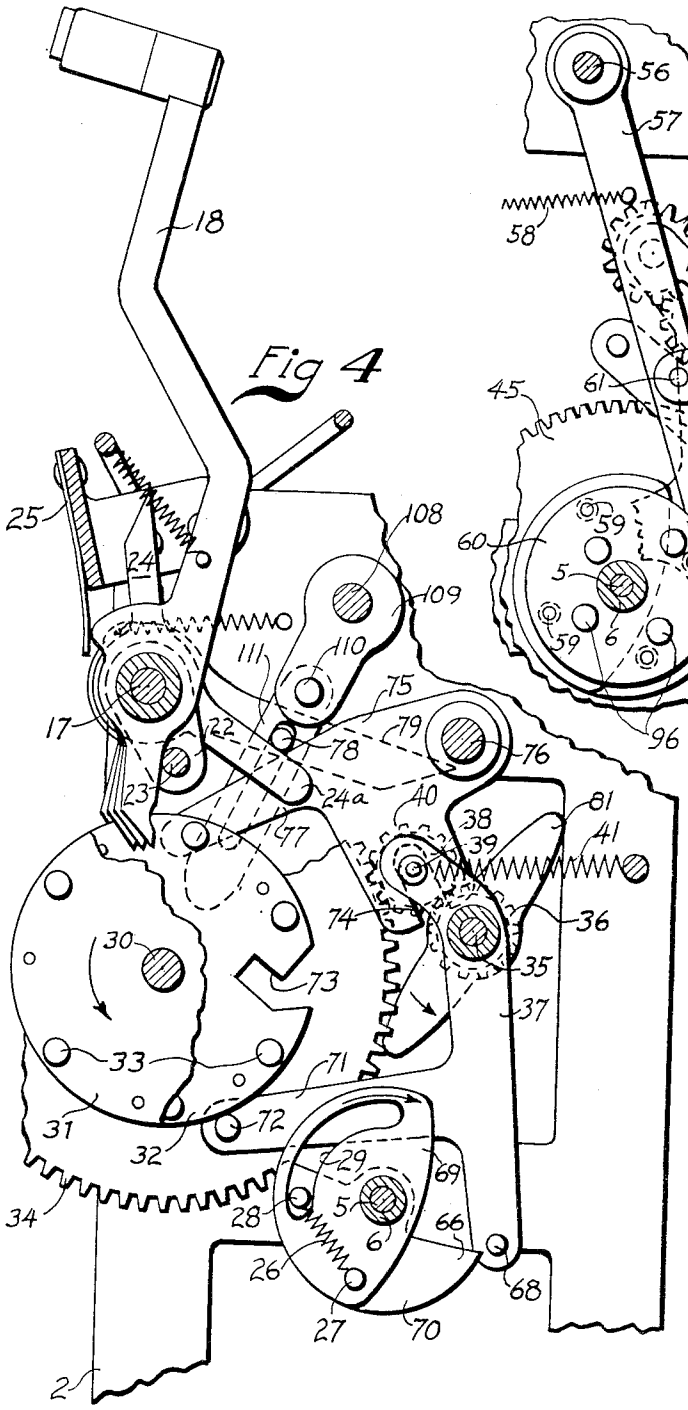


Fig 4



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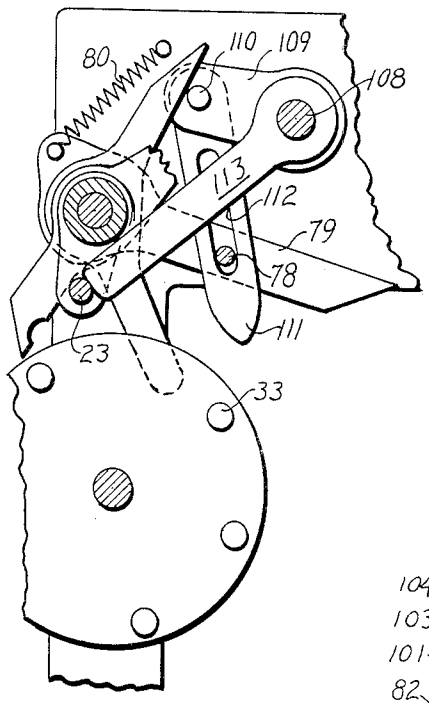


Fig 6

Fig 5

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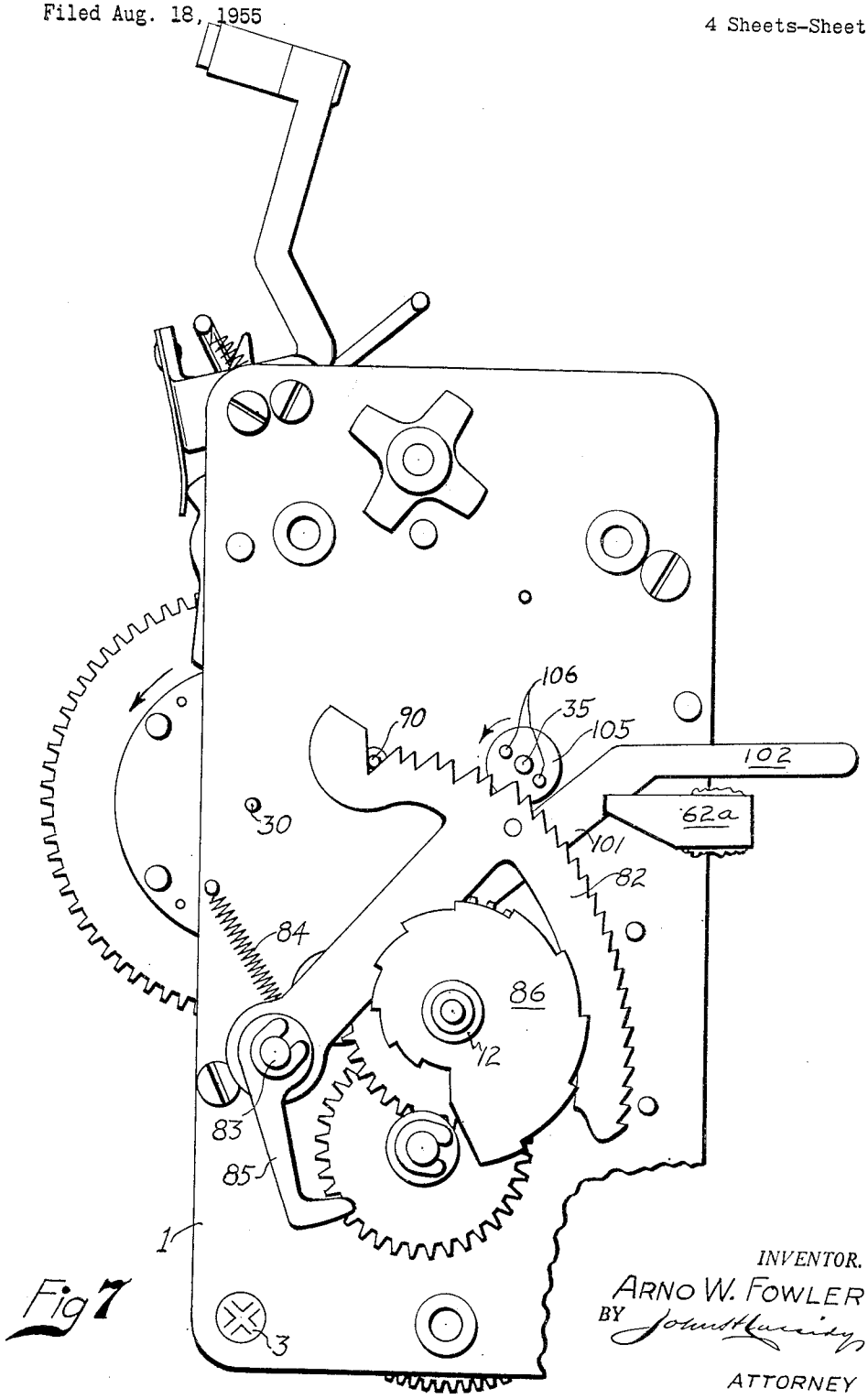


Fig 7

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2,779,151

ELECTRIC CHIME CLOCK

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3 Claims. (Cl. 58—38)

This invention pertains to electric clocks equipped with striking and chiming mechanism.

An object of this invention is to provide an improved mechanism in such a clock for starting and controlling the chiming mechanism.

Another object is to provide such control means with yielding connections whereby the spindle which drives the minute hand may be turned backwards in setting the clock and such connections will accommodate such movement and automatically reset themselves for normal operation.

Another object is to provide improved means for stopping the chiming mechanism at the end of its normal operation.

A further object is to provide simple means for rendering the chiming and striking mechanism entirely inoperative when so desired.

Further objects will appear from the following description taken in connection with the accompanying drawings in which—

Fig. 1 is a vertical sectional view of the portion of a clock mechanism taken about in the plane indicated at 1 in Fig. 5;

Fig. 2 is a front elevation of a portion of the mechanism with parts broken away and parts in section in plane 2 of Fig. 5;

Fig. 3 is a detail section taken about in the plane 3 of Fig. 5;

Fig. 4 is a detail section in plane 4 of Fig. 5;

Fig. 5 is a side elevation of the clock mechanism with parts omitted so as to show others which would be hidden otherwise;

Fig. 6 is a detail of the mechanism for rendering the chiming and striking mechanisms inoperative; and

Fig. 7 is a front elevation of the complete mechanism.

In accordance with this invention, generally stated, the ordinary clock mechanism is provided with chiming mechanism which is automatically conditioned and started at each quarter of the hour. Different chimes are sounded at the different quarters to distinguish them from each other, and at the hour, the mechanism is automatically conditioned and operated to strike the hour.

The mechanism for starting the chiming has means engaged by selecting pins on a disk which is rotated by the clock mechanism, said means functioning to start the driving of the chiming mechanism. Since the clock must sometimes be reset, and ressetting may involve reversing rotation of the clock mechanism, a yielding member is provided engageable by said pins which will yield when the pins move in reverse direction to permit them to pass and snap back to its normal position as each pin is passed.

There is also provided a special shutoff mechanism operable by a key which functions to move the various actuated elements of said mechanism to positions clear of their actuating means, thus rendering the chiming and striking mechanisms inoperative.

The general mechanism of this clock is substantially the same as that described in Patent No. 2,176,870, issued

October 24, 1939, to A. W. Fowler, and reference to the patent may be had for further details.

Referring to the drawings, more particularly Fig. 5, the clock structure comprises, generally, front and rear frame plates, 1 and 2 respectively, connected by any suitable number of cross rods 3, in the usual manner, to make a rigid structure. An electric motor 4, mounted on the rear plate 2, drives the seconds spindle 5. The minutes spindle is a sleeve 6, surrounding the spindle 5 and driven thereby through a gear train including a pinion 7, on the spindle 5, driving a gear 8 on a shaft 9, a pinion 10 on the shaft 9, and a gear 11 on the spindle 6. An hour spindle, in the form of a sleeve 12, surrounding the sleeve 6, is driven from said sleeve through a gear train including pinion 13, gear 14, pinion 15 and gear 16, in the usual manner.

The chiming mechanism comprises a shaft 17, journaled in the frame plates 1 nad 2, and having pivoted thereon a series, in this case four, striking hammers 18, 19, 20 and 21. These are loose on the shaft 17 and are spaced apart by their hubs as shown in Fig. 5. An arm 22, fixed to the shaft 17, carries a cross-pin 23 extending across the lower ends of all the striking hammers. A second arm 24 is also fixed to the shaft 17 and is arranged to engage a cross brace 25 extending between the frame plates 1 and 2, to limit the movement of the cross-pin 23. A shaft 30, Fig. 4, has fixed thereto a pair of chiming disks 31 and 32 each provided with a series of hammer actuating pins 33 suitably spaced on both sides thereof. These pins are located so that, as the disks rotate on the shaft 30 the different pins engage the lower ends of the hammers 18, 19, 20, and 21 to retract and release them so as to strike in a different sequence at each quarter of the hour. A gear 34, fixed to the shaft 30, serves to drive the same.

A shaft 35, journaled in the frame plates 1 and 2, has fixed thereto a pinion 36. Pivoted on the shaft 35 is a lever 37 of special shape, one arm 38 of which carries a pin 39, Fig. 4, on which a pinion 40 is mounted to rotate. A tension spring 41 tends to turn the lever 37 clockwise as seen in Fig. 4. The pinion 40 is positioned to engage and drive the gear 34 when the lever 37 is rocked counterclockwise against the tension of the spring 41.

A shaft 42, Fig. 3, mounted in the frame plates 1 and 2, has loosely mounted for rotation thereon a gear 43 and a pinion (44) fixed thereto and meshing with a gear 45 on the spindle 5, so that the gear 43 is driven in continuous rotation. Pivoted on the shaft 42 is an arm 46 which carries a pin 47 on which is mounted a pinion 48 meshing with the gear 43 and driven thereby. Also pivoted on the shaft 42 is a rocker plate 50, biased in clockwise direction, Fig. 3, by a spring 51. The plate 50 and the arm 46 are adjacent to each other on the shaft 42, and are connected by a spring 52 engaging a pin 53 on the rear of the rocker plate and a pin 54 on the rear of the arm 46, the latter pin passing through the arm to the front thereof and into a hole 55 in the rocker plate, which hole serves as a stop to limit the movement of the pin 54. The pinion 48 is positioned to mesh with the pinion 36 when the rocker plate 50 is rocked counterclockwise. Pivoted on a pin 56 on the rear of the front plate 1 is a starting arm 57 biased by a spring 58 attached to the plate 1. The lower end of this arm is positioned to be engaged by each of four pins 59, equally spaced circumferentially on the rear of a disk 60 mounted on the minutes spindle 6 to rotate therewith. As the disk 60 rotates, each of the pins 59, in turn, picks up and releases the arm 57, so that this arm is actuated every quarter hour. Pivoted at 61 on the arm 57 is a link 62 biased by a spring 63. The link 62 is formed with a hooked notch 64 positioned to receive a pin 65 on the

arm 46 when the arm 57 is in the position of Fig. 3, i. e. when moved to the right by one of the pins 59. It will be seen that when the arm 57 is moved to this position by one of the pins 59, the spring 63 will pull the link 62 upward to engage the hooked notch 64 with the pin 65. Then, when the pin 59 moves on and releases the arm 57 that arm will move to the left, carrying with it the link 62 and the arm 46, thereby moving the pinion 58 into mesh with the pinion 36 to start the chiming mechanism.

The chiming mechanism is driven through the pinions 36 and 40 and the gear 34 which turns the shaft 30 and the disks 31 and 32 carried thereby. The pins 33 on these disks then move and release the lower ends of the striking hammers 18, 19, 20, and 21 in proper sequence to strike the chime. The sequence is different for each quarter hour. At the hour, after chiming the four quarters, the mechanism sets itself for striking the hour. For this purpose the lower end of the lever 37 has a pin 68 which normally rides on the edge of a cam 69 carried by the minutes spindle 6. The cam 69 is in the form of a half-disk and is fixed to the spindle 6. A second half-disk 70 is loosely mounted on the same spindle just in rear of the cam 69. These two half-disks are connected together by a spring 26 engaging a pin 27 on the cam 69 and a pin 28 on the half-disk 70, the latter pin being movable in an arcuate slot 29 in the cam member 69. At the hour, this cam arrives at the position shown in Fig. 4 where the tip 66 of the half-disk 70 is in position to release the pin 68. However, the lever 37 has a laterally extending arm 71 carrying a pin 72 which rides on the edge of the disk 32. The disk 32 has a notch 73 positioned so that after the four quarter chimes have been struck, this notch comes to a position to receive the pin 72. Thereupon the pin drops into said notch under the tension of the spring 41, and the consequent pivotal movement of the lever 37 about the shaft 35 moves the pinion 40 out of mesh with the gear 34 to stop the rotation of the chiming disks 31 and 32 while the shaft 35 continues to rotate.

The pin 39 on the arm 38 of the lever 37 is engaged in a slot 74 in a special lever 75 pivoted on a shaft 76 supported on the frame plates 1 and 2. The lever 75 has an arm 77 which extends beneath a pin 78 carried by an arm 79 which is loose on the shaft 17, and tensioned by a spring 80, Fig. 6. The above-described movement of the lever 37, when the pin 72 drops into the notch 73, causes the pin 39, moving in the slot 74, to turn the lever 75 counter-clockwise on its pivot, Fig. 4, thereby permitting the pin 78 and the arm 79 to swing clockwise on the pivot 17 so as to place the tip of said arm in the path of rotation of a two-arm actuator 81 fixed to the shaft 35. This conditions the mechanism for striking the hour. In so doing, the actuator 81, rotating with the shaft 35 engages the tip of the arm 79 to swing and release the same twice during each revolution of the shaft 35. At each swing of the arm 79 the pin 78 engages the lower end 24*a* of the arm 24 and the latter is rocked (clockwise, Fig. 4) thereby rocking the arm 22. This causes the pin 23 to engage the lower ends of all four of the striking hammers to swing them clockwise on the shaft 17. As the arm 79 is released by the actuator 81 all four of the hammers are freed to strike in unison.

In order to control the chiming and striking, a counting ratchet 82 is provided, arcuate in shape, pivoted at 83 on the plate 1, and biased by a spring 84 in the counter-clockwise direction, Fig. 2. In order to position the ratchet for striking the hours, it has attached thereto an arm 85 engageable with a snail cam 86 carried by the hour spindle 12 in a well known manner. A control lever 87, pivoted at 88 on the plate 1 and tensioned by a spring 89, carries a pin 90 engageable with the teeth of the ratchet 82. The teeth of the ratchet are so formed

that each pair of teeth, for the first four pairs, is radially higher than the preceding pair, so that by raising the pin 90 by the proper distance, the ratchet may be stopped thereby at any one of these pairs. Pivoted on a pin 91 on the rear of the lever 87 is a cam member 92. A spring 93, tensioned between a pin 94 on the lever 87 and a pin 95 on the cam member, serves to locate the cam member in the position of Fig. 2, the pin 95 projecting from the front of said member and engaging the edge of the lever 87 to serve as a stop.

The disk 60, on the minutes spindle 6, is provided on the front face thereof with a series of pins 96, successive pins in the counter-clockwise direction, Fig. 2, being located at progressively increasing distances, by uniform increments, from the center of the spindle 6. These pins are arranged to successively engage the cam face 97 of the cam member 92 as the disk 60 rotates. The first of these pins (upper left, Fig. 2) is so located that as the disk 60 turns, the pin moves the cam member and the lever 87 to lift the pin 90 just enough to clear the first pair of teeth on the ratchet 82. The spring 84 then pulls the ratchet around on its pivot until the first tooth of the second pair strikes the pin 90 and the ratchet is stopped thereby. The first pin 96 then moves out from under the cam member by rotation of the disk 60 and the lever 87 drops back (a recess 98 providing ample clearance for the pin 96) until the pin 90 lodges in the notch just ahead of the second pair of teeth. This conditions the mechanism to strike one sequence of chimes at the first quarter of the hour.

It may be seen from Fig. 2 that the pressure of each pin 96 on the cam member 92 is always in such a direction as to maintain said member in its normal position with respect to the lever 87 so that it will always function as described. If, however, the disk 60 should be turned backwards in setting the clock, said pins may pass the cam member by rotating the same on its pivot 91 against the tension of the spring 93, and after each pin 96 has passed, the cam member will snap back to its normal position.

The pins 59 on the rear face of the disk 60 are located 90° apart and each pin 96, on the front face, is located sufficiently ahead of one of the pins 59 to complete the setting of the ratchet 82 as described before the pin 59 actuates the starting arm 57 to start the chiming mechanism. The link 62 has its end portion bent around to the front of the frame plate 1 as shown at 62*a* in Fig. 2. Pivoted at 100 on the plate 1 is a floating lever 101 having a horizontal finger 102 extending above the link-end 62*a*. This lever carries on its front face a short stud 103, engageable by a similar stud 104 on the rear face of the ratchet 82. The shaft 35 has mounted on its forward end a small counting disk 105, Fig. 7, carrying a pair of pins 106 which extend across the rim of the ratchet 82. When the ratchet has been set by one of the pins 96 and the chiming mechanism started as described, the shaft 35 is set in rotation and turns the counting disk 105 in the counter-clockwise direction, Fig. 7, and the pins 106, engaging successive teeth of the ratchet, move the same back to its starting position. Just before the ratchet arrives at that position, the stud 104 engages the stud 103 and further movement of the ratchet causes the lever 101 to move so that its finger 102 moves the link-end 62*a* downward. This disengages the notch 64 from the pin 65 and permits the spring 51 to swing the rocker plate 50 to the right, Fig. 3, carrying with it the arm 46 and the pinion 48 which is thereby disengaged from the pinion 36 to stop the chiming mechanism.

In order to render the chiming and striking mechanism entirely inoperative, a shaft 108, Figs. 4 and 6, is journaled in the frame plates 1 and 2. This shaft carries a crank arm 109 having pivoted thereto at 110 a link 111 having a slot 112 adapted to receive the pin 78 on the striking arm 79. The shaft 108 has fixed

thereto a second arm **113**. The rear end of the shaft **108** may have a squared portion **114** to receive a key, not shown, whereby the shaft may be turned. When this shaft is turned clockwise, Fig. 6, the crank arm **109** raises the link **111** which hauls up the arm **79** to a position out of the path of the actuator **81**. At the same time, the arm **113** moves the pin **23** to the left and finally lodges above it in the position shown in Fig. 6. This locks the striking hammers out of the paths of the pins **33**.

Various changes may be made in the details of construction, within the scope of the appended claims, without departing from the spirit of this invention. Parts of the invention may be used without the whole and improvements may be added while retaining some or all of the advantages of the invention.

I claim:

1. In an electric chime clock having a minutes spindle, chiming mechanism, means operated by said spindle to condition said mechanism for different chiming sequences at the different quarters of the hour, and a counting ratchet controlling the chiming sequence; the improvement comprising, a pivoted control arm having a stop thereon, said arm being biased to engage said stop with said ratchet, and a cam member movably mounted on said arm and biased to normally position the same for cooperation with said conditioning means but permitting movement of said member relative to said arm to permit reverse movement of said spindle when setting the clock.

2. In an electric chime clock having a minutes spindle, and chiming mechanism, a counting ratchet controlling said mechanism, a movable control arm having a stop thereon engageable with said ratchet, conditioning means having a selecting member driven to move in timed relation to said spindle, a plurality of locating elements on said member, a cam member movably mounted on said arm and yieldingly positioned thereon in the path of movement of said locating elements whereby engagement of one of said elements with said cam member operates to move said arm so as to position the stop thereon to engage a specific tooth of said ratchet, said cam member yielding to reverse movement of said locating elements when the spindle is turned in reverse direction when setting the clock.

3. In an electric chime clock having a minutes spindle and chiming mechanism, a counting ratchet controlling said mechanism, a movable control arm having a stop thereon engageable with said ratchet, a rotary disk driven in timed relation with said spindle and having a plurality of locating pins thereon at different radial distances from its center of rotation, and a cam member movably mounted on said arm and having a portion thereof in the path of movement of said pins, said member being biased to maintain said portion in said path during normal rotation of said disk but to yield upon reverse movement of said pins to permit said member to move out of said path when setting the clock by reverse movement of said spindle.

4. In an electric chime clock having a minutes spindle, chiming and striking mechanism, means operated by said spindle to condition said mechanism for operation, a counting ratchet controlling the operation of said mechanism, and means operated by said spindle to start the operation of said mechanism; the improvement comprising, a movable member engageable with said starting means and having an abutment, and an abutment on said counting ratchet engageable with said abutment of said member to move the latter to move said starting means to stop said mechanism.

5. In an electric chime clock having a minutes spindle, chiming and striking mechanism, means operated by said spindle to condition said mechanism for operation, a counting ratchet controlling the operation of said mechanism, and means operated by said spindle to start the operation of said mechanism; the improvement comprising, a floating lever having a finger engageable with said starting means and having an abutment, and an abutment on said counting ratchet engageable with said abutment of said lever to move the lever to cause said finger to move said starting means to stop said mechanism.

6. In an electric chime clock having a minutes spindle, chiming and striking mechanism, means operated by said spindle to condition said mechanism for operation, said means including a selecting member having a plurality of locating elements thereon, a counting ratchet mounted for setting and return movements to control said mechanism, a movable control arm having a stop thereon engageable with said ratchet, a cam yieldingly positioned on said arm for engagement with said locating elements to position said stop relatively to said ratchet, means operated by said spindle for starting the operation of said mechanism, a movable member engageable with said starting means and having an abutment, and an abutment on said ratchet engageable at the end of its return movement with said abutment on said movable member whereby said member is moved to engage and move said starting means to stop said mechanism.

7. In a chime clock having chiming mechanism including striking hammers operated separately by said mechanism, striking mechanism for operating said hammers in unison, a movable stop member against which said hammers normally rest, and a retractable operating member for said striking mechanism; means for rendering said chiming and striking mechanism inoperative comprising, a rotatable shaft, manipulating means for rotating said shaft, and an arm on said shaft movable by rotation thereof to move said stop member to locking position to prevent movement of said hammers, and a link operable by rotation of said shaft to retract said retractable member to prevent operation of said striking mechanism.

8. In a chime clock having chiming mechanism including striking hammers operated separately by said mechanism, and a movable stop member against which said hammers normally rest; a rotatable shaft, manipulating means for rotating said shaft, and an arm on said shaft operable by such rotation to move said stop member to a position locking said hammers against chiming movement by said mechanism.

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