

Dec. 8, 1959

L. A. MAAS

2,915,872

PERIODIC CHIME CONTROL MECHANISM

Filed June 6, 1955

4 Sheets-Sheet 1

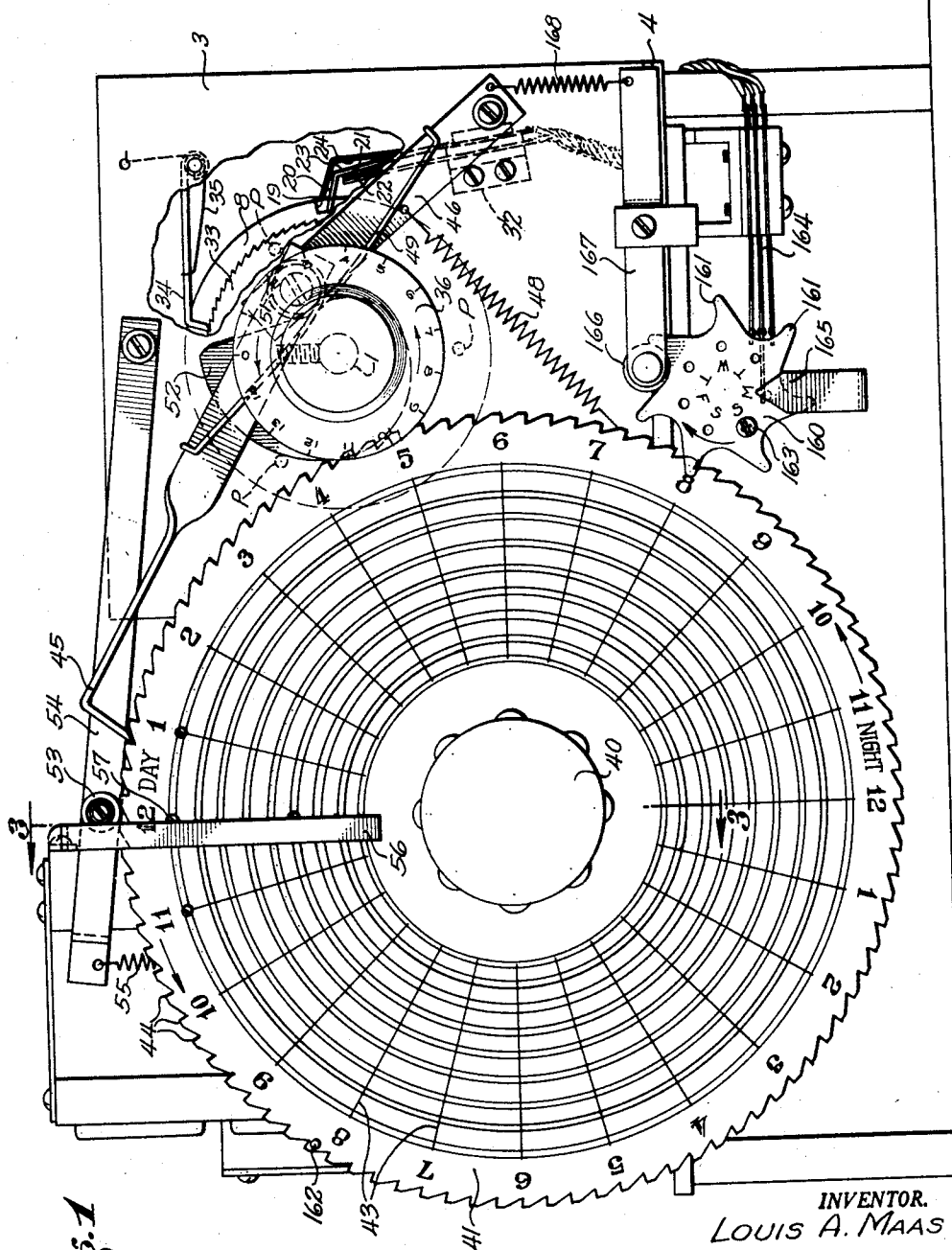


Fig. 1

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4 Sheets-Sheet 2

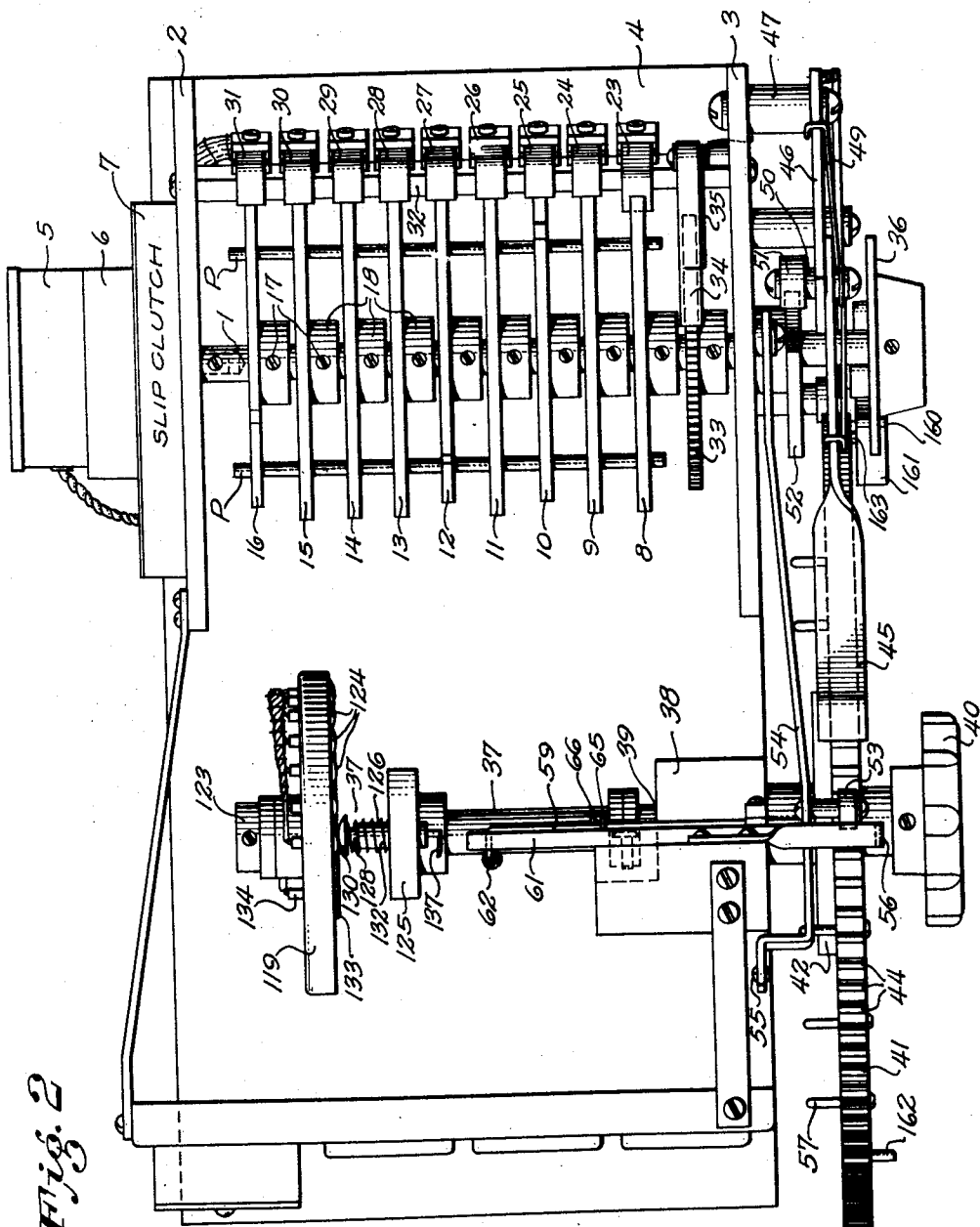


Fig. 2

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4 Sheets-Sheet 3

Fig. 3

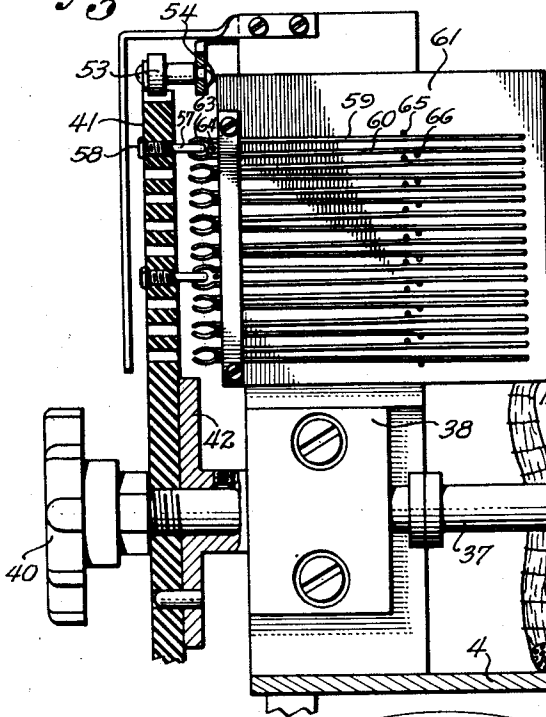


Fig. 4

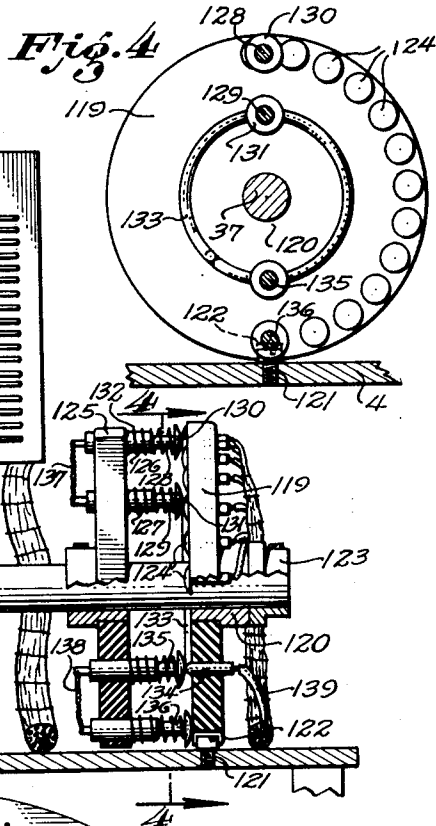
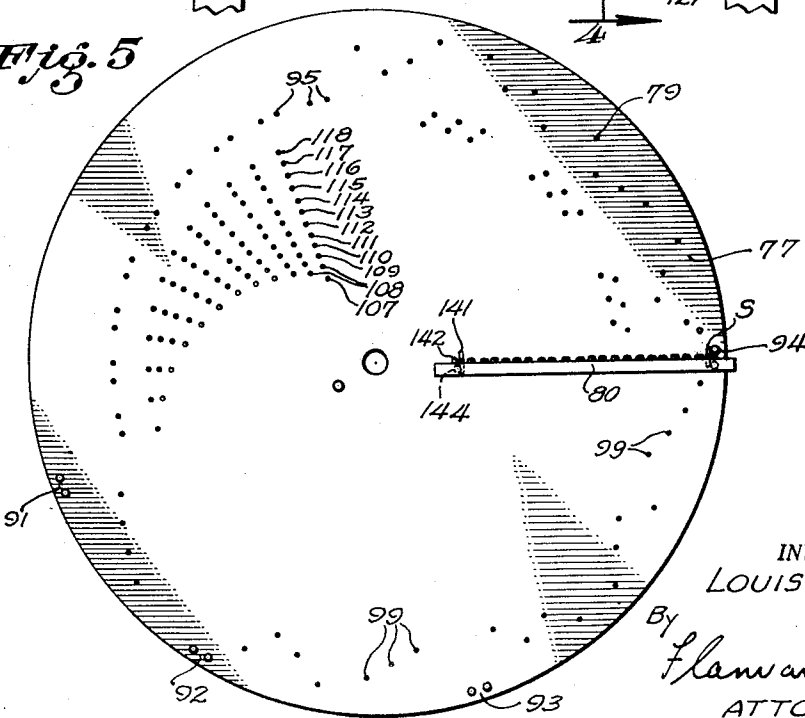


Fig. 5



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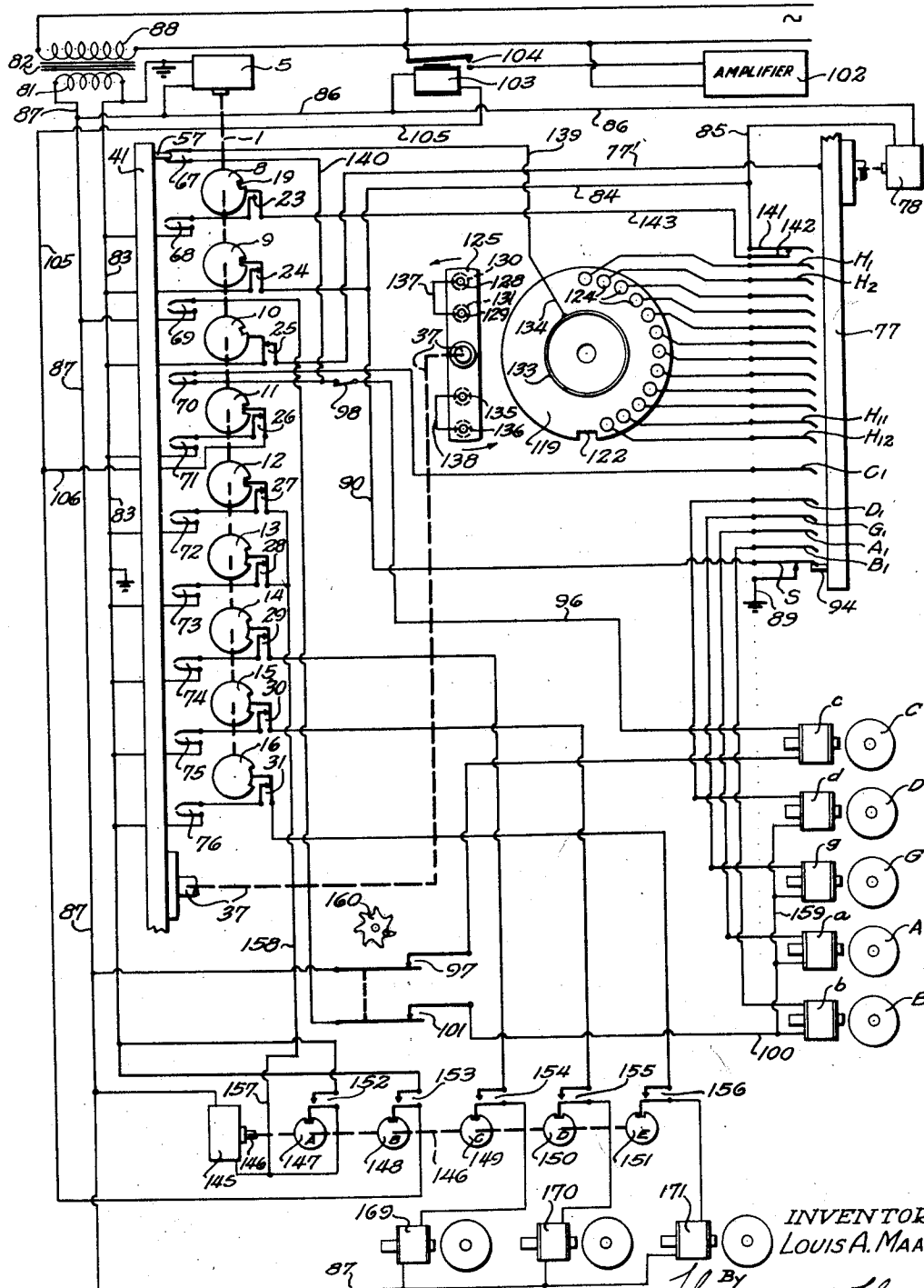
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PERIODIC CHIME CONTROL MECHANISM

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4 Sheets-Sheet 4



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PERIODIC CHIME CONTROL MECHANISM

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Application June 6, 1955, Serial No. 513,500

7 Claims. (Cl. 58—38)

This invention relates to a circuit-controlling mechanism for periodically operating a percussion musical instrument by the aid of electrical energy.

A control mechanism of this character is described and claimed in a prior Patent No. 2,641,897 in the name of Louis A. Maas, issued on June 16, 1953, and entitled "Chime Clock Control Mechanism." In that patent, there are described motors for driving circuit controller disks, as well as relays for effecting periodic energization of the motors and for energizing the strikers of the chimes. In this way, the chimes may be sounded at quarter hour periods to play any appropriate melody, or to sound Angelus bells; as well as to strike an hour chime for each hour.

It is one of the objects of this invention to simplify control systems of this character, and especially by elimination of numerous relays that are required in said former system.

It is another object of this invention to provide a mechanism that may be easily set to correspond to the correct time of day.

It is still another object of this invention to provide an improved circuit controller including a spring contact arm and a relatively movable pin, which insures reliable operation over extended periods.

It is still another object of this invention to provide a control wheel for energizing the circuits that is intermittently advanced, as by the aid of a pawl, whereby the system is simplified. The intermittent operation may, of course, be either hourly, or every quarter-hour, or every half-hour, or any aliquot part of an hour.

The chimes, whether for use to play the melody, or Angelus, or the hour strikes, are controlled by a melody disk. When quarter-hourly periods of activity are to be effected, the disk is intermittently advanced every quarter-hour, so as to make a complete revolution each hour. Sometimes the angular position of this disk may accidentally be incorrect in relation to the time.

It is another object of this invention periodically to bring this disk into true synchronism, in a simple manner, and without the necessity of manual operation.

It is still another object of this invention to provide an additional automatic bell ringer with provisions to control the length of the period in which the bell ringer may be active.

It is another object to make it possible to silence the chimes for any one or more days of the week.

This invention possesses many other advantages, and has other objects which may be made more clearly apparent from a consideration of one embodiment of the invention. For this purpose, there is shown a form in the drawings accompanying and forming a part of the present specification. This form will now be described in detail, illustrating the general principles of the invention; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of this invention is best defined by the appended claims.

2

Referring to the drawings:

Figure 1 is a front elevation, partly broken away, of a circuit-controlling mechanism utilized in connection with the invention;

Fig. 2 is a plan view thereof;

Fig. 3 is a fragmentary vertical sectional view, taken along a plane corresponding to line 3—3 of Fig. 1;

Fig. 4 is a fragmentary sectional view, taken along a plane corresponding to line 4—4 of Fig. 3;

Fig. 5 is a rear view of a melody disk utilized in the system; and

Fig. 6 is a wiring diagram of the complete system.

The system, in general, operates in a manner analogous to that disclosed in said prior Patent No. 2,641,897.

There are shown, in the present instance, four chime bars D, G, A and B (Fig. 6) corresponding to the similarly designated four tones. Each of these bars is respectively adapted to be struck, when an energizing circuit is completed, by the aid of the electromagnets *d*, *g*, *a* and *b*. Any desired number of tone bars or chime bars may be used; the specific tones herein used correspond to the familiar Westminster chimes.

A fifth bar C is indicated for striking an Angelus note with its corresponding striker electromagnet *c*. The particular form of these chime bars is unimportant. One form that may be utilized is that indicated in said prior patent.

The electromagnets *c*, *d*, *g*, *a* and *b* are arranged to be periodically energized in a definite sequence to play a melody, such as the Westminster chimes. For this purpose, circuit-controlling apparatus illustrated most clearly in Figs. 1 to 5, inclusive, may be used. In addition, an hour note may be struck to provide an hour toll at the end of each hour; the number of times the note is struck corresponding to the hour of the day or night. In the present instance, electromagnet *c* and chime bar C are utilized for the hour note.

A plurality of rotary devices for operating circuit controllers that serve to energize the electromagnet circuits is utilized.

As shown in Figs. 1 and 2, a shaft 1 is shown as appropriately journaled in plates 2 and 3 mounted upon a base 4. This shaft is adapted to be driven by an electric motor 5 through a reduction gearing 6 and a slip clutch 7.

The motor 5 and its shaft 1 are indicated diagrammatically at the upper left-hand portion of Fig. 6. In the present instance, the shaft 1 carries a plurality of spaced insulation disks 8 to 16, inclusive. These are held onto the shaft by the aid of set screws 17 passing through threaded apertures in the hub 18. These insulation disks, as hereinafter described, are provided with notches or slots of appropriate angular extent and location for opening and closing circuit controllers.

For example, in the position indicated in Fig. 1, the disk 8 has a slot 19 permitting entry of a spring arm 20 therein to cause the contacts 21 and 22 to engage. This closed position continues only until the upper end of spring arm 20 is raised out of the slot 19, as the shaft 1 rotates in a counterclockwise direction. The spring arm upon which the contacts 21 and 22 are mounted, as well as these cooperating contacts, may be indicated as circuit controller 23. Similar circuit controllers are associated, respectively, with each of the disks 9—16, inclusive, and are indicated by reference characters 24 to 31, inclusive.

These spring arms may be insulatingly mounted upon a supporting bar 32 extending between the plates 2 and 3. These circuit controllers 23 to 31, inclusive, are utilized in a manner to be hereinafter described in connection with the wiring diagram of Fig. 6.

The shaft 1 may be driven at a rate so that it makes one complete revolution in one-fourth or one-half of an hour or any aliquot part of the hour. In the present

instance, the shaft 1 makes one revolution in fifteen minutes.

The disks 8 to 16 are also held in proper relative angular positions by a plurality of equiangularly spaced rods or pins P. Three such pins are shown; accordingly, it is possible angularly to adjust the cam disks 8 to 16 by five-minute intervals with respect to each other.

Backward rotation of the shaft 1 is restrained by a simple pawl and ratchet mechanism, including the ratchet wheel 33 and a pawl 34. This pawl 34 is mounted on a post attached to the plate 3, and is urged to engaging position by the aid of a spring 35.

The shaft 1 extends through the plate 3 and carries a knob or button 36 which may be graduated in one-minute intervals. The shaft 1, by virtue of slip clutch 7, may be adjusted by hand to correspond accurately to the particular minute of the time of day which falls within the specific quarter-hour interval when the adjustment is made. Thus, to adjust shaft 1 to twenty minutes after the hour, the numeral 5 on knob 36 is placed in vertical position. This adjustment obviously corresponds to five minutes, twenty minutes, thirty-five minutes, and fifty minutes past the hour.

Hereafter, since the shaft 1 is driven at the rate of four revolutions an hour, the shaft 1 will be referred to as the "fifteen-minute shaft."

A twenty-four hour shaft 37 (Figs. 2 and 3) is mounted for free rotation in the bearing standard 38 appropriately supported upon the base 4. This bearing standard 38 carries a bearing sleeve 39.

At its left-hand end, the shaft 37 carries a manually operable knob 40. The shaft 37 also carries a coder wheel 41 (made of insulation material) adapted to make one revolution in twenty-four hours. For supporting this coder wheel upon the shaft 37, use is made of a hub 42.

The outer periphery of the wheel 41 is subdivided to correspond to twenty-four hours of the day as indicated by the radial lines 43 (Fig. 1). The spacing between these radial lines is further subdivided into quarters, and is represented by four ratchet teeth 44 on the periphery, and corresponding to quarter-hour intervals.

Sometime during the rotation of the fifteen-minute shaft 1, and preferably about two minutes before the end of each complete revolution corresponding to the end of the fifteen-minute period, the coder wheel 41 is advanced by one tooth. For this purpose, use is made of an advancing pawl 45 (Figs. 1 and 2) having an end adapted to engage between the teeth 44. This pawl is pivotally mounted at the end of an arm 46 having a hub 47, for appropriately mounting it on a trunnion pin supported on the plate 3. A tension spring 48 urges the arm 46 in a counterclockwise direction. A light hairpin spring 49 having a portion wound around the hub of the arm 45 urges this pawl arm 45, also in a counterclockwise direction, so as to engage a tooth 44.

The pin 50 pivotally supporting the pawl arm 45 also rotatably carries a cam follower roller 51. This cam follower roller is arranged to follow a cam 52 mounted on the fifteen-minute shaft.

As shown most clearly in Fig. 1, this cam 52 is so arranged that when the zero mark on the dial of knob 36 is vertical, the cam 52 has completed its operation to advance the coder wheel 41.

This wheel 41 is held by a roller 53 against inadvertent movement. This roller 53 engages between a pair of adjacent teeth 44 and is carried by a pivoted arm 54 (see also Fig. 3). A tension spring 55 urges the arm 54 in a counter-clockwise direction, and correspondingly the roller 53 is yieldingly urged against the teeth 44.

Since the shaft 37 upon which the coder wheel 41 is mounted is free to rotate except for the restraint imposed upon it by the pawl 45 and the roller 53, it is possible, by the aid of knob 40, to adjust this coder wheel in a counter-clockwise direction, to bring that tooth 44 which corresponds to the last full quarter-hour at the time of

adjustment to vertical position. In Fig. 1, the time falls between twelve noon and quarter past twelve. That number on the dial of knob 36 which is in vertical position, shows the number of minutes that has elapsed after the time indicated by the position of coder wheel 41.

The position in time of the coder wheel 41 may be indicated by an arm 56 having a right-hand edge radial to the axis of the shaft 37. This right-hand edge acts as a pointer. For example, at the particular point illustrated in Fig. 1, the time indicated by wheel 41 is twelve noon. Once each quarter-hour, the coder wheel 41 is moved in a counterclockwise direction as hereinbefore explained by an angle corresponding to one-fourth of a twenty-fourth part of the entire circle.

With each advance of the wheel 41, circuit controllers are operated for the purpose of effecting energization of operating circuits. One element of each circuit controller operated by the coder wheel 41 is in the form of a pin 57 (Fig. 3). This pin 57 is shown as integrally formed at the end of a screw 58 threaded into the coder wheel 41. Each pin is adapted to cooperate for closing the circuit between a pair of spring arms 59 and 60 mounted upon an insulation base 61. As viewed in Fig. 3, these insulation arms have ends projecting through the base 61, by the aid of which the electrical connection 62 may be made (Fig. 2).

These arms 59 and 60 are preferably made of resilient conducting wire. Their ends are arcuately formed, facing each other as indicated in Fig. 3.

The pairs of arms 59 and 60 form elements of a circuit adapted to be connected to each other by a pin 57 when the pin is extended between the arcuate ends 63 and 64. Depending upon the absence or presence of the pins 57 in a radial row along the wheel 41, those circuits which include contact arms such as 59 and 60, would be opened or closed. The pins 57 extend in the general direction of the arms 59 and 60, and are moved by wheel 41 in a direction transverse to these arms.

The pins 57 are so aligned that they continue to make contact between the corresponding pairs of arms 59—60 until the next intermittent movement of the coder wheel 41, when a different set of pins may be active to close the corresponding circuit controllers.

By appropriate arrangement of the pins 57 on the disk 41, appropriate controlling circuits as hereinafter explained can be made and broken.

Each pair of contact arms 59 and 60 is provided with the abutment pins 65 and 66 (Fig. 3). These insure against intolerable spreading of the arms. The contact between a pin 57 and its corresponding arms is of limited area. This contact is formed by rubbing between convex surfaces. An effective positive circuit connection is thereby made.

No attempt has been made to show all of the active pins 57 on the coder wheel 41 in Fig. 1. Generally that may be arranged along the radial lines 43, and intermediate lines corresponding to quarter-hour intervals. These radial series of pins occur therefore along equiangularly spaced lines corresponding to the angular spacing of the teeth 44.

In Fig. 6, the coder wheel 41 and its shaft 37 are indicated diagrammatically. Only a portion of this wheel is shown, and most of the pins 57 have been omitted. However, there are pairs of contact arms (exemplified by arms 59 and 60 of Fig. 3) indicated by reference characters 67 to 76, inclusive. These pairs will be hereinafter referred to as "circuit controllers."

In addition to the apparatus heretofore described, there is diagrammatically illustrated in Figs. 5 and 6 a melody disk 77. This melody disk is shown as rotated in a clockwise direction by an electric motor 78. It is, in general, of the same character as the melody disk described in said prior patent.

The melody disk is made of a conducting metal and forms a ground connection. Projecting in directions

parallel to the axis of the disk are arrangements of conducting pins exemplified by pin 79 in Fig. 5. A series of spring contact arms are supported upon an insulation plate or base 80 (Fig. 5) attached to a suitable support. These spring contact arms are in the path of the pins 79. Twelve of these spring contact arms H_1 to H_{12} , inclusive, correspond to the hour chime. These spring contact arms are adapted to complete circuits for the hour toller electromagnet c when appropriate pins pass these spring contact arms. Another spring contact arm C_1 is used for the Angelus tone energizing one of the striker electromagnets, such as the electromagnet c .

Four additional spring contact arms D_1 , G_1 , A_1 and B_1 are used to energize the striker electromagnets d , g , a and b , respectively.

A motor-stopping spring contact arm S is also provided. The manner in which this spring contact arm operates will be described hereinafter.

The specific arrangement or sequence of spring contact arms illustrated in Fig. 5 is of no moment, so long as the conducting pins giving ground to the spring contact arms are correspondingly correctly arranged.

There will now be described how the motor 78 rotating the melody disk 77 is energized at the beginning of each fifteen-minute period. This beginning is marked by the arrival of the number zero in the vertical position on the flange or dial carried by the knob 36. This position is indicated in Fig. 1.

When this occurs, the cam disk 9 (Figs. 2 and 6) has just arrived at a position permitting closure of the contacts of the circuit controller 24. The motor 78 is then energized through the following circuit: from the secondary winding 81 of a step-down transformer 82, conductor 83, circuit controller 24, conductors 84 and 85, motor 78 and conductor 86 to the other terminal of the winding 81.

The transformer 82 has a primary winding 88 connected to a source of commercial electrical energy.

The motor circuit just traced remains completed only for a very short interval since the slot in cam disk 9 is quite narrow.

The motor 78 continues to be energized through a parallel circuit as follows: conductor 83, which is grounded, ground connection 89 at the lower portion of the melody disk 77, spring contact arm S , connections 90, 84 and 85, motor 78, and connection 86 to the main 87. This circuit remains completed until broken in a manner now to be described.

For breaking the circuit for motor 78 after a playing interval of the melody disk 77 (Fig. 5), use is made of pairs of insulation pins 91, 92, 93 and 94 near the periphery of the disk. These pins are intended to engage the spring contact arm S in order to break the ground connection 89 and stop the motor 78.

The melody disk 77, for the position shown in Fig. 5, is ready to perform the hour melody and the hour chime. Accordingly, the angle traversed by the disk on the hour corresponds to the angular spacing between pins 94 and 91. When pins 91 arrive at the position of pins 94, the spring contact arm S is moved away from a stationary contact pin that is connected to ground 89, and the motor 78 then comes to rest.

Succeeding energization of the motor circuit by the aid of the circuit controller 24 will cause in succession the rotation of the disk 77 through the arc between pins 91 and 92, the arc between pins 92 and 93, and the arc between pins 93 and 94.

The Angelus, in the present instance, is intended to be sounded three times a day, and through several successive energizations of the striker electromagnet c . The spring contact arm C_1 is utilized for this purpose. The melody disk 77 accordingly carries in the sector between pins 91 and 94 the pins 95 which in succession contact the comb C_1 and cause successive energizations of the circuit for electromagnet c . This circuit can be traced

as follows: from the grounded disk 77, pin 95, spring contact arm C_1 , circuit controller 70, manual switch 98, connection 96, electromagnet c , a switch 97, back to connection 87. The switch 97, as hereinafter described, may be opened for certain days of the week for automatically quieting the Angelus. The switch 98 may be operated whenever it is desired to manually silence the Angelus.

The circuit controller 70, in the energizing circuit, is maintained closed by one of the coder wheel pins 57, arranged to come into operative position with circuit controller 70 in every three-quarter hour position. This circuit stays completed through the circuit controller 70 until the coder wheel 41 is moved to its succeeding position by the pawl 45. The motor-starting circuit through the circuit controller 24 is disconnected long before the fifteen-minute interval expires due to the opening of the circuit controller 24 by movement of the fifteen-minute shaft 1.

In the playing interval on the half-hour, that sector of the melody disk 77 included between pins 92 and 93 becomes active. In this instance, appropriate series of pins 99 cooperate with spring contact arms D_1 , G_1 , A_1 and B_1 to energize the striking electromagnets for chime bars D , G , A and B . A typical circuit for one of these bars as played by the pins includes the grounded disk 77, spring contact arm G_1 , electromagnet g , connections 159 and 100, switch 101, circuit controller 69, to the conductor 87. The switch 101 is associated with switch 97 to cause automatic deenergization of the melody circuit for certain days of the week.

The circuit controller 69 included in this circuit is closed on the half-hour by a pin 57 mounted on the coder wheel 41.

An amplifier system 102 (upper right-hand portion of Fig. 6) is utilized for amplifying the sound of the chime bars. This amplifier system is arranged to be energized before the melody disk 77 is active so as to be sure that the filaments in the amplifier tubes are preheated.

The circuit for this amplifier system 102 includes the relay 103 (Fig. 6) which, when energized, closes the contact points 104 for energization of the amplifier system 102 across the mains feeding the transformer 82.

The circuit for the coil of relay 103 may then be traced as follows: from conductor 87, connection 86, the coil of relay 103, connections 105 and 106, circuit controllers 26 and 71 in series, to connection 83. Circuit controller 71 is closed by one of the pins 57 mounted on the coder wheel 41, in every position of this coder wheel. Circuit controller 26 is closed by the cam disk 11 mounted on the fifteen-minute shaft 1. This cam disk has a slot which becomes active one minute prior to the beginning of the cycle of playing, and remains energized through the circuit controller 26 for a long enough period to permit the melody disk 77 to move through its playing angle.

At the hour positions of the coder wheel 41, hour strikes are completed through the striker electromagnet c . The twelve spring contact arms H_1 to H_{12} cooperating with pins on the melody disk 77 are utilized for this purpose. Thus when spring contact arm H_1 is active, the pin 107 (Fig. 5) of the melody disk 77 cooperates with this spring contact arm, and the chime bar C is sounded once. This sounding of the hour note occurs after the completion of the melody play corresponding to the arrangement of the pins 79 in the sector between pins 94 and 91.

In order to strike the hour of two, only the spring contact arm H_2 is active, and two angularly spaced pins 108 complete and open the circuit twice for the striker electromagnet c . Pins 109 to 118, inclusive, correspond to the hours of three to twelve, inclusive, and cooperate respectively with the spring contact arms H_3 to H_{12} . Of course, only one spring contact arm is active at a time. That spring contact arm is active which corresponds to the proper hour toll. The series of pins 107 to 118 corresponding to each of the combs H_2 to H_{12}

are arranged arcuately as indicated, and the number of pins in each arc corresponds to the hour to be struck.

The selection of the active spring contact arm in the series of combs H_1 to H_{12} is effected by the aid of the coder wheel shaft 37 (shown diagrammatically by a dotted line in Fig. 6). The structure of this selector wheel is illustrated to best advantage in Figs. 2, 3 and 4.

A stationary insulation disk 119 is provided with a hub 120 through which the right-hand end of shaft 37 extends. This hub serves as an additional bearing for the shaft 37. The disk 119 is held in stationary position by the aid of a screw 121 attached to the base 4, and having a head engaging the slot 122 in the lower edge of the disk 119.

A collar 123 is attached to the shaft 37 for providing an abutment for the right-hand end of hub 120.

Twelve equiangularly spaced conducting buttons 124 are supported in the left-hand side of the disk 119. These buttons 124 are also indicated in Fig. 6, and are respectively connected to the spring contact arms H_1 to H_{12} . These twelve buttons 124 have convex contacting surfaces. They are distributed over an angle slightly less than 180° .

A contact-carrying arm 125 made of insulation material is mounted upon the shaft 37. This arm extends in both directions radially of the shaft 37. It carries two pairs of contact posts arranged 180° apart. One pair of contact posts comprises the guide bushings 126 and 127 in which are guided, respectively, the contact posts 128 and 129. These contact posts have heads 130 and 131 provided with convex contacting surfaces. The outer post 128 is resiliently urged toward the contact button 124 by the aid of a compression spring 132. The other post 129 is similarly resiliently urged against a conducting ring 133 mounted radially inwardly of the contact buttons 124.

As illustrated most clearly in Fig. 6, the contact buttons 124 are respectively connected to the hour chime spring contact arms H_1 to H_{12} , inclusive. The conducting ring 133 is connected as by a bar 134 into a circuit for energizing the hour toll chime, as hereinafter explained.

The other pair of contact posts include posts 135 and 136 arranged similarly in construction to the posts 128 and 129. Furthermore, the two posts in each set are electrically connected as by the aid of connections 137 and 138.

These sets of contact posts 128—129, 135—136 in succession cooperate with the buttons 124. Thus, in the position shown in Fig. 4, the contact posts 128—129 are active. The contact post 136 is out of contact with any of the buttons and will remain out of contact until the coder wheel 41 is advanced by an amount corresponding to one hour. Accordingly, after the hour chimes for each hour from one to twelve has been struck, a different pair of contact posts is ready to repeat the sequence.

Since the coder wheel 41 is advanced by an angle corresponding to one-quarter hour periods, the posts 128—129, 135—136 are advanced in four steps between two hourly positions. However, the buttons 124 are never electrically bridged; a succeeding button 124 is contacted only after the preceding button is disconnected.

The hour chime circuit may now be traced. It includes the grounded melody wheel 77, any of the sets of pins 107—108, inclusive, and any one of the spring contact arms H_1 to H_{12} . Thence from the active one of these spring contact arms, connection is made to a pair of posts, such as 128 and 129, by the aid of the connection 137; thence, to the ring 133, connection 134, conductor 139, circuit controller 67, conductor 140, switch 98, conductor 96, striker electromagnet c , switch 97, to conductor 37. The circuit controller 67 has its circuit completed on the hour by the aid of any one of a series of hour strike pins 57. These pins are carried by the coder wheel 41 at hourly intervals for completing the circuit through circuit controller 67.

It may occasionally happen that the melody wheel 77

is not in synchronism with the other elements of the circuit. At the three-quarter hour position of the coder wheel 41, a corrector circuit is completed through motor 78 for causing the wheel 77 to advance to a position corresponding to that shown in Fig. 5. For this purpose there is a circuit established through the motor 78 as follows: conductor 86, motor 78, conductor 85, a corrector spring contact arm 141 carried on base 80, a contacting post 142 normally in contact with the spring contact arm 141, conductor 143 and circuit controllers 23 and 68 in series, to the conductor 83. A pin 57 mounted on the coder wheel 41 closes the circuit controller 68 at each three-quarter hour position of the coder wheel.

The circuit controller 23 is controlled by the cam disk 8, the slot 19 of which permits this circuit controller 23 to close once every fifteen minutes at the end of a fifteen-minute interval.

Due to the energization of this circuit, the melody disk 77 continues to rotate until the circuit is interrupted by a pin 144 (Fig. 5) made of insulation material which cooperates with the spring contact arm 141 to urge it out of contact from post 142. This pin 144 engages the spring contact arm 141 for opening the circuit just prior to the time that the insulation pin 94 would engage the spring contact arm S . This sets the melody disk 77 in correct or synchronized position, so that it may proceed to play the melody, the Angelus and the hour strikes the next time the coder wheel is advanced by the pawl 45.

In order to be sure that this correcting movement of the disk 77 will not cause the chimes to be operated, a silencer circuit for the chimes is provided. Silencing is effected by breaking the ground connection 77' to the disk 77. This ground connection is included in series with circuit controller 25. The disk 10 operates this circuit controller synchronously with the corrector circuit controller 23. The pins carried by the melody disk therefore are ineffective to close the circuits for the hour toll, the Angelus or the melody chimes D, G, A and B.

It may sometimes be desirable to continue tolling or ringing bells for a short interval at the beginning of each quarter-hour period. For this purpose, a bell-ringer motor 145, illustrated in the lower left-hand portion of Fig. 6, is provided. This ringer motor has a shaft 146 upon which are mounted insulation cam disks 147, 148, 149, 150 and 151 which operate circuit controllers 152, 153, 154, 155 and 156.

The motor circuit can be completed either through a short period playing interval or through a long period playing interval. For confining the operation of the ringer motor 145 to a short period of play, the cam disk 12 and circuit controller 27 are utilized. These cooperate with the circuit controller 72 closed by a pin 57 placed at any appropriate place upon the coder wheel 41. When such a pin is active, the motor circuit can be traced from conductor 87, motor 145, connections 157 and 158, and circuit controllers 27 and 72. Since the slot in the disk 12 is quite narrow, the circuit controller 27 maintains this motor circuit closed only for a short interval.

However, should a long playing period be desired, a pin 57 closes circuit controller 73. In that event, the ringer motor circuit is completed through circuit controllers 28 and 73 in series. Since the cam disk 13 has a relatively wide slot, this energization continues for a longer period than when circuit controller 72 is active.

The circuit controllers 154, 155, and 156 serve to energize, respectively, the circuits for the striker electromagnets 169, 170 and 171 which are caused to ring once for each revolution of the shaft 146. The energizing circuit for electromagnet 169 can be traced therefore as follows: line 87, electromagnet 169, circuit controllers 154, 29 and 74 in series, to conductor 83. Circuit controller 74 is controlled by an appropriate pin 57 mounted on the coder wheel 41. For each revolution of shaft 146, therefore, the electromagnet 169 is energized.

A similar circuit can be traced for the striker electro-

magnet 170 as follows: line 87, electromagnet 170, circuit controllers 155, 30 and 75 in series, to conductor 83. The circuit for striker electromagnet 171 is similarly controlled by the circuit controllers 156, 31 and 76 in series, to conductor 83.

As many more circuit controllers as desired may be added to be operated by the shaft 146. Furthermore, the disks 149, 150 and 151 may be provided with any appropriate number of slots to provide for more than one energization per revolution of the shaft 146.

It is important that the shaft 146 be stopped at a position where the circuit controllers 154, 155 and 156 are open. For this purpose, a holding circuit for the ringer motor 145 is provided by the aid of the circuit controller 152 and disk 147. This insures that after both of the circuit controllers 27 and 28 are open, the motor 145 will continue to rotate until the circuit controllers operated by disks on shaft 146 are all open.

It is also desirable to maintain the amplifier system 102 active until the bell ringing motor 145 stops. For this purpose, the circuit controller 153 and its disk 148 are utilized. This circuit controller maintains energization of relay 103 until the shaft 146 is brought to a stop as just described.

The switches 97 and 101 for silencing the striker electromagnets *c*, *d*, *g*, *a* and *b* can be controlled by a star wheel 160 shown in greater detail in Figs. 1 and 2. This wheel 160 has seven teeth 161. It is rotated one-seventh of a revolution for each revolution of the coder wheel 41.

For this purpose, the coder wheel 41 carries a star wheel actuating pin 162 on the front face of the coder wheel. As the midnight position of the coder wheel 41 is passed, the pin 162 becomes active and rotates the star wheel 160 in a clockwise direction. The star wheel 160 carries a pin 163 which may be inserted in any one of seven apertures for actuating a contact-carrying member 164. This contact-carrying member may be urged by the pin to hold the contact-carrying member 164 in open or closed position, as desired.

A pointer 165 cooperates with the initial letters of the day of the week marked on the wheel, to indicate the adjusted position of the star wheel with relation to time.

In order to maintain the star wheel 160 in accurately adjusted position, a roller 166 is utilized, mounted upon a pivoted arm 167. A tension spring 168 urges the roller 166 into the bottom of the space between adjacent teeth.

By the aid of this star wheel arrangement, it is possible to silence the device for one or more days of the week.

The inventor claims:

1. In a system of the character described: an intermittently advanced coder wheel; a melody disk; an electric motor for advancing the disk through angular movements in succession; means cooperating with the coder wheel for periodically energizing the motor; and a correcter circuit for independently energizing said motor for moving the disk to a predetermined position, comprising: a first circuit controller operated by the coder wheel; and a second circuit controller in series with the first circuit controller and operated by the disk to open the correcter circuit when the disk reaches a definite angular position.

2. In a system of the character described: an intermittently advanced coder wheel; a melody disk; an electric motor for advancing the disk through angular movements in succession; means cooperating with the coder wheel for periodically energizing the motor; and a correcter circuit for independently energizing said motor for moving the disk to a predetermined position, comprising: a first circuit controller operated by the coder wheel; a second circuit controller in series with the first circuit controller and operated by the disk to open the correcter circuit when the disk reaches a definite angular position; a third circuit controller in series with the said

two circuit controllers for maintaining the energizing circuit closed during the correcting operation.

3. In a system of the character described: an intermittently advanced coder wheel; a melody disk; an electric motor for advancing the disk through angular movements in succession; means cooperating with the coder wheel for periodically energizing the motor; and a correcter circuit for independently energizing said motor for moving the disk to a predetermined position, comprising: a first circuit controller operated by the coder wheel; a second circuit controller in series with the first circuit controller and operated by the disk to open the correcter circuit when the disk reaches a definite angular position; and a silencer circuit operative to render the melody disk ineffective during energization of the correcter circuit.

4. In a system of the character described: a rotary circuit controller device making a revolution in an aliquot part of an hour, and including a pair of parallel circuit controllers periodically operated by the device to close, respectively, for a short or long period; means for optionally determining which of said circuit controllers be active; a motor energizable through either circuit controller; and chime bar strikers periodically operated by rotation of said motor.

5. The combination as set forth in claim 4, with the addition of circuit closing means respectively in series with each of the pair of circuit controllers; and means for periodically closing said circuit closing means for a period corresponding to the aliquot part.

6. In a system of the character described: a first series of circuit controllers; means for cyclically operating said circuit controllers, including a constantly rotating mechanism; a coder wheel intermittently operated by said mechanism at each unit of angular movement of said mechanism; a second series of circuit controllers operated cyclically by said coder wheel; each of said circuit controllers in the second series including a contact member capable of being mounted on the coder wheel at any of a plurality of angularly spaced points; chimes controlled by said two series of circuit controllers; and an amplifier for the chimes; there being a pair of circuit controllers respectively in the two series for completing the circuit for the amplifier.

7. In a system of the character described: a first series of circuit controllers; means for cyclically operating said circuit controllers, including a constantly rotating mechanism; a coder wheel intermittently operated by said mechanism at each unit of angular movement of said mechanism; a second series of circuit controllers operated cyclically by said coder wheel; each of said circuit controllers in the second series including a contact member capable of being mounted on the coder wheel at any of a plurality of angularly spaced points; chimes controlled by said two series of circuit controllers; and a melody wheel having provisions for sounding an hour chime; said coder wheel having one of its circuit controllers for optionally energizing the hour chimes.

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