

July 16, 1940.

P. C. SMITH

2,207,703

TIME-OF-DAY ANNOUNCING MACHINE

Filed Sept. 24, 1938

5 Sheets-Sheet 1

FIG. 1

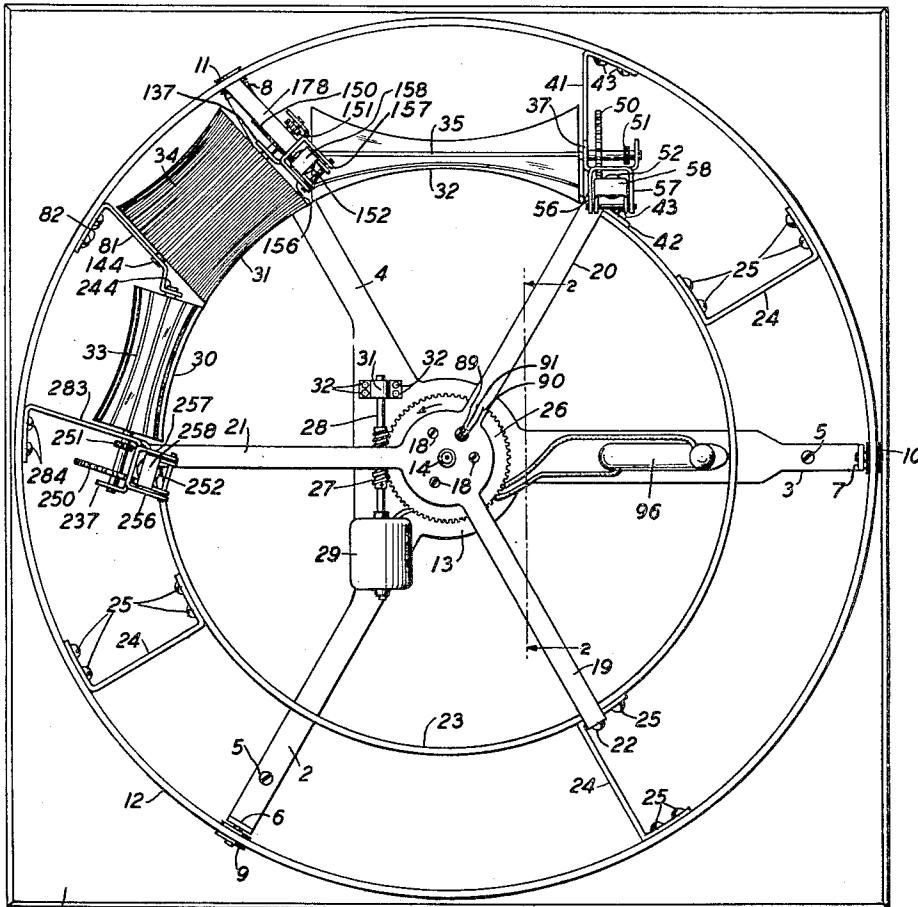
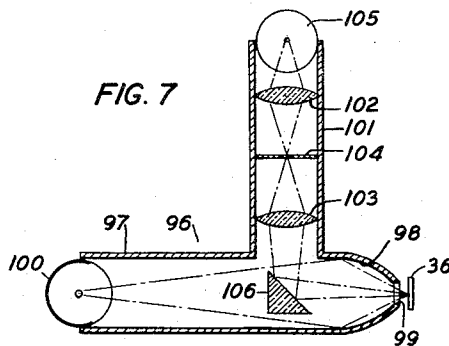


FIG. 7



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TIME-OF-DAY ANNOUNCING MACHINE

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FIG. 2

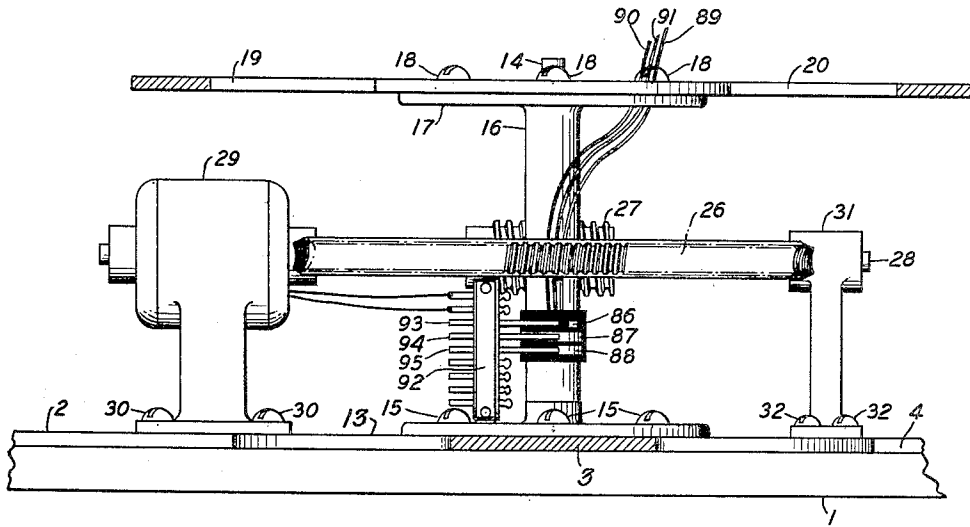
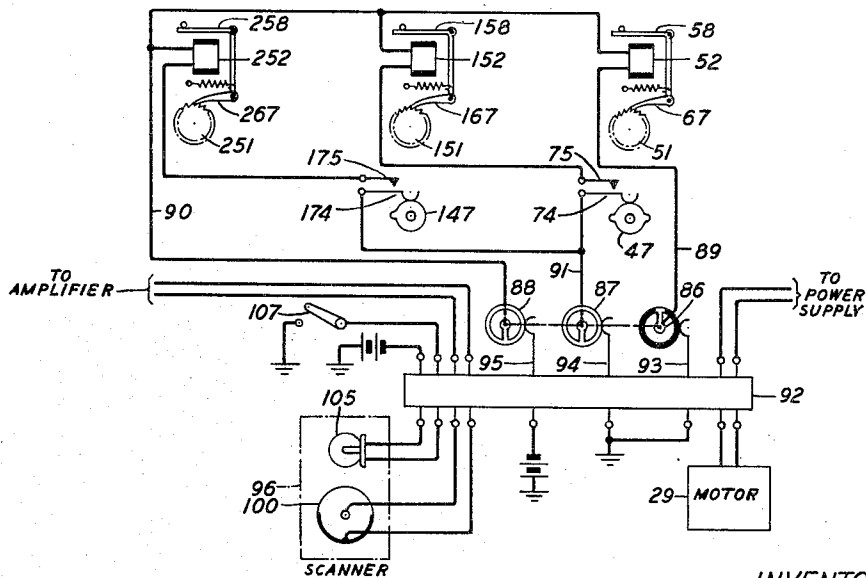


FIG. 6



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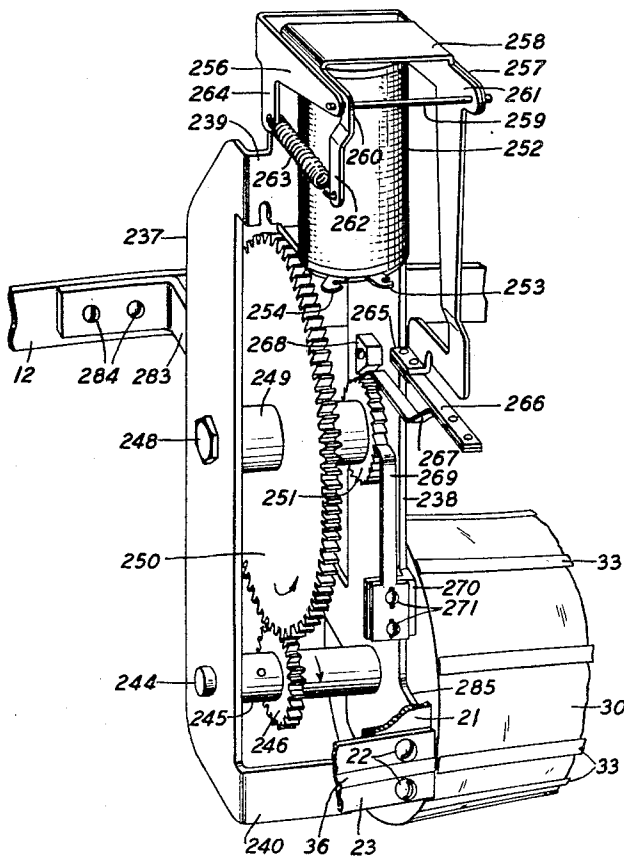
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TIME-OF-DAY ANNOUNCING MACHINE

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5 Sheets-Sheet 3

FIG. 3



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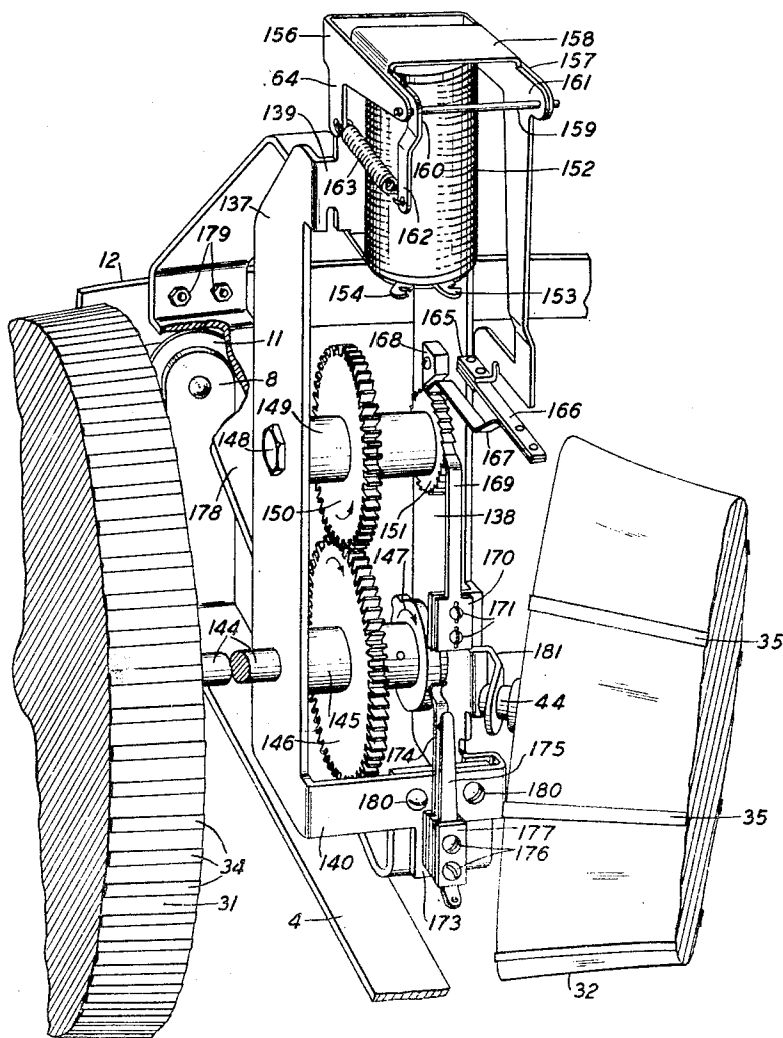
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TIME-OF-DAY ANNOUNCING MACHINE

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FIG. 4



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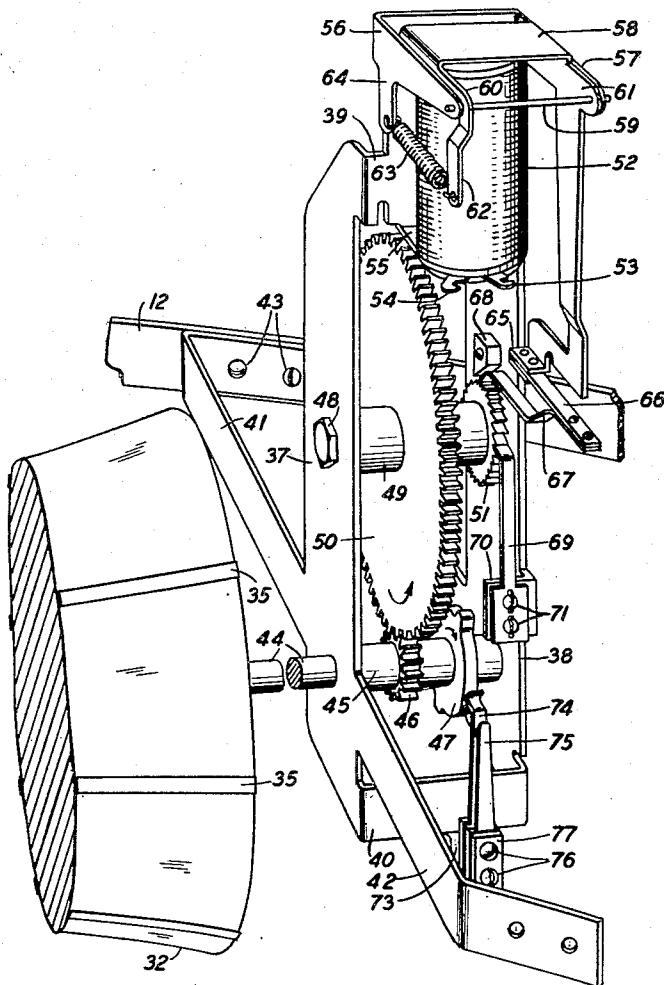
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TIME-OF-DAY ANNOUNCING MACHINE

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FIG. 5



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UNITED STATES PATENT OFFICE

2,207,703

TIME-OF-DAY ANNOUNCING MACHINE

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Application September 24, 1938, Serial No. 231,564

9 Claims. (Cl. 58—14)

This invention relates to a time-of-day announcing machine for use in connection with telephone systems whereby audible announcements of the correct time may be transmitted automatically to such subscribers' lines as may have initiated calls for time-of-day service.

Heretofore time-of-day service has been supplied in large exchange areas from a central time bureau in which a special operator's position is located, any subscriber in the area being able by calling a special directory number to obtain a connection with the time bureau either over a manually extended switching network or over a dial switching network, dependent on the switching facilities of the area, provision being made to enable a large number of subscribers to simultaneously receive the time service. In such systems the operator orally announces the correct time which she observes from a clock at quarter minute intervals so long as there is an incoming call for time service, the time announcement being telephonically transmitted to all subscribers' lines which are at the time connected to the bureau.

While manually operated time service bureaus may be economically used in connection with large exchange areas of metropolitan centers, it is not economical to supply time-of-day service from manually operated bureaus in small exchange areas. It is therefore the object of the present invention to provide an automatic announcing machine for periodically making time-of-day announcements to all subscribers' lines which may be connected thereto in any desired manner. It is a further object of the invention to provide means for making an additional announcement of any desired character interspersed with the time announcements.

In accordance with the invention, a rotatable structure is provided comprising two concentric rings, the inner one of which is provided with an inner polished or mirror-like surface, as by chromium plating, upon which is a strip of film bearing a photographic sound track of a preliminary announcement which might comprise any desired information such as advertising matter followed by the phrase "When you hear the tone signal the time will be." Disposed in a cut-away portion of the inner ring and rotatably mounted between the two rings of the rotatable structure are three drums mounted end to end on axes lying in the plane extending through the center line of the film strip on the inner ring. The periphery of each drum is a concave surface of revolution generated by the rotation of an

arc of a circle having a radius equal to the radius of the inner surface of the inner ring around an axis parallel to the cord of the arc. Each drum is therefore substantially spoolshaped. The peripheral surface of each drum is preferably polished to afford a mirror-like surface as by chromium plating and film strips having sound tracks are mounted lengthwise thereon.

The first drum is provided with twelve equally spaced film strips having sound tracks corresponding to the twelve hour announcements "one-two-twelve." The peripheral surface of the second drum is divided circumferentially into sixty equal sections in fifty-nine of which film strips are mounted having sound tracks corresponding to the minute announcements "one-two-three-fifty-nine," the sixtieth section either carrying no film strip or a strip having the sound track of the announcement "naught." The peripheral surface of the third drum is for convenience of construction divided circumferentially into eight equal sections and further divided into two groups of four sections each; three sections of each group carrying film strips having sound tracks corresponding to the quarter minute announcements "and one quarter," "and one half," "and three quarters"; the fourth section of each group carrying no film strip or, if desired, carrying a film strip having the announcement "o'clock."

Each drum is mounted to be rotated step-by-step by a stepping mechanism individual thereto. The quarter minute drum is advanced one-eighth of a revolution during a portion of each revolution of the rotatable structure and upon completing each half revolution or once each minute closes the circuit of the stepping mechanism associated with the minute drum to advance it one step or one-sixtieth of a revolution. The minute drum upon completing each revolution or once an hour closes the circuit of the stepping mechanism associated with the hour drum to advance it one step or one-twelfth of a revolution. The three drums thus advance periodically to position the film strips carried thereby in circular alignment with the film strip carried by the inner ring so that at any announcement period or every fifteen seconds the film strips will be positioned for scanning to announce the correct time.

The rotatable structure is provided with a supporting spider to which is secured a hub rotatable on a stub-shaft secured to a supporting base. The hub is provided with a worm gear by which it and the rotatable structure secured thereto may be rotated and with a commutator and slip

rings by means of which current may be supplied to the stepping mechanisms of the drums. For driving the worm gear a synchronous motor having a worm secured to its rotor shaft is mounted on the supporting base, the motor being operated by current under the control of a master clock regulator to drive the rotatable structure through one complete revolution every quarter minute.

Secured to the supporting base within the inner ring of the rotatable structure is a scanning unit of the reflecting type having its optical axis aligned with the center line of the film strips to be scanned. This unit comprises a light source, condensing lenses and a prism for reflecting light from said source against the film strip of the ring and the film strips of the drums that are aligned therewith at any announcing period and a parabolic reflector for reflecting light reflected from the film strip upon a photoelectric cell. The photoelectric cell may be connected through a suitable amplifier to an output circuit with which subscribers' lines may be connected.

If it be assumed that the nearest correct time is "twelve fifty-nine and three quarters" and that the several drums have been adjusted to position films thereof bearing the announcements "twelve," "fifty-nine" and "and three quarters" in alignment with the center line of the preliminary announcement film carried by the inner ring of the rotatable structure, then upon the rotation of the structure and the drums carried thereby past the scanning unit during the few seconds just preceding the actual time to be announced, light from the source of illumination will first be directed against the film carried by the ring and reflected to the photoelectric cell, whereby the preliminary announcement, for example, "When you hear the tone signal the time will be" will be transmitted to calling lines connected to the machine. Immediately thereafter light will be successively directed against the exposed films on the hour, minute and quarter minute drums and the time announcement "twelve fifty-nine and three quarters" will be transmitted. Thereafter any suitable tone signal may be transmitted under clock control at the exact time previously announced.

During the remainder of the revolution of the rotatable structure, no announcement may be made, but the drums will be advanced as required in readiness to announce the next division of time or in the case assumed, each drum will be advanced one step to expose the hour film "one", the blank space or "naught" on the minute drum and the blank space or "o'clock" on the quarter minute drum. Therefore on the next revolution of the rotatable structure past the scanning unit, the preliminary announcement followed by the time announcement "one o'clock" will be transmitted. If desired, however, the first portion of the inner ring which is rotated past the scanning unit during the time the drums are being adjusted to new announcing positions, may be provided with a film having a sound track thereon for transmitting any desired information as of an advertising character, for example, this film might be combined with the preliminary announcement film to give a more extended preliminary announcement such as "Toll calls are surprisingly reasonable. When you hear the tone signal the time will be."

The invention having been now generally described, reference may be had for a more complete understanding thereof to the following de-

tailed description taken in connection with the accompanying drawings of which:

Fig. 1 is a top plan view of the announcing machine;

Fig. 2 is a partial side elevational view taken along section line 2-2 of Fig. 1, but drawn on a slightly larger scale;

Fig. 3 is a perspective view of the stepping mechanism for driving the quarter minute drum;

Fig. 4 is a perspective view of the stepping mechanism for driving the minute drum;

Fig. 5 is a perspective view of the stepping mechanism for driving the hour drum;

Fig. 6 is a circuit diagram of the electrical connections of the announcing machine; and

Fig. 7 is a diagram of the optical system of the scanning unit.

The announcing machine comprises a base member 1 upon which a supporting spider having arms 2, 3 and 4 is secured by screws 5. The outer ends of the arms of the spider are bent upwardly at right angles as indicated at 6, 7 and 8 and grooved rollers 9, 10 and 11 are rotatably secured to the ends thereof serving to support the outer ring 12 of a rotatable structure to be hereinafter described. Mounted on the central portion 13 of the spider and axially disposed with respect to the rollers 9, 10 and 11 is a flanged stub-shaft 14, the flange of which is secured to the spider by screws 15.

Rotatably supported on the stub shaft 14 is a rotatable structure comprising a hub member 16 journaled on the stub-shaft and having a flange 17 upon the upper end thereof to which is secured by screws 18, a second spider having three radially extending arms 19, 20 and 21. Secured to the down-turned ends of these arms by screws 22 is an inner ring 23, that portion of the ring extending between the ends of arms 20 and 21 being omitted for a purpose to be later described. The ring 23 is joined to the outer ring 12 by U-shaped braces 24, the arms of which are secured to the inner and outer rings by screws 25. For driving the rotatable structure, a worm gear 26 is formed integrally with the hub member 16 or otherwise secured thereto with which meshes a worm 27 mounted on the rotor shaft 28 of a motor 29. The motor is secured to the arm 2 of the supporting spider by screws 30 and the end of the rotor shaft 28 is journaled in a bearing 31 secured to the arm 4 of the supporting spider by screws 32. The gearing ratio between the worm gear 26 and worm 27 and the speed of the motor 29 are so selected that the rotatable structure is driven at a constant speed of one revolution every quarter minute. For accurately determining this speed, the motor may be controlled in any desired manner by a master clock (not shown).

Supported on the rotatable structure and positioned end to end are three rotatable drums 30, 31 and 32. Each drum is substantially spool-shaped and has a peripheral surface of revolution generated by the rotation of an arc of a circle having a radius equal to the radius of the inner surface of the inner ring 23 around an axis parallel to the cord of the arc. The peripheral surface of each drum is provided with a mirror-like surface, as, for example, by chromium plating. The three drums are so mounted that their axes all lie in the plane extending through the center lines of the inner and outer rings 23 and 12, whereby a portion of their peripheral surfaces together with the inner face of

ring 23 forms a complete circle as disclosed in Fig. 1.

Cemented or otherwise secured to the surface of each drum are a plurality of longitudinally extending film strips of the character employed in talking picture production. The drum 30, which will be termed the hour drum, is provided with twelve equally spaced film strips 33 upon which are photographed the sound tracks for the twelve hour divisions of time "one—two—three—four—five—six—seven—eight—nine—ten—eleven—twelve." The drum 31, which will be termed the minute drum, has its peripheral surface divided into sixty equal sections, on fifty-nine of which are mounted fifty-nine equally spaced film strips 34, upon which are photographed the sound tracks for the minute divisions of time "one—two—three—four—five—six—seven—eight—nine—ten—eleven—twelve—thirteen—fourteen—fifteen—sixteen—seventeen—eighteen—nineteen—twenty—twenty-one—twenty-two—twenty-three—twenty-four—twenty-five—twenty-six—twenty-seven—twenty-eight—twenty-nine—thirty—thirty-one—thirty-two—thirty-three—thirty-four—thirty-five—thirty-six—thirty-seven—thirty-eight—thirty-nine—forty—forty-one—forty-two—forty-three—forty-four—forty-five—forty-six—forty-seven—forty-eight—forty-nine—fifty—fifty-one—fifty-two—fifty-three—fifty-four—fifty-five—fifty-six—fifty-seven—fifty-eight—fifty-nine—sixty." Since the sixtieth minute division of time corresponds to a change of hour, the sixtieth section of the drum surface may either be provided with no film but with a mask so that when this section of the drum is scanned, as later described, no sound transmission will result or may be provided with a film strip bearing the sound track "naught." The drum 32, which will be termed the quarter minute drum, has its peripheral surface divided into eight equal sections and further divided into two groups of four sections each. On the first three sections of each group are secured three film strips 35 upon which are photographed the sound tracks for the quarter minute divisions of time "and one quarter," "and one half" and "and three quarters." The fourth section of each group may either be provided with no film strip and masked or may be provided with a film strip bearing the sound track "o'clock" since the fourth quarter minute of time corresponds to a change of minute.

It will be apparent that the quarter minute drum 32 need have its surface divided into only one group of four sections, but since this drum is of greater length than the other drums to accommodate the longer films required, it is desirable in order to add rigidity thereto to increase its diameter. With an increased diameter and more extended peripheral surface, it is then desirable to divide the surface into eight rather than four sections to avoid large rotational steps in the positioning of successive film strips into the scanning position.

The inner surface of ring 23 is also provided with a mirror-like surface, as by chromium plating, upon which is cemented or otherwise secured a film strip 36 as disclosed in Fig. 3. This film strip bears a photographic sound track of a preliminary announcement such as "when you hear the tone signal the time will be." This film strip is attached to the surface of ring 23 immediately contiguous to the left end of the hour drum 30 as viewed in Fig. 1 and extends as far around the ring as the length of the sound track for the announcement requires. If desired, the length of the preliminary announcement film could be extended nearly the full length of the inner surface of ring 23 thereby increasing the length of the announcement. In that case the preliminary announcement, in addition to the phrase above indicated, might include other information which it might be desirable to impart to calling subscribers, such as information of an advertising nature. For example, the operating telephone company might use such an expanded preliminary announcement to promote the more extended use of telephone facilities as by transmitting a phrase "Toll calls are surprisingly rea-

sonable. When you hear the tone signal the time will be" or the telephone company might sell the advertising service to a suitable advertiser.

Instead of using separate film strips cemented or otherwise secured to the mirror surfaces of the drums and ring 23, the sound tracks could be, in accordance with well-known methods, photographed directly on the surfaces. However, it would be preferable to use a film strip for the preliminary announcement particularly if an advertising slogan or other information were embodied therein, since it would then be possible to change the character of the announcement film from time to time.

Each of the drums is arranged to be rotated step-by-step by stepping mechanism individual thereto of the general type disclosed in Patent 1,472,465, granted October 30, 1923 to O. F. Forsberg and R. M. De Vignier. Considering first the stepping mechanism shown in detail in Fig. 5 and associated with the right end of the quarter minute drum 32 as viewed in Fig. 1, it comprises a frame having two parallelly disposed side members 37 and 38 joined at their ends by cross members 39 and 40. The side member 37 is provided with two laterally extending arms 41 and 42, the ends of which are respectively secured by screws 43 to the rings 12 and 23, whereby the stepping mechanism is supported from the inner ring 23 and an additional support for the outer ring 12 is afforded. One end of the shaft 44 of drum 32 is journaled in bearing holes near the lower ends of the side members 37 and 38.

Secured on the shaft 44 between the side members is a hub member 45 having formed integrally therewith a pinion gear 46 and a cam wheel 47. Also journaled on a bolt 48 extending through openings in the side members is a second hub member 49 having formed integrally therewith a driving gear 50 and a ratchet wheel 51. The gear 50 is meshed with the pinion 46, the gearing having a step-up ratio of six to one. The ratchet wheel 51 is provided with forty-eight teeth and therefore when the ratchet wheel is advanced one step or one-forty-eighth of a revolution, due to the gear ratio between gears 50 and 46, the drum 32 is advanced through one-eighth of a revolution.

For advancing the ratchet wheel 51 step-by-step, a stepping magnet 52 is provided having winding terminals 53 and 54. The magnet is mounted on a vertically extending core, the lower end of which is secured to the ear 55 extending horizontally from the lower edge of the upper cross member 39 of the frame. The cross member 39 is also provided with two arms 56 and 57 extending forwardly therefrom on either side of the magnet 52 between the forward ends of which an armature member 58 is pivoted on the pivot pin 59. The armature member comprises two L-shaped side arms 60 and 61 having the ends of their horizontally disposed portions joined together to form an armature overlying the upper end of the magnet core. The depending portion 62 of the side arm 60 is connected by spring 63 to a depending arm 64 of the arm 56 of cross-member 39 for normally holding the armature in its retracted position away from the upper end of the magnet core and the depending portion of the side arm 61 is formed upon its lower end with an ear 65 to which is secured one end of a reed spring 66. To the free or outer end of the reed spring 66 an inwardly extending stepping pawl 67 is riveted or otherwise secured. The pawl 67 is made to cooperate with the teeth 75

of the ratchet wheel 51 by means of a block 68 adjustably secured to the inside of the side member 38 of the frame which guides the end of the pawl into engagement with the teeth of the ratchet wheel.

A resilient holding pawl 69 is provided to prevent backward movement of the ratchet wheel 51 and to thereby hold the drum 32 in the position to which it has been advanced. The pawl 69 is adjustably secured by screws 71 to an ear 70, bent at right angles from the forward edge of side member 38 of the frame.

On a downwardly extending portion 73 of the lower cross-member 40 of the frame a spring pile-up is mounted. The spring pile-up comprises two springs 74 and 75 suitably insulated from each other and from the member 73 by interposed separators of insulating material and is secured to the member 73 by screws 76 which extend through an outer clamping plate 77 and through the springs and interposed separators into threaded holes in the member 73. To insulate the springs from the screws the screws may, in the usual manner, be surrounded by sleeves of insulating material. The end of spring 74 engages against the edge of cam wheel 47 so that normally the contacts carried by springs 74 and 75 are out of engagement. The cam wheel 47 is provided with two cam lugs so positioned thereon that the contact springs 74 and 75 are brought into engagement twice during each revolution of the drum 32.

The stepping mechanism associated with the minute drum 31 is indicated between the adjacent ends of drums 31 and 32 in Fig. 1 and is disclosed in detail in Fig. 4. It comprises structural details similar to those of Fig. 5, as previously described and for convenience of reference elements corresponding to those of Fig. 5 have been designated by similar reference numerals, but with the prefix numerals 1. In this stepping mechanism the ratchet wheel 151 is provided with forty-eight teeth and the gear ratio between the gears 150 and 146 is a step-down ratio of four to five whereby upon each step of the ratchet wheel 151 by the energization and de-energization of magnet 152, the gear wheel 150 is rotated one-forty-eighth of a revolution and thereby rotates the minute drum one-sixtieth of a revolution.

The frame of this stepping mechanism is entirely supported from the outer ring 12 by a V-shaped support 178 secured at its apex to the ring 12 by bolts 179 and having the ends of its forwardly extending arms secured to the cross-members 139 and 140 of the frame of the stepping mechanism by screws. The screws by which the lower arm of support 178 is secured to the lower cross-member 140 are shown at 180. In addition, the side member 138 is provided with a forwardly and angularly disposed ear 181 which serves as the bearing support for the left end of the shaft 44 of the quarter minute drum 32. The spring pile-up comprising springs 174 and 175 which cooperates with the cam wheel 147, is secured to a downwardly extending portion 173 of the lower cross-member 140 by the screws 176, these springs being forced into engagement by the single cam lug on the cam wheel 147 once during each revolution of the minute drum 31.

The left end of the shaft 144 of the minute drum 31 and the right end of the shaft 244 of the hour drum 30 are journaled in a support 81 secured to the outer ring 12 by screws 82 as most clearly shown in Fig. 1.

The stepping mechanism associated with the

hour drum 30 is indicated at the left end of the drum in Fig. 1 and is shown in detail in Fig. 3. It comprises structural details similar to those of Fig. 5 previously described and for convenience of reference elements corresponding to those of Fig. 5 have been designated by similar reference numerals, but with the prefix numerals 2. In this-stepping mechanism the ratchet wheel 251 is provided with forty-eight teeth and the gear ratio between the gear 250 and the pinion 246 is a step-up ratio of four to one whereby upon each step of the ratchet wheel 251 by the energization and deenergization of magnet 252, the gear wheel 250 is rotated one-forty-eighth of a revolution and thereby rotates the hour drum one-twelfth of a revolution.

For supporting the frame of this stepping mechanism the side member 238 is provided with a rearwardly extending arm 283, the end of which is secured to the outer ring 12 by the screws 284 and with a forwardly extending arm 285, the end of which is secured by the screws 22 to the end of spider arm 21 and to the end of the inner ring 23. No cam wheel or cooperating contacts are provided in this stepping mechanism.

The step-by-step advance of the stepping mechanism associated with the quarter minute drum 32 is under the control of a commutator segment 86 insulatedly supported on the hub 16 of the rotatable structure as disclosed in Fig. 2. Also insulatedly supported on the hub 16 are two slip rings 87 and 88. As disclosed in the wiring diagram of Fig. 6, one terminal of the magnet coil 52 of the stepping mechanism associated with the quarter minute drum 32 is connected to the commutator segment by wire 89 and the other terminal of coil 52 and one terminal of each of the coils 152 and 252 of the stepping mechanisms associated with the minute and hour drums 31 and 30, respectively, are connected to the slip ring 88 by the wire 90. The other slip ring 87 is connected by wire 91 to the springs 74 and 174 of the spring pile-ups of the stepping mechanisms associated with the quarter minute and minute drums and the contacts 75 and 175 are connected respectively to the other terminals of magnet coils 152 and 252.

Mounted on the flange of sub-shaft 14 is a connecting block 92 having a plurality of terminal lugs and brushes 93, 94 and 95 insulatedly supported thereon. The brushes 93, 94 and 95 are positioned to cooperate with the commutator segment 86 and the slip rings 87 and 88, respectively. The brushes 93 and 94 are connected to the grounded terminal of an operating battery and brush 95 is connected to the ungrounded terminal of the battery. The two upper terminal lugs of the connecting block serve for making a connection between the motor 29 and source of alternating current and the remaining four terminal lugs serve to make connections with a scanning unit 96.

For scanning the sound tracks on the ring 23 and drums 30, 31 and 32, a scanning unit 96 of the reflected light type is mounted on the supporting spider arm 3 as disclosed in Fig. 1. This unit is diagrammatically disclosed in Fig. 7 and comprises a horizontally disposed tube 97, the scanning end of which is constricted to form an interior parabolic surface which is provided with a mirror-like reflecting surface 98, the apex of which is provided with a light orifice 99. Positioned in the other end of the tube 97 is a photoelectric cell 100. Connected with the tube 97 at right angles thereto is a second tube 101 within which are positioned two condensing lenses 102

and 103 and an optical screen 104. The upper end of the tube 101 is closed by a lamp 105. Positioned within the tube 97 at the juncture of the axes of the tubes 97 and 101 is an optical prism 106.

The unit 96 is mounted on the arm 3 with its light orifice 99 in close proximity to the surface of the films to be scanned and with the axis of the tube 97 in the horizontal plane extending through the center line of the film strip 36 supported on the ring 23 and with the terminals of the lamp 105 and photoelectric cell connected through terminal lugs of the connector block 92 to a source of current supply and to an output amplifier circuit, respectively. When the announcing machine is in operation with the circuit of lamp 105 closed by the switch 107, a beam of light is focussed by the lens system comprising the lenses 102, 103 and prism 106 on the film strip, such as strip 36, and the light passing through the film strip is reflected by the mirror surface back of the film strip to the surface of the parabolic reflector 98 and thence upon the photoelectric cell 100, thereby causing in the well-known manner the generation of a speech current in accordance with the sound track on the film strip being scanned. This current is suitably amplified and transmitted to calling lines which may be connected with the announcing machine.

The mechanical details of the announcing machine having been described, the manner in which the machine functions will now be set forth. For this purpose, it will be assumed that the circuit of lamp 105 and of motor 29 are closed and that the rotatable structure comprising the interconnected rings 12 and 23 and the hour, minute and quarter minute drums carried thereby is being rotated in the direction of the arrow on the worm gear 26 at a uniform speed of one revolution every quarter minute. It will further be assumed that the hour drum 30, the minute drum 31 and the quarter minute drum 32 have been previously advanced by their associated stepping mechanisms to position the hour film 33 bearing the sound track for the hour announcement "twelve," the minute film 34 bearing the sound track for the minute announcement "fifty-nine" and the quarter minute film bearing the sound track for the quarter minute announcement "and three quarters" in position to be scanned by the scanning unit 96, that is, with their center lines aligned with the center line of the preliminary announcement film 36 carried by the ring 23 and that the rotatable structure has been rotated to a position in which the commencement end of the preliminary announcement film 36 is opposite the light orifice 99 of the fixed scanning unit 96.

As the rotatable structure continues to rotate the preliminary announcement film 36 is first moved at a proper reproducing speed past the fixed scanning unit resulting in the reproduction and transmission of the preliminary announcement in accordance with the sound track on the film 36, for example "When you hear the tone signal the time will be." Immediately thereafter the film strip 33 of the hour drum 30 which has been advanced to a scanning position will be moved past the scanning unit to reproduce and transmit the hour announcement "twelve" followed immediately thereafter by the passage of the film strip 34 of the minute drum 31 and immediately thereafter by the passage of the film strip 35 of the quarter minute drum 32 to reproduce and transmit the minute announcement "fifty-nine" followed by the quarter minute announcement "and three quarters." Any sub-

scribers whose lines are at the time connected to the announcing machine will thus hear the complete announcement "When you hear the tone signal the time will be twelve fifty-nine and three quarters."

Following the transmission of the quarter minute announcement and at the exact time previously announced, a suitable tone may be transmitted to the connected subscribers' lines under the control of a master clock. During the remainder of the complete revolution of the rotatable structure and before it has rotated to the position in which the commencement of the preliminary announcement film 36 has again been positioned before the fixed scanning unit 96, the stepping mechanisms associated with the drums 30, 31 and 32 are operated as required to position films carried by the drums indicative of the next succeeding quarter minute division of time for scanning or in accordance with the previous assumption to advance the hour drum 30 one step to bring the hour film having the sound track for the hour announcement "one" into scanning position; to advance the minute drum 31 one step into the position in which the blank portion of its surface is disposed for scanning and to advance the quarter minute drum one step to bring a blank portion of its surface or, if so provided, to bring a film bearing the announcement "o'clock" into scanning position, whereby upon the next revolution of the rotatable structure, the announcement "When you hear the tone signal the time will be one o'clock" will be reproduced and transmitted.

The advancement of the quarter minute drum 32 between the announcement periods is controlled by the momentary engagement of commutator segment 86 carried by the hub 16 of the rotatable structure with brush 93, thereby closing and then opening the circuit of stepping magnet 52. This circuit as disclosed in Fig. 6 extends from ground over brush 93 and commutator segment 86, over conductor 89 through magnet 52, conductor 90, slip ring 88 and brush 95 to battery and ground. The operation and release of magnet 52 thereby advances the ratchet wheel 51 one step and through the gears 50 and 46 rotates the quarter minute drum 32 through one-eighth of a revolution. The cam 47 on the shaft 44 of the drum is so positioned that upon the advance of the drum from the position in which the film bearing the announcement "and three quarters" to the position in which either a blank space of the drum surface or, if supplied, the film bearing the announcement "o'clock" is exposed for scanning, that is, at the end of each minute, it will close and then open its associated contacts 74 and 75. It will be noted in this connection that since two groups of quarter minute films are mounted on the drum 32, and the drum is rotated through one complete revolution every two minutes, the cam 47 will close its contacts twice upon each revolution of the drum or once at the end of each minute.

Upon the closure and opening of the cam contacts 74 and 75, a circuit for operating and releasing the magnet 152 of the stepping mechanism associated with the minute drum 31 is controlled which may be traced in Fig. 6 from ground over brush 94 and slip ring 87, conductor 91, contacts 74 and 75, winding of magnet coil 152, conductor 90, slip ring 88 and brush 95 to battery and ground. The operation and release of magnet 152 thereby advances the ratchet wheel 151 one step and through gears 150 and 146 rotates

the minute drum 31 one-sixtieth of a revolution. The cam 141 on the shaft 144 of the minute drum is so positioned that upon the advance of the drum from the position in which the film bearing the announcement "fifty-nine" to the position in which the blank portion of the drum surface is exposed for scanning, that is, at the end of each hour, it will close and then open its associated contacts 174 and 175.

Upon the closure and opening of contacts 174 and 175, a circuit for operating and then releasing magnet 252 of the stepping mechanism associated with the hour drum 30 is controlled which may be traced in Fig. 6 from ground over brush 94 and slip ring 87, conductor 91, contacts 174 and 175, winding of magnet 252, conductor 90, slip ring 88 and brush 95 to battery and ground. The operation and release of magnet 252 thereby advances ratchet wheel 251 one step and through gears 250 and 246 rotates the hour drum 30 through one-twelfth of a revolution.

Following the scanning of the films and the transmission of the announcement "When you hear the tone signal the time will be one o'clock" the next engagement of commutator segment 86 with brush 93 will, in the manner previously described, advance the quarter minute drum 32 one-eighth of a revolution to bring the film strip carried thereby having the sound track for the announcement "and one quarter" into scanning position, but the drums 30 and 31 will not be advanced at this time so that the succeeding announcement will be "When you hear the tone signal the time will be one and three quarters." To preclude the possibility of this announcement being interpreted by the subscriber as one and three quarters hours or to be 1:45 o'clock, the blank space on the minute drum might be provided with a film strip bearing the sound track of the announcement "naught."

Since it is believed that the setting of the drums for other divisions of the time of day will be apparent, further detailed description of the setting of the drums will not be given herein.

As previously stated, the preliminary announcement may be expanded to include any additional information, for example of an advertising character. Furthermore, while the invention has been disclosed with the scanning unit fixed and the film bearing portions mounted on a structure rotatable with respect to the scanning unit, it will be obvious that without departing from the spirit of the invention as set forth in the appended claims, the rotatable structure could be made stationary and the scanning unit could be rotated by the motor 29 with respect thereto at the speed of one revolution every quarter minute.

What is claimed is:

1. In a phonographic announcing machine, an assembly comprising a reflecting surface having the sound track of a preliminary announcement thereon and a plurality of adjustable members having reflecting surfaces bearing the sound tracks of other announcements, said sound tracks being arranged for alignment in a single circular orbit, an optical scanning unit comprising a light source, a lens tube, a photoelectric cell and means for directing light from said source upon said sound tracks and for directing reflected light from said sound tracks upon said cell and means for causing a relative rotational movement between said assembly and said scanning unit.

2. In a phonographic announcing machine, an

assembly comprising a reflecting surface having the sound track of a preliminary announcement thereon and a plurality of adjustable members having reflecting surfaces bearing the sound tracks of other announcements, said sound tracks being arranged for alignment in a single circular orbit, an optical scanning unit comprising a light source, a lens tube, a photoelectric cell, and means for directing light from said source upon said sound tracks and for directing reflected light from said sound tracks upon said cell, and means for rotating said assembly past said scanning unit to successively scan said first sound track and sound tracks carried by said members.

3. In a time announcing machine, an assembly comprising a reflecting surface having the sound track of a preliminary announcement thereon and a plurality of clock-controlled adjustable members having reflecting surfaces bearing sound tracks of the hour, minute and fractional minute divisions of the time of day thereon, said sound tracks being arranged for alignment in a single circular orbit, an optical scanning unit comprising a light source, a lens tube, a photoelectric cell and means for directing light from said source upon said sound tracks and for directing reflected light from said sound tracks upon said cell, and means for causing a relative rotational movement between said assembly and said scanning unit.

4. In a time announcing machine, an assembly comprising an arcuate ring having an inner reflecting surface bearing the sound track of a preliminary announcement and a plurality of clock-controlled drums having concave peripheral reflecting surfaces, the surfaces of said ring and a portion of the surface of each of said drums being aligned in a circular orbit, one of said drums bearing on its surface the sound tracks of the hour divisions of time, the second of said drums bearing on its surface the sound tracks of the minute divisions of time and a third of said drums bearing on its surface the sound tracks of the fractional minute divisions of time, an optical scanning unit comprising a light source, a lens tube, a photoelectric cell and means for directing light from said source upon said sound tracks and for directing reflected light from said sound tracks upon said cell, and means for rotating said assembly past said scanning unit to successively scan sound tracks of said ring and of said drum.

5. In a time announcing machine, an assembly comprising an arcuate ring having an inner reflecting surface bearing the sound track of a preliminary announcement and a plurality of clock-controlled drums positioned end to end and each having a concave peripheral reflecting surface, the surface of said ring and a portion of the surface of each of said drums being arranged in a circular orbit, one of said drums bearing on its surface the sound tracks of the hour divisions of time, a second of said drums bearing on its surface the sound tracks of the minute divisions of time and a third of said drums bearing on its surface the sound tracks of the fractional minute divisions of time, an optical scanning unit comprising a light source, a lens tube, a photoelectric cell and means for directing light from said source upon said sound tracks and for directing reflected light from said sound tracks upon said cell and means for rotating said assembly past said scanning unit to successively scan the sound tracks of said ring and of said drums.

6. In a time announcing machine, an assembly

comprising an arcuate ring having an inner reflecting surface bearing the sound track of a preliminary announcement and a plurality of rotatable drums having concave peripheral reflecting surfaces, the surface of said ring and a portion of the surfaces of said drums being aligned in a circular orbit, the first of said drums bearing on its surface the sound tracks of the hour divisions of time, the second of said drums bearing on its surface the sound tracks of the minute divisions of time and the third of said drums bearing on its surface the sound tracks of the fractional minute divisions of time, a stepping mechanism associated with each of said drums for rotating said drums to bring the sound tracks carried thereby into scanning positions, means operated by the stepping mechanism associated with the third drum for controlling the stepping mechanism associated with said second drum, means operated by the stepping mechanism associated with the second drum for controlling the stepping mechanism associated with said first drum, an optical scanning unit for scanning the sound track carried by said ring and the sound tracks carried by said drums which have been positioned in scanning positions, means for causing a relative rotational movement between said assembly and said scanning unit at a scanning speed of one revolution every quarter minute and means operable during each such revolution to control the stepping mechanism associated with said third drum.

7. In a time announcing machine, an assembly comprising a plurality of rotatable drums positioned end to end and each having a concave peripheral reflecting surface, a portion of the surface of each drum being arranged in a circular orbit, the first of said drums bearing on its surface twelve sound tracks of hour divisions of time, the surface of said second drum being divided into sixty equal sections and bearing thereon sound tracks of the minute divisions of time and the surface of said drum being divided into eight sections arranged in two groups of four sections each, and each group of sections bearing sound tracks of the quarter minute divisions of time, means for advancing said third drum one-eighth of a revolution every quarter minute, means controlled in the advance of said third drum for advancing said second drum one-sixtieth of a revolution at the end of every minute and means controlled in the advance of said second drum for advancing said first drum one-twelfth of a revolution at the end of every hour, whereby at every quarter minute period, said drums are positioned to align sound tracks thereof indicative of the correct time in positions to be scanned.

8. In a time announcing machine, an assembly comprising a plurality of rotatable drums positioned end to end and each having a concave peripheral reflecting surface, a portion of the surface of each drum being arranged in a circular orbit, the first of said drums bearing on its surface twelve sound tracks of the hour di-

visions of time, the surface of said second drum being divided into sixty equal sections and bearing thereon sound tracks of the minute divisions of time and the surface of said third drum being divided into eight sections arranged in two groups of four sections each, and each group of sections bearing sound tracks of the quarter minute divisions of time, a stepping mechanism associated with each of said drums, means for controlling the stepping mechanism associated with said third drum to advance said drum one-eighth of a revolution every quarter minute, means controlled by the rotation of said third drum to operate the stepping mechanism associated with said second drum to advance said latter drum one-sixtieth of a revolution at the end of every minute, and means controlled by the rotation of said second drum to operate the stepping mechanism associated with said first drum to advance said latter drum one-twelfth of a revolution at the end of every hour, whereby at every quarter minute period said drums are positioned to align sound tracks thereof indicative of the correct time in positions to be scanned.

9. In a time announcing machine, a base member having a centrally disposed stub-shaft, a rotatable structure having a hub member journaled on said shaft, a spider secured thereto, an arcuate ring secured to the arms of said spider, the inner face of which is provided with a reflecting surface bearing the sound track of a preliminary announcement, an outer ring mounted concentrically with said arcuate ring, a plurality of rotatable drums supported end to end from said rings having concave peripheral reflecting surfaces, a portion of the surface of each drum extending into the space between the ends of the arcuate ring and arranged in the circular orbit of said ring, one of said drums bearing on its surface the sound tracks of the hour divisions of time, a second of said drums bearing on its surface the sound tracks of the minute divisions of time and the third of said drums bearing on its surface the sound tracks of the quarter minute divisions of time, an optical scanning unit mounted on said base member with its optical axis in alignment with the sound track of said arcuate ring, means for rotating said rotatable structure past said scanning unit at a uniform speed of one revolution every quarter minute, means controlled by the rotation of said structure for advancing said third drum one step every quarter minute, means controlled by the advance of said third drum for advancing said second drum one-sixtieth of a revolution at the end of every minute, and means controlled by the advance of said second drum for advancing said first drum one-twelfth of a revolution at the end of every hour, whereby upon every revolution of said rotatable structure, said drums are positioned to align sound tracks thereof indicative of the correct time with the sound track of said arcuate ring for scanning by said optical unit.

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