# United States Patent [19]

**Parilla**

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[54] **ELECTRONIC SOUND EFFECTS APPARATUS**


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[ * ] Notice: The portion of the term of this patent subsequent to Feb. 22, 1989, has been disclaimed.


[22] Filed: **July 13, 1972**

[21] Appl. No.: **271,299**

**Related U.S. Application Data**

[60] Continuation-in-part of Ser. No. 227,247, Feb. 17, 1972, Pat. No. 3,708,632, which is a division of Ser. No. 750,030, Aug. 5, 1968, Pat. No. 3,644,682.

[52] **U.S. Cl.** ..... **179/100.1 VC; 179/6 TA; 179/100.1 C; 179/100.3 D; 360/12**

[51] **Int. Cl.**..... **G11b 15/18;** G11b 27/22

[58] **Field of Search** ..... 179/100.1 VC, 100.1 C, 179/100.2 S, 100.3 D, 6 TA, 2 TC; 360/12



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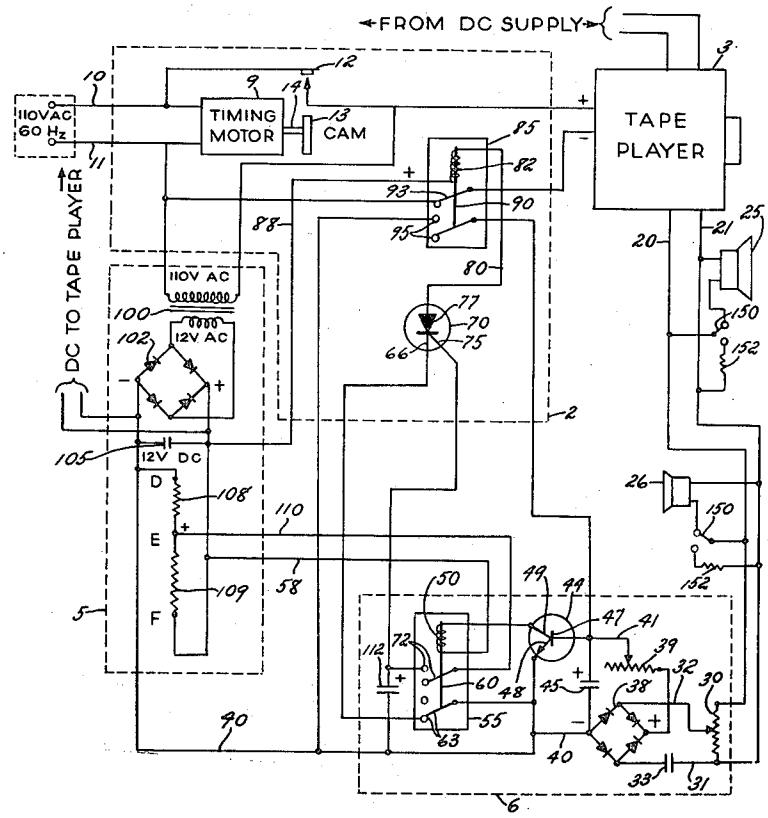
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[57] **ABSTRACT**

An electronic sound effects apparatus for indicating the passage of the hour and for also issuing periodic announcements by reproduction of the human voice or other sound, the apparatus having a clock, a timer and a tape-player including a loudspeaker, which timer produces periodic signals at selected time intervals to start the tape-player, the tape being preprogrammed to issue announcements such as the time sequentially by reproduction of the preprogrammed material through the loudspeaker and being synchronized with the actual local time so as to repeat itself with appropriate announcements throughout the desired operating cycle. Displacement of the tape itself through the tape-player is used to stop the tape-player at the end of each announcement and before the next announcement is due to start, so that the announcement will always remain in phase with the local time indefinitely. If desired, the tape-player may be concurrently used for entertainment, or other purposes, at the choice of the user.


**4 Claims, 3 Drawing Figures**



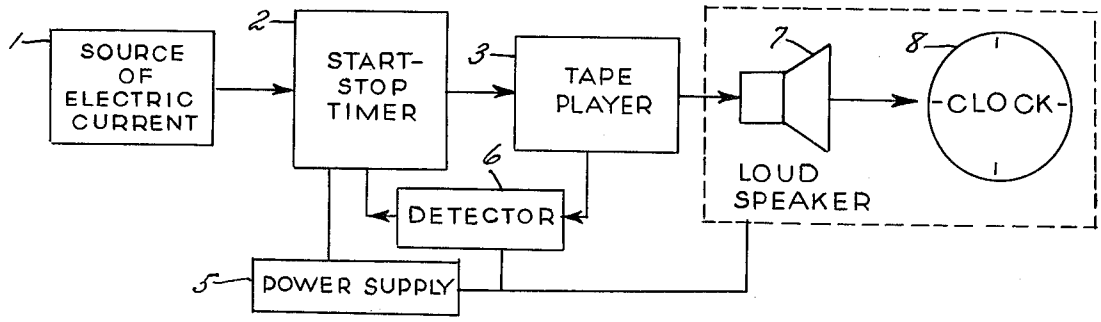

1
SOURCE OF ELECTRIC CURRENT
2
START-STOP TIMER
3
TAPE PLAYER
7
LOUD SPEAKER
8
-CLOCK-
6
DETECTOR
5
POWER SUPPLY

Fig. 1

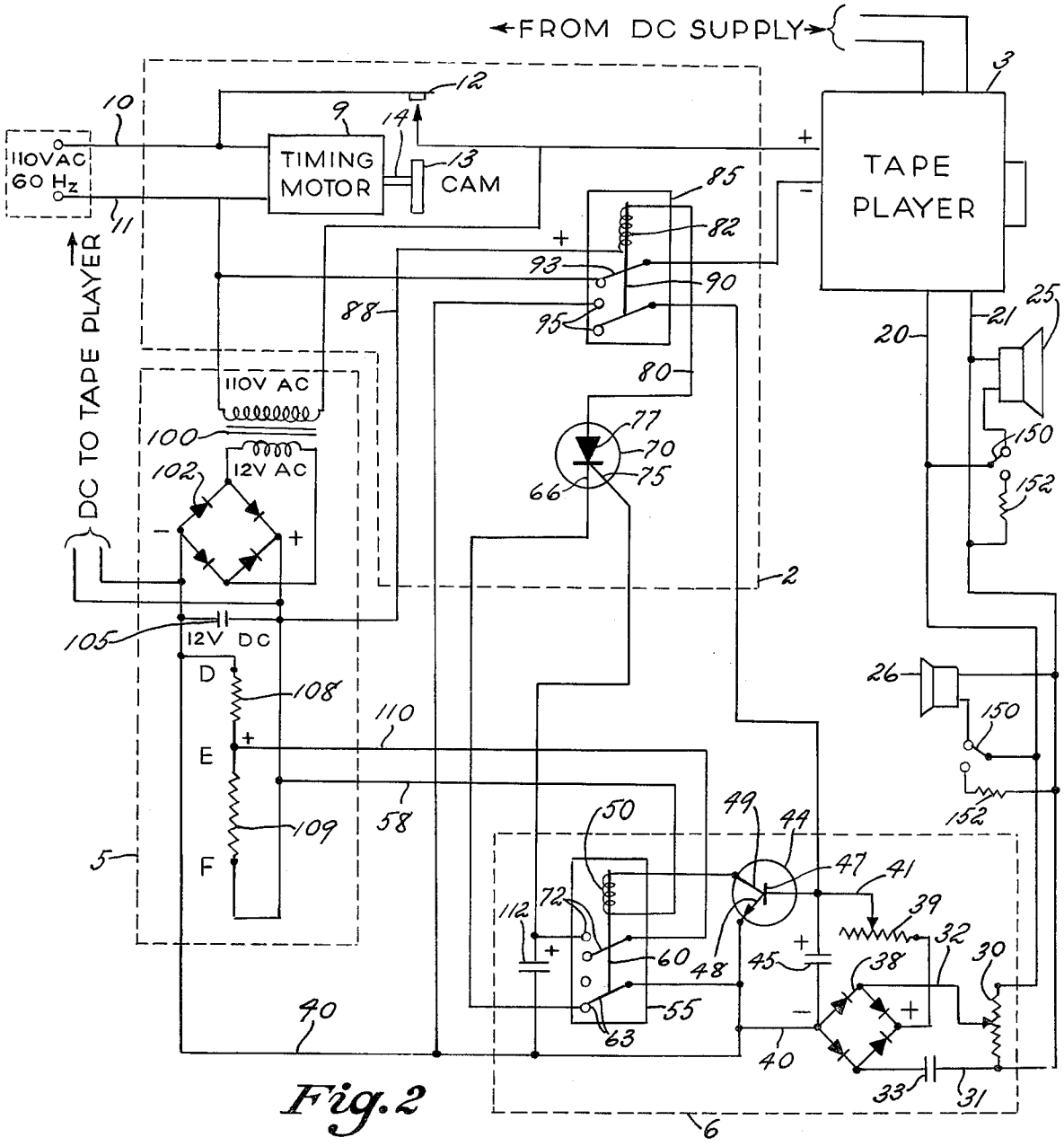

FROM DC SUPPLY
TAPE PLAYER
110VAC 60 Hz
TIMING MOTOR
CAM
DC TO TAPE PLAYER
110V AC
12V AC
12V DC
D
E
F
2
5
6
40
58
110
105
108
109
100
102
66
77
70
75
80
82
85
88
90
93
95
20
21
25
26
150
152
30
31
32
33
38
39
41
44
45
47
48
49
50
55
60
63
72
112

Fig. 2

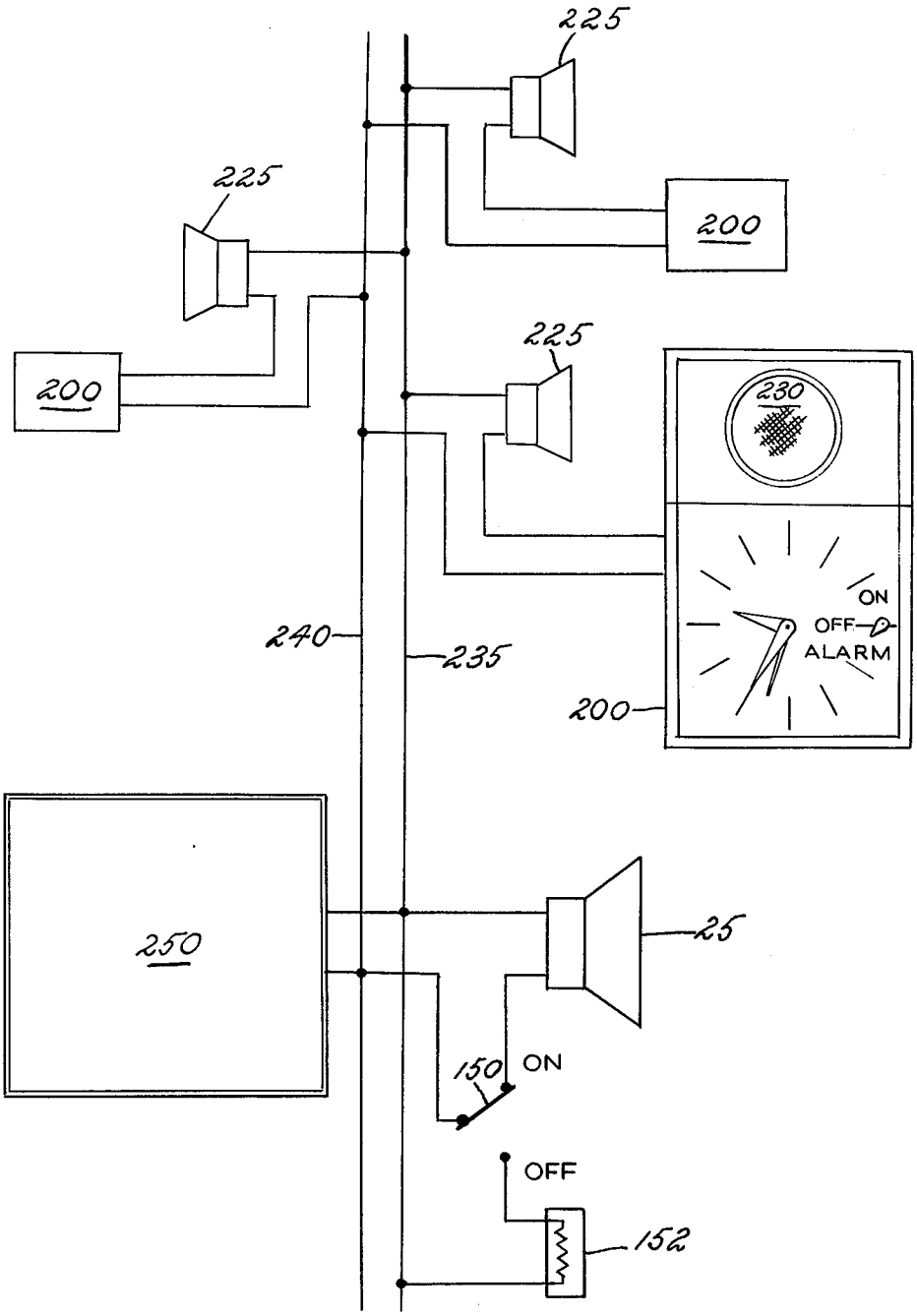

225
225
225
200
200
230
ON
OFF
ALARM
240
235
200
250
25
150
ON
OFF
152

*Fig.3*

# ELECTRONIC SOUND EFFECTS APPARATUS

This application is a continuation-in-part of my co-pending application Ser. No. 227,247, filed Feb. 17, 1972, now U.S. Pat. No. 3,708,632, which application in turn is a divisional of co-pending prior application Ser. No. 750,030, filed on Aug. 5, 1968, now U.S. Pat. No. 3,644,682, issued Feb. 22, 1972.

## SUMMARY OF THE INVENTION

This invention relates to the field of horology and relates more particularly to an electronic sound effects, or talking clock, apparatus which may not only ring chimes, carillons, and/or strike gongs, as desired, to mark the passage of the hour, but which may also reproduce the human voice calling out the hour, such as, "The time is now twelve o'clock."

The new sound effects, or talking clock, apparatus, may be added to or employed with any type of clock, whether electrically driven by household current; by self-contained electric batteries; by hand winding; or by gravity (weights) such as the grandfather clocks.

In general, electrical sensing means are provided which respond when the minute hand of any clock approaches a preselected position, such as, for example, the twelve o'clock position. In this position, which happens once per hour, an electrical circuit of the apparatus system is closed, which circuit then actuates a tape-player embodied in the system and having its output speaker associated with the clock. Advantageously, the speaker unit may be physically incorporated in and form a part of the clock unit. The tape-player is programmed to announce the time sequentially. After each announcement, the tape is automatically stopped. In addition to hourly announcements, they may be half-hourly, quater-hourly or at any periodic intervals desired.

Manifestly, the talking clock apparatus must be capable of operating unattended for weeks and months and still have the time announcements synchronized with the local standard time. To conserve tape, it must start and stop before and after each announcement and the duration of operation or time announcement be limited to relatively short periods such, for example, as from ten (10) to forty (40) seconds. The frequency of the time announcement is a design variable. Too frequent announcements might be objectionable. Westminister chimes on clocks have been widely accepted, having a frequency of chimes on each quarter-hour or every fifteen minutes. A quarter-hour frequency requires 96 start/stop cycles per day, or 2900 per month, or about 35,000 cycles per year.

In accordance with this invention, the tape itself is used to stop the tape-player, so that the latter always stops at the end of the then current announcement, and before the next announcement is to start. Thus, the error is always limited to one cycle only; and the time announcement will remain in phase with the local standard time indefinitely.

It is among the objects of this invention to provide a novel electronic sound effects, or talking clock apparatus.

Another object of this invention is to provide electronic talking clock apparatus in which a timer produces periodic signals at selected time intervals to start a tape-player.



Another object of this invention is to use the displacement of the tape itself through the tape-player to provide a signal which stops the tape-player.

Another object of this invention is to modify the tape-player to sense the "stop" signal on the tape and to stop the tape-player.

Another object of this invention is to pre-program the tape to announce the time sequentially so that, once synchronized with the actual local standard time, it will repeat itself throughout the desired operating cycle, up to 24 hours each day, and day after day.

Another object of this invention is to provide means whereby the tape-player may be conveniently used for entertainment, or other purposes, instead of as a talking clock, at the choice of its owner.

Another object of this invention is to provide a talking clock by mounting a loudspeaker directly on the aft face of the new talking clock, in which the clock face has a centrally located, cloth-covered opening for passage of sound waves therethrough.

Another object of this invention is to provide a stereophonic musical clock by mounting two or more loudspeakers directly on the aft face of the new talking clock, in which the clock face has two cloth-covered openings for passage of sound waves there-through, for the purpose of reproducing stereophonic sound.

Another object of this invention is to mount a separate clock, either electrically driven by household current or by selfcontained batteries, or hand wound, or gravity driven, on the cloth-covered output side of an enclosed speaker system to provide a talking clock.

Another object is to provide multiple loudspeaker outlets all controlled from a central control unit, including a single tape-player.

Another object is to provide optional means for rendering the pre-recorded announcements inaudible at one or more loudspeakers, while still advancing the tape by operation of the tape drive system, so that the tape is still synchronized with the local time whenever it is desired to return to audible announcements.

Yet another object is to provide automatic means for returning the loudspeakers from inaudible to audible status.

Still another object is to provide means for preselecting the time when the system automatically is returned from inaudible to audible status, thus, in effect, creating a talking alarm clock.

Another object is to provide multiple loudspeaker outlets all controlled from a central control unit, including a single tape-player, each such loudspeaker being provided with means for pre-selecting the time at which that loudspeaker is returned from inaudible to audible status, each such loudspeaker being located in a different location as in a hotel and/or motel for the exclusive use of the occupant therein.

## DESCRIPTION OF THE DRAWINGS

In the accompanying drawings which form part of the instant specification and are to be read in conjunction therewith and in which like numbers refer to like parts throughout the several views:

FIG. 1 is a view showing, in block diagram form, one embodiment of an electronic talking clock apparatus in accordance with this invention;

FIG. 2 is a part-schematic and part-diagramatic view of details of the start-stop timer, the detector, and the power supply of the apparatus depicted in FIG. 1; and

FIG. 3 is a part-schematic and part-diagramatic view showing details of a multiple loudspeaker station apparatus of the type illustrated in FIGS. 1 and 2 in which the individual stations are equipped with means for rendering the recorded announcement inaudible and for automatically returning the system from inaudible to audible status at a pre-determined time, thus in effect constituting a talking alarm clock.

Referring now more particularly to the block diagram of FIG. 1, power from a suitable source 1 of alternating current electric power is supplied to a start-stop timer 2. The timer then supplies power to "start" the tape-player 3 at periodic intervals as fixed by its detailed design as more fully described hereinafter, and to a power supply 5. As the tape in the tape recorder is transported past the player head (not shown) sound stored on the tape as a message is reproduced in a known manner by the loudspeaker 7 associated with the clock 8. When the tape has been displaced sufficiently to complete the desired stored message, it is followed by a segment of tape which is devoid af any audio signal. The detector 6 monitors the audio output of the tape-player, and for the duration of the audio output, it issues a "run" signal to the start-stop timer 2. When the non-recorded segment of the tape enters the pick-up head, the detector ceases to issue the run signal to the start-stop timer 2 which, in turn, discontinues the supply of electric power to the tape-player, all as is more fully described hereinafter. The process is repeated each time the timer delivers power to the tape-player, with automatic stoppage of the latter on termination of the run signal produced by the detector when the audio output of the tape-player ceases.

The timer 2, power supply 5, and detector 6 may be a physically integral part of the tape-player 3, or may be a separate unit for adaptation to existing tape-players, as desired.

The tape-player, including timer, power supply, detector and loudspeaker, may, in some cases, be mounted directly on the clock face; or may be used independently without the clock face.

As is more fully shown in FIG. 2, the start-stop timer preferably comprises a 110 V a.c., 60 Hertz synchronous motor 9 which is shunted across the tape-player power input leads 10 and 11 so that it may be continuously driven. The motor 9 operates a micro-switch 12 in the input lead 10 through a suitable cam 13 mounted on its output shaft 14. (Gearing in a gear box mounted between the armature of the motor 9 and the output shaft 14 reduces the speed of the later to any desired value.) When the cam 13 is four-lobed, and the output shaft makes one revolution per hour, the four-lobed cam will close the micro-switch 12 once every fifteen minutes, giving quarter-hourly actuation of the tape-player 3 for generating quarter-hourly time signals.

Upon closure of the micro-switch 12, power is supplied via the input leads 10 and 11 to operate the tape-player drive motor (not shown) for the tape magazine. In the customary manner, the tape in the magazine traverses a tape-head (not shown). The audio output signal from the tape-head is amplified by the tape-player 3 and is supplied via the output leads 20 and 21 to parallel loudspeakers 25 and 26 and to a potentiometer 30 at the input to the detector 6.

In the detector 6, audio signals delivered to the potentiometer 30 by the leads 20 and 21 are coupled by leads 31 and 32 and a capacitor 33 to a full-wave bridge rectifier 38. The resultant d.c. voltage is fed through an adjustable resistor 39 and by leads 40 and 41 to the base-emitter circuit of an npn transistor 44. A filter capacitor 45 is disposed between the base 47 and the emitter 48 of the transistor 44. When in the normal, non-operative state ( in which no audio signal is fed to the detector 6), the base 47 and the emitter 48 of the transistor 44 are at the same potential, i.e., when there is no bias voltage delivered from the rectifier 38, the transistor 44 is cut off. However, when an audio signal is supplied to the potentiometer 30 by the leads 20 and 21 from the tape-player 3, the audio signal is detected and rectified and a positive d.c. voltage is applied to the base 47 of the transistor thereby forward-biasing the transistor and causing substantial current to flow to the collector 49 of the transistor 44. The collector circuit is completed through a solenoid coil 50 of a double-pole double-throw relay 55, and the d.c. power supply 5 by leads 58 and 40.

When energized, the relay 55, by movement of its armature 60, opens the normally-closed relay contacts 63 in the lead 40 from the negative terminal of the power supply to the cathode 66 of a silicon controlled rectifier 70 in the start-stop timer 2, and closes normally open relay contacts 72 which applies an intermediate positive voltage from the power supply 5 to the gate 75 of the silicon controlled rectifier 70.

The anode 77 of the silicon controlled rectifier 70 is connected by lead 80 to the solenoid coil 82 of a relay 85 in the start-stop timer 2, said solenoid coil 82 in turn being connected to the most positive terminal of the power supply 5 through a lead 88.

When energized, the relay 85, by movement of its armature 90, opens a normally-closed relay contact 93 in the power input lead 11, stopping the tape-player, and closes a normally open relay contact 95 connecting the base 47 to the emitter 48 of the transistor 44, thereby cutting off conduction in the collector circuit of said transistor and insuring that the transistor will remain non-conductive (and that relay 55 will not reopen) until the relay 85 has been de-energized and the cycle terminated.

When the timer cam 13 has advanced sufficiently to reopen the micro-switch 12, and hence open the input lead 10, all power to the system is cut off and the silicon-controlled rectifier 70 and series relay 85 become de-energized. The cycle is then completed and the system is ready to repeat another cycle.

In the case of the reel-to-reel type standard tape-players some simplification in operation can be made by using a commercially available continuous loop, automatic repeating magnetic tape magazine. This may be fitted on standard reel-to-reel tape-players and eliminate the need for reversing the tape to repeat the time cycle. By spacing the stop signal (silent segment) on the tape, the tape can be made to repeat the time announcement continuously day after day. Since only a section of tape free of audio signal is required to act as a stop signal (by terminating the run signal), no modifications of a conventional tape-player or comparable device is required.

The low-voltage d.c. power supply 5 consists of a transformer 100 which reduces the 110 V 60 Hertz a.c. to 12 volts a.c. at the output terminals of its secondary. This reduced voltage is connected to a full-wave bridge rectifier 102 which converts the 12 volt a.c. to approximately 12 volts d.c., which appears at the output termi-

nals of the bridge rectifier **102** and is filtered by an electrolytic capacitor **105.** A pair of resistors **108** and **109,** constitute a bleeder resistor having a take-off tap from which a conduit **110** conducts an intermediate voltage (suitable for application to the gate **75** of the silicon-controlled rectifier **70**) to the normally open contacts **72** of relay **55.**

A small capacitor **112** is connected with its positive terminal connected to the gate **75** of the silicon-controlled rectifier **70,** and with its negative lead connected to the lead **40** from the negative terminal of the low-voltage d.c. power supply **5.**

In operation, when the cam **13** is turned by the timing motor **9** to a position at which the micro-switch **12** is closed, power is supplied to the tape-player **3** and the power supply **5** through the input leads **10** and **11** through the normally closed relay contacts **93.** The audio signal delivered by the tape-player to the leads **20** and **21** is conducted through those leads to the loudspeakers **25** and **26** and also to the potentiometer **30** in the detector **6.**

In the detector **6,** the signal delivered to potentiometer **30** is applied to the full-wave rectifying bridge **38** and converted into a forward-biasing voltage which is applied to the base-emitter junction of the transistor **44.** Such forward bias causes current flow through the collector circuit of the transistor **44,** which includes the solenoid coil **50** of the relay **55.** On such actuation of the relay **55,** an intermediate positive voltage is applied through the normally open relay contacts **72** to the gate **75** of the silicon-controlled rectifier **70.** The capacitor **112** is also charged to the applied voltage. At this stage, however, the silicon-controlled rectifier does not fire because actuation of the relay **55** has opened the normally closed contacts **63,** thereby opening its cathode circuit.

When the message delivered by the tape-player ceases, a period of silence follows and audio signal is no longer delivered to the detector **6.** When this occurs, the base-emitter junction of the transistor **44** loses its bias, and the flow of current through its collector circuit ceases, resulting in de-energization of the relay **55.**

Upon de-energization of the relay **55,** the contacts **63** close, connecting the cathode **66** of the silicon-controlled rectifier **70** to the negative terminal of the power supply.

Although the relay contacts **72** have now opened, a charge is retained on the capacitor **112** temporarily and this charge, which is applied to the gate of the silicon-controlled rectifier **70,** is sufficient to cause the rectifier to fire through the solemoid coil **82,** thereby energizing the relay **85.** This condition, i.e., the conduction of the silicon-controlled rectifier **70** and the series relay **85,** is maintained until movement of the cam **13** opens the micro-switch **12,** at which time the rectifier **70** extinguishes, the series solenoid **85** is de-energized, and the entire system is then ready to repeat its cycle.

The RC-time constants of the detector **6** and associated components are such as to maintain the relay **55** in actuated condition for a period slightly longer than the duration of the audio input signal delivered to the potentiometer **30,** thereby insuring that brief pauses, intervals between words and sentences, etc., do not deactivate the relay **55.** However, the discrete unrecorded segment between pre-recorded messages on the tape are of sufficient duration to insure that the detector output ceases and that the relay **55** returns to its normal, unactivated condition.

As illustrated, the loudspeakers **25** and **26** are connected to the output leads **20** and **21** from the tape-player each through a single-pole double-throw switch **150.** In the event it is desired to render the signal from a speaker **26** inaudible, the switch **150** may be thrown to an "off" position, in which condition the audio signal is delivered across a resistor **152** which acts as a dummy load.

Even though a speaker may be rendered inaudible by throwing the switch **150,** the start-stop control system remains operative as previously described and functions each time the synchronous motor **9** and cam **13** starts the operation. When it is desired to resume the audible phase, the loudspeaker switch **150** may be returned to its "on" position, and the messages from the tape-player will again be heard.

FIG. **3** illustrates multiple, parallel means wherein the manually operated switch **150** of FIG. **2** may be operated automatically by a conventional alarm clock **200,** each suitably in a separate room. Such a clock, with its motor and associated gearing and switching means (not illustrated), may be very similar to those presently used in the radio and other alarm clocks, in which, when the preset alarm time is reached, instead of turning on the radio, or a buzzer, simply closes the circuit connecting the speaker **225,** (which may be built into the clock subassembly, behind a grill cloth **230**), to a pair of conduits **235** and **240** carrying the output of the central source of the audio signal **250** which constitutes the device of FIGS. **1** and **2,** and more specifically, to the leads **20** and **21** thereof.

The use of multiple "talking alarm clocks" would be suitable for installation in the guest rooms of hotels and motels. Instead of the guest having to call the desk to leave a message to be called on the telephone the next morning, he would simply set the alarm on the talking alarm clock in his room. Automatically, after the preselected time, the clock will make the prerecorded announcement. Moreover, it will continue to announce periodically until the room occupant turns the device off, in contrast with the telephone call which is made only once. Also, it is more reliable, being automatic, eliminating human errors due to switch-board congestion.

What is claimed is:

**1.** Electronic sound effects, or timed announcement, apparatus comprising:

a tape-player, including a loud speaker, for use with tape having announcements sequentially prerecorded thereon with unrecorded segments between them;

time responsive switch means for starting said tape-player by periodically connecting said tape-player to a source of power for a predetermined interval of time which is longer than the time necessary to play any of said announcements, said time responsive switch means comprising an a.c. synchronous motor directly connected to said power source to be driven thereby, a cam mounted on the output shaft of said motor whereby the cam rotates with the shaft, and a micro-switch operatively associated with the said cam so that the switch contacts are closed by the lobe of said cam, one switch contact being connected to said power source and

the other contact being connected to said tape player;

run-switch means for detecting the playing of an announcement and for generating a signal in response thereto; and

switch means, connected between said tape-player and said power source, responsive to the cessation of said signal for stopping said tape-player by disconnecting said tape-player from said power source.

**2.** The apparatus of claim **1** wherein said means for stopping said tape-player comprises:

a solid state switching device; and,

a relay having a pair of normally closed contacts, the coil of said relay being connected in series with said switching device, and the normally closed contacts connecting said tapeplayer to said power source.

**3.** The apparatus of claim **2** wherein said solid state switching device comprises a silicon controlled rectifier.

**4.** The apparatus of claim **3** wherein said run-switch means comprises:

a rectifier connected to said tape-player for providing a d.c. voltage when an announcement is playing;

a transistor having its base connected to the output of said rectifier, said transistor being biased so that it will be conductive only when the rectifier provides a d.c. voltage;

a capacitor connected to the gate electrode of said silicon controlled rectifier;

electromagnetic relay means, having its coil connected in series with said transistor, for opening the anode-cathode circuit of said silicon controlled rectifier and connecting said capacitor to a source of voltage to be charged thereby when said transistor is conducting, and for closing said anode-cathode circuit when the transistor ceases to conduct, whereby the charge on said capacitor causes said silicon controlled rectifier to conduct.

* * * * *