FIG. 1

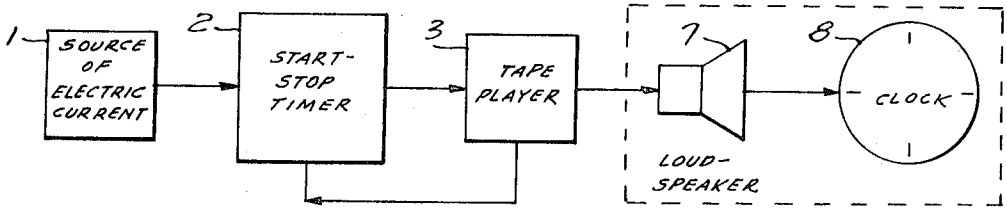
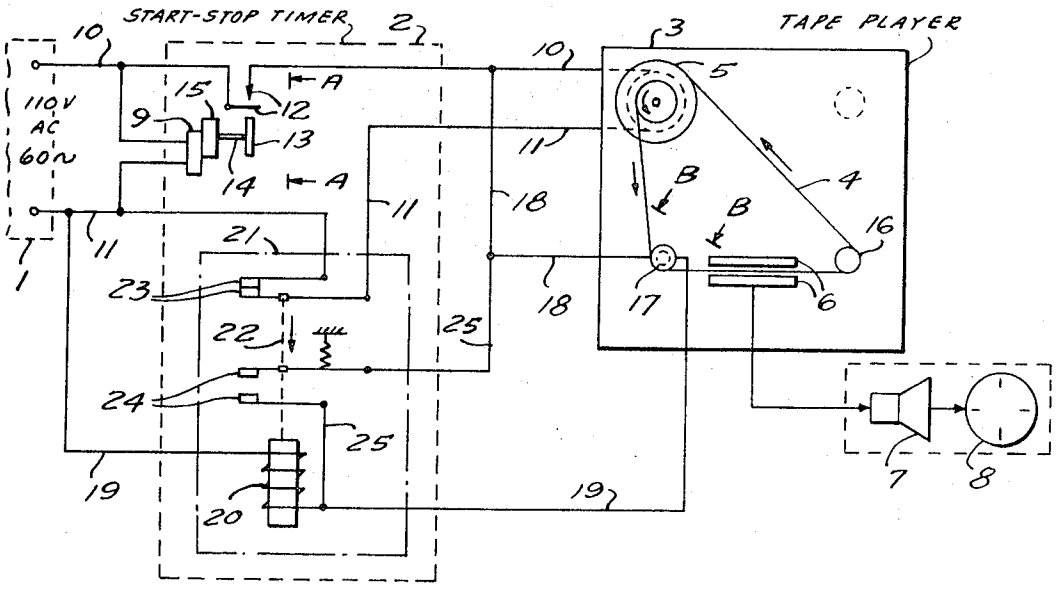


FIG. 2



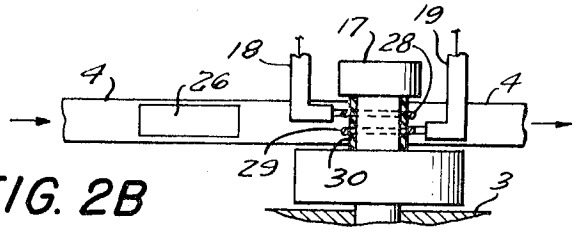


FIG. 2B

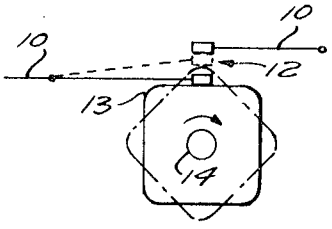


FIG. 2A

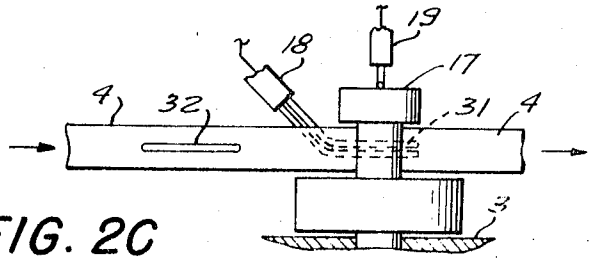


FIG. 2C

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United States Patent

Parilla

[15] **3,644,682**

[45] **Feb. 22, 1972**

[54] TALKING CLOCK APPARATUS

[72] Inventor: **Arthur R. Parilla,** P.O. Box 127, Mountain Lakes, N.J. 07046

[22] Filed: **Aug. 5, 1968**

[21] Appl. No.: **750,030**

[52] **U.S. Cl.**.....**179/100.1 C,** 179/6 TA, 179/100.2 S, 179/100.3 D

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

[58] **Field of Search**.....179/100.1, 100.1 C, 100.1 PS, 179/100.2 S, 100.3 D, 6 TA

[56] **References Cited**

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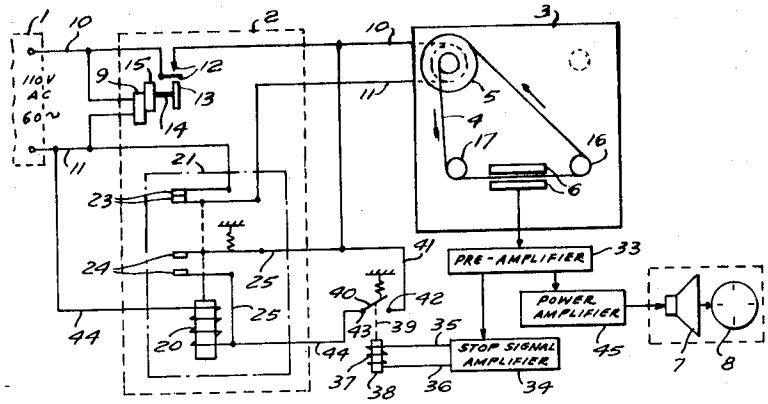
556,794 5/1957 Belgium.....179/100.1

Primary Examiner—Bernard Konick
Assistant Examiner—Raymond F. Cardillo, Jr.
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[57] **ABSTRACT**

Talking clock apparatus for indicating the passage of the hour and for also announcing the hour by reproduction of the human voice, 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 announce the time sequentially by reproduction of the human voice through the loudspeaker and being synchronized with the actual local standard time so as to repeat itself with appropriate time 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 time announcement will always remain in phase with the local standard time indefinitely. If desired, the tape player may be concurrently used for entertainment, or other purposes, instead of as a talking clock, at the choice of the owner.

1 Claims, 15 Drawing Figures



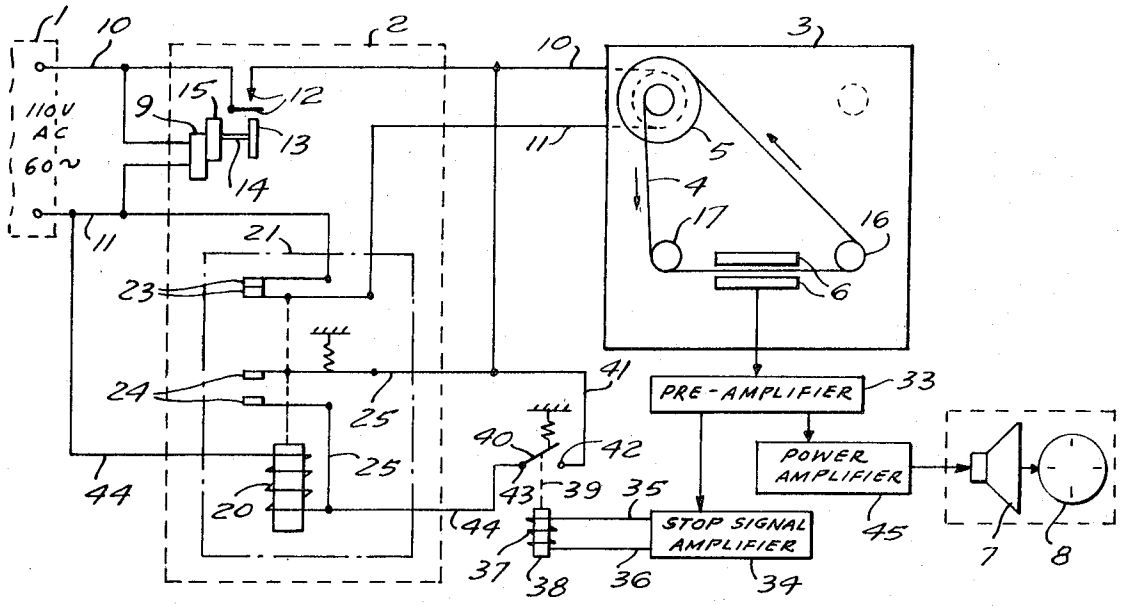


FIG. 3

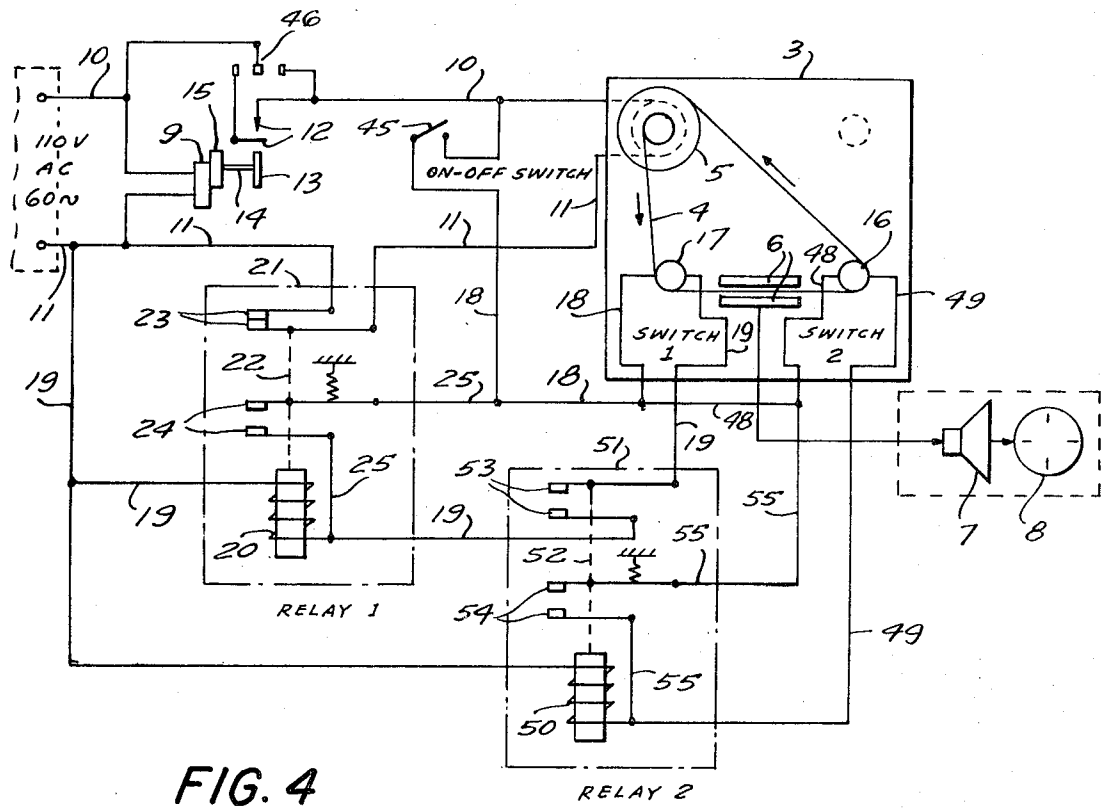
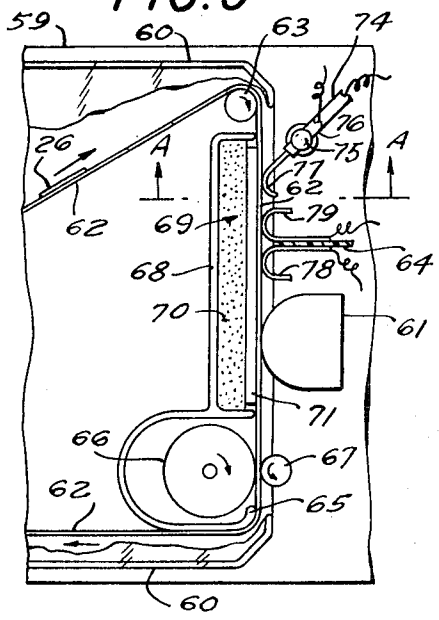


FIG. 4

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FIG. 5



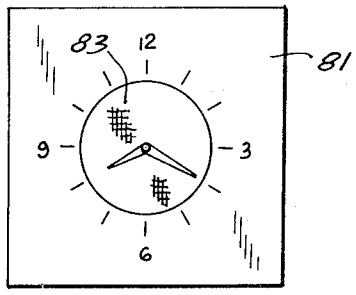
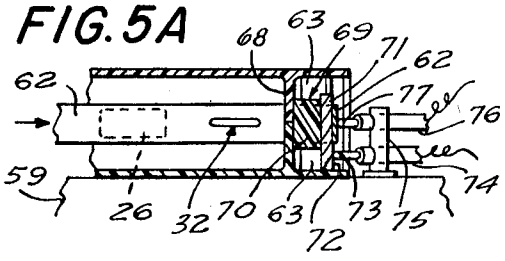


FIG. 6

FIG. 5A



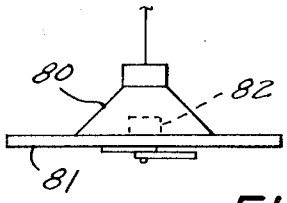


FIG. 7

FIG. 8

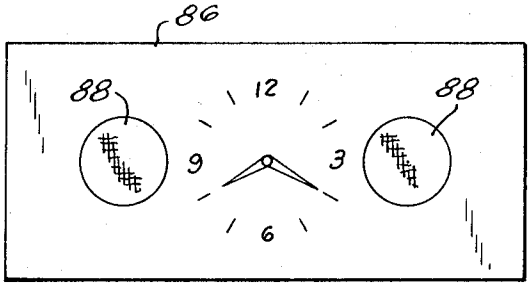
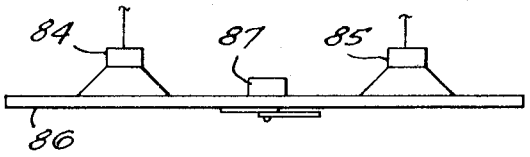


FIG. 9



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FIG. 11

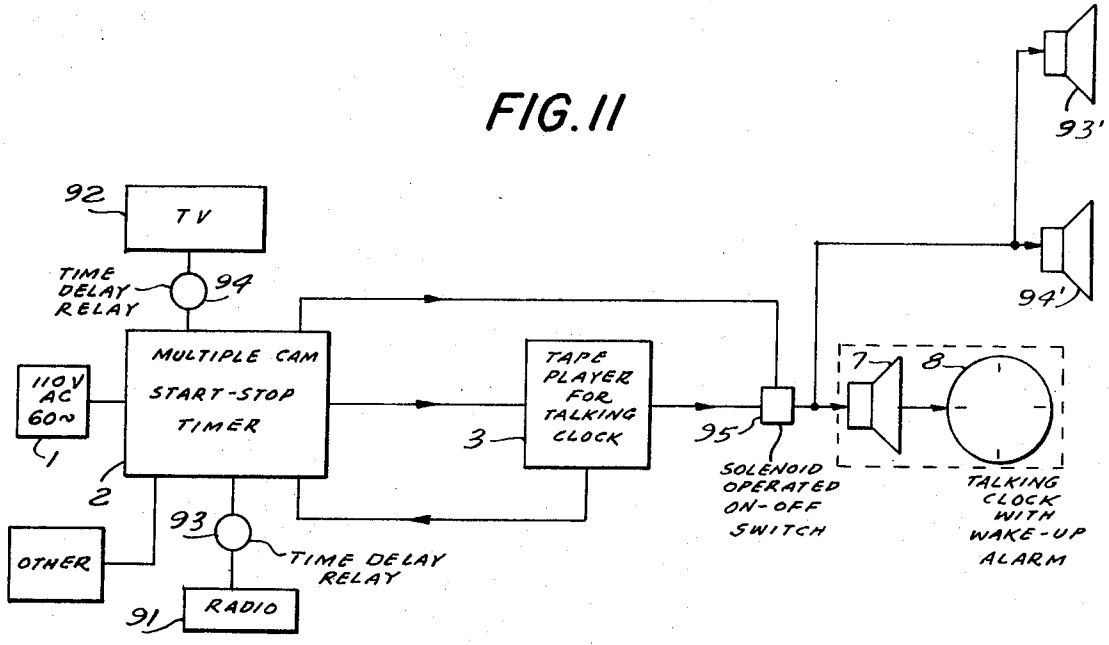
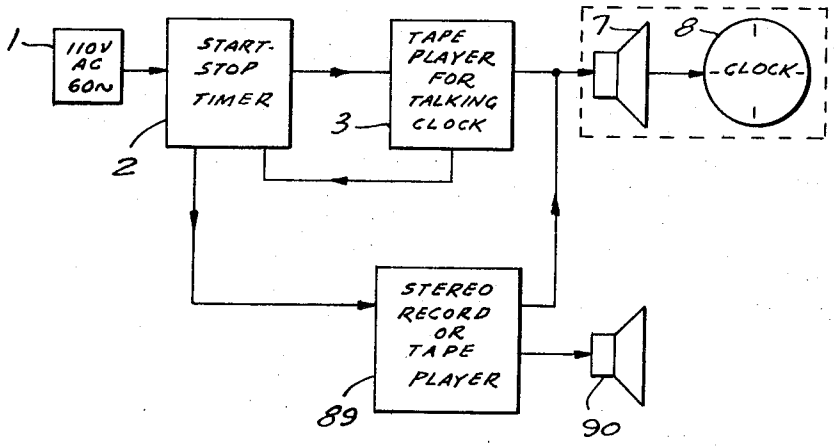


FIG. 10



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TALKING CLOCK APPARATUS

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 12 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 12 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 incroporated 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, quarter-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 10 to 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 15 minutes. A quarter hour frequency requires 96 start/stop cycles per day, or 2,900 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 preprogram 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 therethrough, 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 self-contained batteries, or hand wound, or gravity driven, on the cloth-covered output side of an enclosed speaker system to provide a talking clock.

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 electronic talking clock apparatus in accordance with this invention;

FIG. 2 is a part schematic and part diagrammatic view on a somewhat enlarged scale, of details of the start-stop timer and the tape player of the apparatus depicted in FIG. 1, the view showing a schematic wiring diagram of the control circuit for starting and stopping the tape player;

FIG. 2A is an end view, on a somewhat enlarged scale of the start/stop switch-actuating cam in the control circuit of FIG. 2, taken along the line A—A of FIG. 2, the view also showing, schematically, open and closed positions of the cam-actuated switch in the control circuit;

FIG. 2B is a view in elevation, partly schematic and also on a somewhat enlarged scale, taken along the line B—B of FIG. 2 and showing details of a tape-actuated stop sensing switch embodied in the tape player of FIG. 2, for stopping the tape player as a function of tape displacement;

FIG. 2C is a view similar to that of FIG. 2B but showing a modified form of tape-actuated stop sensing switch;

FIG. 3 is a part schematic and part diagrammatic view of a modified form of the start-stop timer and tape player of FIG. 1, the view showing a schematic wiring diagram of a modified form of control circuit for starting and stopping the tape player, the stopping being effected by all-electronic means;

FIG. 4 is a view similar to that of FIG. 2 but showing a modified form of start-stop control circuit embodying dual tape-actuated stop sensing switches in the tape-player, for over-coming the effects of a stalled or grounded tape;

FIG. 5 is a fragmentary view in plan of a modified form of standard multitrack tape cartridges for use in the talking clock apparatus of this invention;

FIG. 5A is a view in section of the cartridge taken along the line A—A of FIG. 5;

FIGS. 6 and 7 are frontal and top views, respectively, of a modified form of clock unit for use in electronic talking clock apparatus of this invention, the clock unit having a loudspeaker for announcing the time mounted centrally of and back of the clock face;

FIGS. 8 and 9 are frontal and top views, respectively, of a still further modification of talking clock unit for use in a stereophonic electronic talking clock apparatus in accordance with this invention, the unit having dual speakers mounted one on each side of the clock mechanism;

FIG. 10 is a view showing, in block diagram form, an embodiment of a stereophonic electronic talking clock apparatus in accordance with this invention; and,

FIG. 11 is a view showing, in block diagram form, a modified form of electronic talking clock apparatus for starting and stopping various electrically operated devices at selected periodic intervals.

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 detail design as more fully described thereinafter. As tape 4 (FIG. 2) is transported from and to the

continuous repeating tape magazine 5 past the player head 6, sound stored on the tape as a message is reproduced in known manner by the loudspeaker 7 associated with the clock 8. When the tape has been displaced sufficiently to complete the desired stored message, the tape causes a signal to be produced, which signal is sensed by the tape player and fed back 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 detail design of the timer delivers power to the tape player, with automatic stoppage of the latter from a signal produced by the tape itself.

The timer 2 may be a physical integral part of the tape player 3 or may be a separate unit for adaptation to existing tape player, as desired. The tape player, including timer 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 2 preferably comprises an 110V AC 60-cycle 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 microswitch 12 in the input lead 10 through a suitable cam 13 mounted on its output shaft 14. Gearing in a gear box 15 mounted between the armature of motor 9 and the output shaft 14 reduces the speed of the latter to any desired value. When the cam 13 is four lobed, as depicted in FIG. 2A, and the output shaft makes 1 revolution per hour, the four-lobed cam will close the microswitch 12 once very 15 minutes, giving quarter-hourly time signals.

Upon closure of the microswitch 12, power is supplied via the input leads 10 and 11 to operate the tape player drive motor (not shown) for the tape magazine. The tape 4, guided by the capstans or posts 16 and 17, traverses the tape head 6, the message stored on the tape being reproduced by the tape head through the loudspeaker 7. When the tape message is completed a signal generated by the tape closes a solenoid circuit 18, 19 shunted between leads 10 and 11 thus energizing the solenoid coil 20 of a double-pole double-throw relay 21. The solenoid circuit as shown comprises, in series, a first lead 18 connected at one end to power input lead 10 and adapted to be connected at its other end by a tape-actuated stop sensing switch located at the post 17 to one end of a second lead 19, the latter including the solenoid coil 20 having its other end connected to the input lead 11. When energized, the relay 21, by downward movement of its armature 22, opens the normally closed relay contacts 23 in the power input lead 11, stopping the tape player and closes the normally open relay contacts 24 in a latching circuit 25 connecting the leads 18 and 19, latching the relay in its energized state. When the timer cam 13 has advanced sufficiently to reopen the microswitch 12, and hence open the input lead 10, all power to the system is cut off and the relay coil 20 becomes deenergized. The system is then ready to repeat its cycle.

Any type of commercially available tape player may be used, with suitable modification as described herein; i.e., it may be a reel-to-reel type, the four-track and/or eight-track cartridge type, or the smaller cassette type.

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 on the tape, the tape can be made to repeat the time announcement continuously day after day. Since only a stop signal is required, this may be simply done by modifications to the tape player as respects the post 17 as shown in FIG. 2B. This utilizes an aluminum sensing foil 26 similar to that used in some tape players to reverse tape direction.

This system is adapted to existing reel-to-reel machines as shown in FIG. 2 where the tape 4 of the automatic repeating magnetic tape cartridge 5 is shown passing over existing tape guide posts 16 and 17 to guide the tape past the magnetic pickup player head 6. A modification to the post 17 for the purpose of this invention is depicted in FIG. 2B and provides two insulated copper leads or conductors 18 and 19 each having one end bared and looped around the guidepost 17 with insulation 30 separating the bared ends or terminals 28, 29 from the post 17.

Each short strip of electrically conductive aluminum foil 26 is adhesively bonded to the tape surface at a position thereon corresponding to the end of each recorded message. The tape itself is nonconductive. When the aluminum foil strip 26 passes over and bridges the two bared wire terminals 28 and 29, its high conductivity closes the circuit between the leads 18 and 19, energizing the relay coil 20 thereby to open the relay points 23 and stop the tape player, as described above.

When the aluminum foil strip 26 has the proper length in relation to tape speed, it will energize the self-latching relay 21; then, the inertia of the tape transport system, reels, etc., will carry the aluminum foil strip 26 beyond the post 17 and the wire terminals 28, 29, the foil acting as a momentary contact switch, breaking contact and being then in position to repeat the next cycle when the microswitch 12 recloses. Other modifications of this tape-actuated sensing switch are described later.

The use of the aluminum foil strip 26 as the switch means for automatically opening the power input lead 11 offers production problems in applying numerous strips of foil to the tape, which is rather tedious. The foil strip must be suitably aligned with the tape, is fragile and is not easily handled. Also, it adds to the bulk within the automatic repeating magazine. 5.

A preferred method is shown in FIG. 2C. In this arrangement, the post 17 is electrically conductive, with one of the two leads 18 and 19, lead 19 as shown, making an electrical connection with the post. The second lead, lead 18, is, preferably, fashioned of stranded flexible wire, has insulation removed from one end, the bare end strands providing, in effect, a brush 31 making contact with the reverse side of the tape 4. At the required spacing for the message termination, a small and short slot 32 is cut through the tape, preferably on or near the center of the tape width. As the slot 32 in the tape passes between the stranded wire brush 31 and the post 17, electrical contact is made between the brush and post, thus closing the circuit between the leads 18 and 19, energizing the coil 20 to open the relay points 23 in input lead 11 and thereby stop tape motion, as described above. Since the stranded wire brush 31 has substantially greater width than the slot 32, the latter may be offcenter, or, the tape need not be guided with great precision, without losing effectiveness. This, then, greatly simplifies production techniques for producing tape for the purpose of this invention. Since the slot 32 can be quite narrow, no serious loss in tape strength is suffered.

A further modification for producing a signal for stopping the tape 4 is the all-electronic system depicted in FIG. 3. In this system, the tape 4 is provided with successive subaudible stop signals such as, for example, 20-cycle signals, which are prerecorded on the tape at selected intervals. Each such signal is picked up by the playback head 6 and, after passing through suitable filter circuits in a preamplifier 33 so that only the 20-cycle signal remains, is fed to a stop signal amplifier 34 wherein it is amplified and fed via the leads 35, 36 to the coil 37 of a solenoid 38 whose spring-pressed armature 39 normally holds a switch arm 40 in open position as shown in FIG. 3. A first lead 41 connects the power input lead 10 to one terminal 42 of the switch, the other terminal 43 being connected by a second lead 44 through the relay coil 20 to the power input lead 11.

The recorded message of the magnetic tape sound track on the tape 4 is normally picked up by the playback head 6, fed through the preamplifier 33 and power amplifier 45 to the loudspeaker 7 associated with the clock 8. When the recorded message, whether time announcement or otherwise, has ended, the low frequency subaudible stop signal which immediately follows the tape message, passes through the

playback head 6, preamplifier 35 and to the stop signal amplifier 34 for stopping the tape player.

The output from the stop signal amplifier 34 is fed via the leads 35, 36 to the solenoid coil 37 which is energized momentarily and causes armature 39 to move downwardly to connect switch terminals 42, 43 by means of switch arm 40, thereby completing the circuit through relay coil 20, opening the relay contacts 23 to stop the tape player and closing the relay contacts 24 to activate the latching circuit 25. The rest of the cycle operates as described previously.

When the aluminum foil, or the tape slot, system is used, cases may occur where ambient operating conditions may adversely affect the ability of the inertia of the tape transport system to move the aluminum foil or slot away from the electrical terminals on the post 17 as the player mechanism comes to rest. For example, increased friction at low temperatures may cause the tape to stop before the electrical circuit 18, 19 in FIG. 2 is reopened as it should be by the continued tape movement. In this case, the power supply circuit lead 11 to the tape recorder is opened by the relay 21 immediately after the lead 10 is closed by the timer 2 on the intended next cycle, with no message delivered. The talking clock would then remain inoperative. While this condition is not a likely possibility except in extreme environmental conditions, it nevertheless can be avoided by the modification shown in FIG. 4.

In the case of the stalled or grounded tape in which the stop signal (either foil or slot) may keep the circuit 18, 19 closed, this is overcome by adding another relay 51 in series with the first relay 21, as shown in FIG. 4; and by adding a second sensing stop switch (Switch No. 2) on the second post 16 guiding the tape, the second switch being similar in all respects to that shown in FIGS. 2B or 2C. Switch No. 1 of post 17 becomes the first switch the aluminum foil or slot on the tape meets, while Switch No. 2 of post 16 becomes the second switch the aluminum foil or slot meets. In FIG. 4, both relays 21 and 51 are shown in the deenergized state with all circuits open and the player stopped.

The relay 51 may correspond in substantially all respects to the relay 21 and, as depicted in FIG. 4, comprises solenoid coil 50, spring-pressed armature 52, individual pairs of normally open relay contacts 53 and 54. The normally open relay contacts 53 are incorporated in the lead 19 containing the solenoid cell 20 of Relay No. 1.

The sensing stop switch (Switch No. 2) for the post 16 has, after the manner of the sensing stop switch for the post 17, a pair of leads 48 and 49, the first lead 48 being connected at one end to the lead 18 for post 17 and terminating at its other end at the post 16 after the manner of FIGS. 2B and 2C. The second lead 49 is associated at one end with post 16 after the manner of FIGS. 2B or 2C, contains the solenoid coil 50 and is connected at its other end via lead 19 to the power input lead 11. The latching circuit 55 is shunted across the stop switch leads 48, 49.

When the timer cam 13 closes the circuit through input lead 10, the player will operate even though the leads 18, 19 of Switch No. 1 (post 17) are connected by the tape foil strip 26 or through slot 32, because the circuit through lead 19 is open by the normally open contacts 53 of relay 51. Since the player is now operating, the tape signal (foil or slot) moves away from post 17, disconnecting leads 18, 19 and, upon reaching post 16, momentarily connects leads 48, 49 (Switch No. 2) which connection energizes solenoid coil 50. This closes relay contacts 53, making the circuit through lead 19 conductive again. In effect, this "arms" relay 21 so that when the next signal arrives at post 17, the player will stop as previously described. It will be understood that the momentary connection of leads 48, 49 also closes the relay latching circuit 55 by closure of the relay contacts 54, thus maintaining the coil 50 energized until the next stop signal arrives at the post 17.

The upper portion of FIG. 4 shows simple means for bypassing the start/stop timer 2 to permit the use of the tape player 3 for other purposes than the talking clock. As depicted, a manual single-pole, double-throw switch 46 is provided in the lead 10. When the switch is moved to the left, or "Auto Talk Clock" position, the power to the player is supplied through the timer start/stop circuits; when the switch is moved to the right, or "manual" position, the power is supplied through the switch independently of the timer.

In this "manual" position, any standard tape will play uninterruptedly since it would have neither aluminum foil or slots. However, a manual on-off switch 45 may be provided in the lead 18 as shown, to also open the circuit containing Switches No. 1 and No. 2 and thus render their stop system ineffective.

Since the timer synchronous motor 9 will continue to run when the timer microswitch 12 is bypassed by the switch 46, the timer microswitch will continue to be synchronized with the local standard time. To return to the talking clock operation, it is only necessary to reinsert the talking clock tape and operate the tape player 3 with the switch 46 on "manual," until the quarter hour announcement for the quarter which has just passed is being played. The on-off switch should then be closed for automatically stopping the tape in its proper position to make the next announcement for the quarter hour coming up. When the tape has stopped, switch 46 is then returned to "Auto Talk Clock" position.

The continuous loop repeating tape magazine depicted in FIGS. 2, 3 and 4 was used for convenience in describing the control circuits, but the talking clock need not be limited to it. Several types of reel-to-reel tape players may also be used. The player may be one of the older type machines where the tape must be completely rewound before playback can be repeated; or it may be one of the newer types in which the tape will play back in the reverse as well as in the forward direction. In either case, it would never be necessary to remove and interchange reels since sufficient footage is available to operate the clock on just one channel (or two for stereophonic).

Sensing devices needed for these reel-to-reel type players will be required to perform two functions: (1) stop the tape and (2) reverse the tape; and these devices must be mutually exclusive. This can readily be accomplished by the system described herein. For example, a preferred way would be to use the aluminum foil strip 6 (FIG. 2B) as a sensing device for tape reversal since only two would be required; one at each end of the tape. The tape slot 32 (FIG. 2C) would be used as the sensing device for tape stopping, as described, since this would add less bulk to the reel due to the many stops required, and would be considerably less expensive in production. Or, either of the above could be used in combination with a known electronic reversal method, or modified as shown in FIG. 3, for stopping the tape.

Some detailed modifications to the circuitry of FIGS. 2 and 4 would be required which would be obvious to anyone experienced in the art, and thus are not detailed here. This would require, for example, that the sensing device for fast reversal would also include circuitry for making the stop sensing system ineffective during fast reversal. The manual on-off switch 46 of FIG. 4 would then be solenoid-operated during reversal. Or, in the case of playback in either direction, the reversal sensing device, in addition to reversing the direction of tape travel, could also actuate a solenoid-operated double-pole double-throw switch (not shown) to reverse positions of Switch No. 1 and Switch No. 2 in the event the second relay 51 shown in FIG. 4 were used. For the single relay 21 shown in FIG. 2, no such requirement exists.

The four- and/or eight-track cartridge tape players are advantageous for use as talking clocks of this invention. Both use continuously repeating tape magazines, so no reversal is required. Both operate at 3¾ inches per second and can produce a good range of frequency response and good tone quality. Simplicity of insertion and removal of the tape cartridges permits convenient use for playing other tapes when the player is not in use as a talking clock.

At 3¾ inches per second of tape travel, and with 20 seconds for one announcement, the stop signals will be spaced 75 inches (6.25 ft.) apart on the tape. For quarter hour time announcements, 48 announcements are required for a 12-hour

period, requiring 300 feet of tape. Since four-track and eight-track (long play) cartridges have 300 feet of tape, a single track recording would run through twice per day to provide 24 hour service. If desired, a second track may be used to provide both a.m. and p.m. identification.

Stereophonic musical accompaniment or sound effects preceding and/or following each time announcement would then require a minimum of four tracks. The eight-track long play tape could then provide up to 40 seconds for each a.m. and p.m. announcement; or a maximum of 80 seconds if the a.m. and p.m. identification were dropped.

The simplest modification when using the cartridge tape and player system is to use the four-track or the eight-track long play cartridge, both of which have 300 feet of tape. By omitting the a.m. and p.m. identification, 24-hour talking clock announcements can be obtained without the necessity of changing tracks. No additional components are required. The track shift switch now incorporated in conventional tape cartridges would simply be rewired so as to omit the track shift operation and instead used with aluminum foil strips to stop the tape player, using leads **18**, **19** in FIGS. **2** and **4**.

However, in accordance with this invention, if more footage is desired in the tape cartridge, it may be obtained by preserving the track shift operation, using a track-shift-sensing switch and aluminum foil as at present; and adding the slotted tape and a second sensing switch for stopping the tape, all as is more fully depicted in FIGS. **5** and **5A**.

To this end and referring now more particularly to FIGS. **5** and **5A**, cartridge tape player **59** has tape cartridge **60** installed therein in operative relation to the tape player pickup head **61**. Tape **62** as shown is a portion of a conventional continuous loop repeating tape magazine (not shown) packaged within the cartridge. The tape travels from the magazine in the direction of the arrows around the guidepost **63** past the tape player track shift switch **64**, pickup head **61** and thence around the guidepost **65** back to the magazine. Transport of the tape is effected in conventional manner as by means of a set of power-driven pulleys **66** and **67** of the tape player, these pulleys frictionally engaging the tape at directly opposite sides and imparting the necessary driving tension to the tape.

A partition **68** of the cartridge provides a compartment **69** containing a layer **70** of sponge-rubber or other suitable resilient material providing a resilient cushion which conventionally backs up the tape **62** only. In accordance with this invention however, an electrically conductive metal sheet **71** of copper or other suitable conductive material is positioned within the compartment **69** between the cushion layer **70** and the tape.

The metal sheet **71** extends below the lower edge of the tape **62**. As seen in FIG **5A**, the right hand face of this extension provides an electrical contact area **72** which engages and makes electrical contact with the bared wire end portion **73** of an insulated terminal **74** of an automatic stop sensing switch **75** built into the tape player. A second insulated terminal **76** of the switch **75** also has a bared wire end portion **77** which is in wiping engagement with the front surface of the tape **62**.

The bared wire and portions **73** and **77** of terminals **74** and **76** respectively are, preferably, of stranded copper wire. The bared end portion **73** of the terminal **74** is located approximately at the tape centerline so that when a "stop" slot, such as the slot **32** in the tape, appears, the small flexible strands of the bared end portion **77** will deflect into the slot, make contact with the conductive sheet **71**, and complete the stop circuit through the sheet and the terminal **74**. The stop signal may be fed to the terminals **74** and **76** to a start-stop timer, such as the timer **2** depicted in FIG. **2**, to stop the tape player.

It will be apparent that, since the terminal **74** is placed below the tape and clears the tape width entirely, it will never make contact with the tape surface. It will also be apparent that when an aluminum foil track shift strip such as the strip **26**, appears under the terminal end portion **77**, it is unable to complete the "stop" circuit since the second terminal **74** is not in contact with the tape.

The auto track shift sensing switch **64** is provided in usual fashion with two terminals **78** and **79** electrically insulated from each other and bearing on the surface of the tape **62**. These terminals are rigid, compared to the flexible stranded end portions **73** and **77** of the terminals **74** and **76**, respectively, and traverse the full width of the tape. Hence, when the aluminum foil strip **26** on the tape appears and bridges the terminals **78** and **79**, it closes the circuit for shifting the pickup head **61** to the appropriate new track position. On the other hand, it will be apparent that when the tape slot **32** passes the track shift switch **64**, the two terminals **78** and **79** are unable to make contact with the conductive sheet **71** behind the tape since they are separated from the sheet by the tape. Test with standard eight-track tape have shown that the circuit remains open even with 110-volt alternating current applied to the track shift switch **64**. Advantageously, even if this became a problem when extremely thin tapes are used, the switch **64** may be provided with a small recess (not shown) bridging the "stop" slot **32** in the tape. This will provide additional clearance with respect to the conductive sheet **71**, and still provide generous contact with the aluminum foil strip **26** for closing the shift circuit. Thus, the two electrical systems, that is, the "stop" circuit comprising the stop sensing switch **75** and metal plate **71** and the "shift" circuit comprising the track shift switch **64** and a bridging aluminum foil strip **26**, are mutually exclusive.

The operation of a talking clock by a cassette-type tape players can also be accomplished in a manner very similar to the continuous loop cartridge-type player described above.

FIGS. **6** and **7** show one embodiment of a talking clock which combines visual display of the time in combination with a loudspeaker which announces the time at periodic intervals. The speaker cone **80** is centrally mounted behind the clock face **81**, with the clock mechanism **82** easily nested within the cone of the loudspeaker. A conventional cloth cover **83** permits transmission of sound waves through the central opening of the clock.

In FIGS. **8** and **9** there is depicted another embodiment of talking clock of this invention which combines visual display of the time with a stereophonic speaker system for combining longplaying stereophonic music or other stereophonic effects, such as chimes, bird calls, etc., with periodic time announcements. As embodied, two speaker systems **84** and **85** are mounted behind the clock face **86**, one on each side of the clock mechanism **87**. A conventional cloth cover **88** is provided over each speaker opening.

In FIG. **10** there is depicted in block diagram form still another embodiment of the talking clock apparatus of this invention which combines visual display of the time with a loudspeaker which announces time at periodic intervals and utilizes the loudspeaker in conjunction with a second longplaying stereo record player or tape player to supply background music or the like between announcements. As embodied, the start/stop timer **2** selectively energizes two tape players **3** and **89**, tape player **3** giving time announcements as before and the second player **89** being a longplaying stereo record or tape player which is started by the timer **2** in the period between time announcements to supply background stereophonic music and the like through speaker **7** and a second speaker **90**. This modification to the timer **2** to accomplish this is straightforward and obvious to persons having ordinary skill in this art.

In FIG. **11** there is depicted in block diagram form a still further embodiment of this invention again combining visual display of the time with periodic time announcements and also serving to activate auxiliary devices such as a radio, TV, multiple speakers in other rooms and the like, at selected times. As embodied, the start/stop timer **2** is a multiple cam timer provided with ancillary control mechanisms (not shown) such as additional cams driven at different speeds, additional microswitches, etc., whereby other devices may be automatically operated hourly, daily, weekly, or whatever desired time period. For example, hourly news or other programs through

radio **91** and/or TV **92** can be automatically turned on by the timer **2**, and turned off by time relays **93** and **94**, respectively, which would be sufficiently accurate for the purpose. Also, multiple speakers **93** and **94** may be used at the output end of the tape player for use in other rooms, or other areas of large building, as shown. Moreover, by this embodiment, the talking clock may be used as a wakeup alarm, in which case the timer **2** may be set to turn off the speakers **7**, **93** and **94** of the clock **8** by means of the solenoid-operated on-off switch **95** and then reactivating it automatically to start the time announcements again at the time it is desired to wakeup.

What is claimed is:

1. Talking clock apparatus comprising, in combination: a tape player including a loudspeaker, for use with tape having time announcements sequentially prerecorded thereon at timed periodic intervals, said tape player having a power input circuit for connection to a power source of constant frequency alternating current; and, timer means keyed to said frequency, for starting said player, said timer means comprising time-responsive start switch means in said input circuit for closing said circuit to start said player at timed periodic intervals at which said prerecorded time announcements will be reproduced by said player in synchronism with the local standard time, and said timer means also comprising stop switch means responsive to displacement of said tape through said player, for opening said circuit at the completion of each said announcement, in which said power input circuit comprises a pair of power input leads and in which said stop switch means comprises a relay having a solenoid coil in circuit between said power input leads and having closed relay contacts in said power input circuit for opening said circuit in response to a signal generated by said tape, solenoid actuated switch means having normally open contacts in said solenoid coil circuit, for closing said circuit upon signal, and amplifier means associated with said tape player for supplying subaudible actuating signal generated by displacement of said tape through said tape player to activate said solenoid actuated switch means.

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