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(54) **Radio-controlled toy.**

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Description

The present invention relates to a radio-controlled toy, comprising:
a) a transmitter, and
b) a toy body capable of one or a combination of movements,
wherein the transmitter includes
(i) switches for inputting instructions for the one or a combination of movements of the toy body, and
(ii) movement signal generating device for producing output signals,
wherein the toy body includes
(i) receiver for receiving each output signal from the movement signal generating device,
(ii) motors for effecting the one or a combination of movements of the toy body, and
wherein the radio-controlled toy comprises
(iv) recording means for recording each output signal.
It performs various movements corresponding to instruction transmitted from a transmitter.

The DE—A—30 08 604 includes a toy vehicle that is remote controlled by a transmitter that stores motion control programs corresponding to several different movements. Preset programs or movements are activated by the user depressing a corresponding key on the transmitter. The fixed movements can be stored in removable memory modules. Changeable programs can be entered by the user and stored for various movements and recalled by depressing a start key. The changeable programs entered by the user are also stored in a memory. The particular type of memory used for storing the changeable programs is not identified. Each program is stored as a series of pulses and is used to modulate a high frequency carrier. That is, the stored program of digital bits causes the carrier to the broadcast at one of two frequencies. The length of the pulses appears to be the method of information encoding. The vehicle apparently decodes the digital signal by pulse length to perform the desired movement. Since no unusual power supplies are described it must be assumed that the memory for storing the changeable program is a volatile RAM which looses its contents when the power is turned off. When the user (a child) turns off the toy or when the batteries are exhausted the toy will lose its program. Such a loss is important in a situation where a child wants to show his parents the robot movements, but the parents cannot see the movements immediately and the child is disappointed when the program is lost when the toy is turned off or the batteries are exhausted. Because the movements by this known device are transmitted digitally based on pulse length, the toy requires a complex decoder along with the complex button encoder memories in the transmitter, thereby increasing the cost of the toy.

DE—A—19 54 108 is directed to a remote control toy that uses a single transmitting frequency to send control information from several different channels. The system transmits the control information by turning on and turning off the single transmit frequency where the length of each on period encodes the control information. The receiver determines the transmission time and thus decodes the control information. This reference discusses devices which transmit several types of control information simultaneously using several different frequency channels at the same time requiring a broad bandwidth for the total signal.

DE—A—30 09 040 discloses a remote control toy which uses different channels to transmit control information and sound signals into the transmitter by a microphone. A sound channel is dedicated to audio and tone type signals while the control channel is dedicated to pulse type control signals. The control signals are pulse signals produced by a pulse processor before being transmitted and the received pulses are decoded by a remote control decoder. No disclosure is provided with respect to how the pulses encode the control information.

An object of the present invention is to provide a radio controlled toy which can perform a larger number of movements without complex construction and which has functions to memorize an optional number of movements and perform the movements repeatedly whenever desired.

According to the present radio-controlled toy the movement signal generating device is provided for producing pulsed output signals transmitted over a single channel, each of which has a different pulsed frequency corresponding to the one or a combination of movements which are input from said switches for inputting instructions, the output signal being pulsed at only one frequency for each movement or combination of movements, that the toy body includes a control signal generating device feeding one or more control signals corresponding to the frequency of each output signal received by the receiver to the motors and in that the recording means which is encluded in the toy body is provided for recording each output signal received by the receiver in response to the one or more control signals from the control signal generating device, the recorder feeds each recorded output signal to the control signal generating device, which in turn, feeds the one or more control signals to the respective motors.

The present invention turns the carrier on and off at different frequencies for different movements or combinations of movements. The on and off periods are constant and the frequency of the signal during the on period carries the movement controlling information. Only one pulse frequency is transmitted at a time. That is, the combination of commands is encoded in a single pulse frequency. Because only a single channel is used to transmit a single frequency each time a single movement or a combination movement is sent a broad bandwidth channel is not required.

Fig. 1 is a perspective view, illustrating the preferred embodiment of the toy body according to the present invention;

Fig. 2 is a bottom view, illustrating particularly the drive portion of the toy body;

Fig. 3 is a perspective view, illustrating the transmitter;

Fig. 4 is a schematic diagram, illustrating the movement signal generating device; and

Fig. 5 is a circuit diagram, illustrating primarily the receiver, etc. accommodated in the toy body shown in Fig. 1.

The present device is explained below with reference to the accompanying drawings.

Figs. 1 and 2 illustrate a perspective view of the preferred embodiment of a radio-controlled robot toy according to the present invention and the bottom view thereof, respectively. The robot toy 1 comprises a toy body 3 having a bottom portion 2 with a shape similar to a rectangular box, two arms 4L and 4R secured to the toy body 3 at right and left sides, respectively, a head portion 5 provided on the upper surface of the toy body 3 and a semispherical transparent cover 6 with which the head portion 5 is covered.

As shown in Fig. 2, a drive mechanism is provided including three pairs of running wheels 7L and 7R, 8L and 8R, and 9L and 9R which are rotatably mounted to the bottom portion 2 by axles 10, respectively, from front to back. The middle and rear wheels 8L, 8R, 9L and 9R are right and left driving wheels which are individually rotatably driven by a right and left pair of motors 12L and 12R mounted in a central gear box 11, respectively.

As shown in Fig. 1, the toy body 3 has an opening at the lower part of the front which protrudes forward. A cassette tape recorder 21 is accommodated through the opening. The tape recorder 21 is provided as a recording device for memorizing the movements to be performed by the robot toy 1 and performing the movements repeatedly as mentioned below. The tape recorder 21 is constructed so as to receive a cassette tape cartridge 22 at the upper surface thereof. When the cassette tape cartridge 22 is to be inserted or removed, the tape recorder 21 is pulled out frontward. Push button switches 23 through 28 for Halt, Record, Rewinding, Fast Winding, Reproduction and Pose (temporary halt), respectively, are disposed on the front surface of the tape recorder 21. When the toy 1 is moving, the tape recorder 21 is accommodated within the toy body 3 and hence, the front of the tape recorder 21 becomes a part of the front of the toy body 3.

At the upper portion of the front of the toy body 3, there are disposed: a time display portion 31, e.g., a digital readout; a group of switches 32 for setting time, etc. of a timer device mentioned later; an electric source slide switch 33 for effecting "power on/off" states and a timer mode; push button switches 34, 35 and 36 for making the toy body 3 perform movements in any of the modes of radio-control (RC), memory (PRG) and tape record (TR), respectively; and a slide switch 37 for releasing the above-mentioned tape recorder 21 from accommodation within the toy body 3. Movements concerning these various switches will be discussed later in detail. A receiving antenna 38 extends upward from the rear side of the toy body 3.

Two eyes 39L and 39R made of a light transmitting material are provided on the front surface of the head portion 5 of the toy body 3. In addition, illuminants 40L and 40R (Fig. 5) are disposed inside of the eyes 39L and 39R, respectively, for flickering the eyes at the same time as the sound producing movement mentioned below occurs.

The robot toy 1 shown in the drawings performs the various movements of "GO AHEAD", "GO BACK", "TURN TO THE RIGHT", "TURN TO THE LEFT", "TAPE CONTROL", "SOUND A", "SOUND B", and "VOICE" in response to the movement instructions transmitted from a transmitter 50 as shown in Fig. 3. Among these movements, "GO AHEAD", "GO BACK", "TURN TO THE RIGHT", and "TURN TO THE LEFT" are running movements; "TAPE CONTROL" is a movement to drive or halt the tape of the tape recorder 21; "SOUND A" and "SOUND B" are movements to produce predetermined robot sounds from a sound producing portion mentioned later; and "VOICE" means that each of the above-mentioned movements is halted, and the voice of an operator transmitted through a wireless microphone 62 built into the transmitter 50 is reproduced by a sound producing portion (a speaker built into the tape recorder 21 in the embodiments shown in the drawings) of the toy robot 1. Mechanisms for performing these movements are explained below.

First, the transmitter 50 is provided on its front with: a lever 60 for turning on or off four input switches 51, 52, 53 and 54 (Fig. 4) to determine the running direction of the toy body 3; push button input switches 55, 56, 57 and 58 for instructing movements of VOICE, TAPE CONTROL, SOUND A and SOUND B, respectively; an electric source switch 59; a pilot lamp 61 which is turned on when the electric source switch 59 is turned on, and a microphone 61. The transmitter 50 has a transmitting antenna 63 on its upper surface.

Inside of the transmitter 50 is accommodated a movement signal generating device 64 which outputs a movement signal having a predetermined frequency in response to on/off selection of the above-mentioned input switches 51 through 58 together with the other necessary circuit elements, as shown in Fig. 4. The movement signal generating device 64 comprises a one-chip microcomputer (CPU) having predetermined input and output ports, i.e., eight input port Nos. 1 to 8, being operatively connected to the input switches 51 through 58, respectively. The movement signal generating device 64 is programmed so as to transmit to the frequency output port a pulse signal having a frequency set as shown in the following Table in response to the input (movement instruction) when one or more switches among the input switches 51 through 58 are turned on.

TABLE

Input port of transmitter

	Frequency (Hz)															
	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	4200	4400	4600
1 GO AHEAD	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0
2 TURN TO THE RIGHT	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
3 GO BACK	0	0	1	0	0	0	0	0	0	0	1	1	1	0	0	0
4 TURN TO THE LEFT	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0
5 VOICE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
6 TAPE	0	0	0	0	1	0	0	1	0	0	1	0	0	1	1	0
7 SOUND A	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	0
8 SOUND B	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0

Output port of receiver

	Frequency (Hz)															
	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	4200	4400	4600
1)) LEFT MOTOR	1	1	0	0	0	0	0	1	1	1	0	0	0	1	0	0
2)	0	0	1	1	0	0	0	0	0	0	1	1	1	0	1	0
3)) RIGHT MOTOR	1	0	0	1	0	0	0	1	1	1	0	0	0	0	1	0
4)	0	1	1	0	0	0	0	0	0	0	1	1	1	1	0	0
5 VOICE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
6 TAPE	0	0	0	0	1	0	0	1	0	0	1	0	0	1	0	0
7 SOUND A	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	0
8 SOUND B	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0

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In the above Table, for example, when the input switch 52 is turned on (instruction for "TURN TO THE RIGHT"), "1" is input to the input port No. 2 of the CPU, thereby outputting "1800 Hz". When the input switches 51 and 57 are turned on together "ROBOT SOUND A" is produced with the movement of "GO AHEAD"), "1" is input to the input port Nos. 1 and 7 of the CPU, thereby outputting "3200 Hz".

On the other hand, inside of the toy body 3, there is accommodated, as shown in Fig. 5, a circuit comprising: a receiver 71; a control signal generating device 72; the above-mentioned running motors 12L (also referenced as M1) and 12R (also referenced as M2); a circuit portion 73 of the tape recorder 21; a timer device 74; the time display portion 31; the group of switches 32 of the timer device 74; the slide switch 33; the push button switches 34, 35 and 36 which are disposed on the upper part of the front of the toy body 3; and the light emitting diodes 40L and 40R.

The frequency signal received by the receiver 71 in the circuit of Fig. 5 is input to a switching circuit 75 and a gate 76. Here, the signals sent from the radio-control switch 34, the memory switch 35 and the recording switch 24 of the tape recorder 21 when the respective switches are pushed are referred to as RC, PRG and R, respectively, and a voice mode changing signal from the control signal generating device 72 is referred to as V0. The switching circuit 75 is constituted so as to transmit the frequency signal from the receiver 71 into a mixing circuit 92 of the tape recorder 21 when both of RC and V0 are input or when both of PRG and R are input. On the other hand, the gate 76 is constituted so as to open and transmit the frequency signal into the input port of the control signal generating device 72 when R is input. Between the memory switch 35 and the input port of the control signal generating device 72, there is connected a second gate 77 which opens when the gate 76 closes. More particularly, the recording switch 24 is not pushed, and when the memory switch 35 is not pushed (shown in full line), the frequency signal is input into the control signal generating device 72 through the gate 77.

The control signal generating device 72 comprises a one-chip microcomputer having the same predetermined input and output ports as the above-mentioned movement signal generating device 64. The control signal generating device 72 outputs the following control signals to each of eight output port Nos. 1 to 8 in response to the frequency of the signal fed to the input port.

First, output port Nos. 1 and 2 are connected to a drive circuit 78 of the above-mentioned left wheel driving motor 12L, and output port Nos. 3 and 4 are connected to a drive circuit 79 of the right wheel driving motor 12R. Each of the drive circuits 78 and 79 is constituted so as to rotate normally each of the motors 12L and 12R, i.e., in the direction in which the toy body 3 moves forward. When one of the two output ports, in this case output port Nos. 1 and 3, outputs "1" and one of the other output port Nos. 2 and 4 outputs "0", each of the motors 12L and 12R rotates in the opposite direction, i.e., in the direction in which the toy body 3 moves backward. Such a motor driving circuit is known.

Output port No. 5 outputs a voide mode changing signal which is fed to the above-mentioned switching circuit 75 and to a normally open relay 81 via an amplifier 80. The contact point of the feed relay 81 is connected to a speaker 82 of the tape recorder 21.

Furthermore, the output port Nos. 6 through 8 are connected to the timer device 74 and feed output signals to direct the movements of the tape drive, the production of robot SOUND A and the production of robot SOUND B, respectively.

The timer device 74 comprises a known large scale integrated circuit (LSI), usually used with watches, for driving the time display portion 31 having a liquid crystal display. The LSI has a function which displays time in response to each switch input of the group of switches 32 or which generates a predetermined signal or an alarm sound when a properly set time arrives.

With regard to the robot toy 1 shown in the drawings, the movement of the timer device 74 is controlled by a control signal from the control signal generating device 72. More specifically, when output port No. 6 outputs "1", a signal to close a normally open relay 84 provided at an electrical supply line to a motor 83 of the tape recorder 21 is output. When output port No. 7 outputs "1", an alarm sound signal having a predetermined frequency is sent to an output port connected to a small-sized sound producing means 85 such as a piezoelectric buzzer in accordance with an alarm sound producing program. Further, when output port No. 8 outputs "1", an alarm sound signal having a frequency other than the above-mentioned frequency is sent to the same output port in accordance with the same alarm sound producing program. These alarm sound signals (hereinafter, referred to as S) are also fed to an illuminant flickering circuit mentioned later.

The corresponding relation of the above-mentioned frequency signal input into the control signal generating device 72 determined as mentioned above to the output from each output port is as shown in the above Table.

Referring in greater detail to the structure of the above-mentioned preferred embodiment, when the signal of "1800 Hz" (instruction for "TURN TO THE RIGHT") is received, the output port Nos. 1 and 4 of the control signal generating device 72 output "1". Therefore, the left side motor 12L rotates normally and the right side motor 12R rotates in the reverse direction, resulting in rotation of the toy body 3 to the right. Further, when the signal of "3200 Hz" (instructions for movement of making "ROBOT SOUND A" with "GO AHEAD") is received, the output port Nos. 1 and 3 of the control signal generating device 72 output "1". Therefore, both the right and left motors 12R and 12L, respectively, rotate normally and the timer device 74 outputs the alarm sound signal S, so that the toy body 3 goes ahead while the sound producing means is

producing a predetermined robot sound (alarm sound usually associated with a watch). At this time, both of the eyes 39L and 39R flicker.

The circuit portion 73 of the tape recorder comprises a preamplifier 91, a mixing circuit 92 and a main amplifier 93 which send a signal to the speaker 82 to generate a voice. In this robot toy 1, when the radio-control (RC) switch 34 is pushed and the voice mode switching signal (VO) is output as mentioned above, or when the memory (PRG) mode switch 35 and the recording (R) switch 24 are pushed, the output from the receiver 71 is input to the mixing circuit 92 through the switching circuit 75. On the other hand, when the memory mode switch 35 is not pushed, the signal $\overline{(PRG)}$ of the electric source voltage is added to the third gate circuit 86 via this switch 35. The gate circuit 86 is provided between a microphone terminal to which a microphone 94 is connected, if necessary, and the mixing circuit 92, and is constituted so as to send the voice signal input through the microphone 94 to the mixing circuit 92 when the above-mentioned signal $\overline{(PRG)}$ is applied. A motor driving switch 95 interlocked with the respective switches for sound recording, sound reproduction and the like is provided in the electrical supply line to the motor 83.

Finally, the illuminants 40L and 40R disposed in the robot eyes 39L and 39R, respectively, are connected to the electric source Vdd and a transistor 96 in series. Since the output of the main amplifier 93 of the tape recorder 21 or the (+) side voltage of the alarm signal S output from the above-mentioned timer device 74 is applied intermittently via a diode 97 and a resistor 98 connected to the base of the transistor 96, the two illuminants 40L and 40R flicker simultaneously.

The movements of the radio-controlled robot toy 1 shown in the drawings and described above are as follows:

1. Radio-control mode (RC)

First, if the slide switch 33 for the electric source, which is positioned on the front surface of the toy body 3 of the robot toy 1, is turned on and the RC switch 34 is then pushed, the two interlocked, movable contact points are changed as shown with dotted lines in Fig. 5. Therefore, the electric source voltage Vdd applied to the RC switch 34 via the electric source slide switch 33 is fed to the receiver 71 and to the switching circuit 75 as the above-mentioned RC signal.

Then, if the switch lever 60 on the transmitter 50 is operated, any of the four frequencies from 1600 Hz to 2200 Hz as shown in the Table is transmitted. At this time, in the robot toy 1, the memory switch 35 and the sound recording switch 24 are present in the full line positions of Fig. 5, and hence none of the above-mentioned signals PRG and V0 are generated and the signal V0 from the control signal generating device 72 is not output either. Therefore, the frequency signal received by the receiver 71 is input to the control signal generating device 72 through the memory switch 35 and the second gate circuit 77 without passing through the switching circuit 75 and the gate circuit 76. The control signal generating device 72 outputs at output port Nos. 1 through 4 corresponding to the frequency of the input signal. Thus, the left and right motors 12L and 12R rotate forward or backward, so that the toy body 3 is made to move in the direction instructed by the lever 60 of the transmitter 50.

On the other hand, if the sound producing switch 57 or 58 is pushed, the frequency of 2600 Hz or 2800 Hz is transmitted. In the robot toy 1, the control signal generating device 72 outputs at output port No. 7 or No. 8 corresponding to the frequency signal. The timer device 74 sends the alarm sound signal S corresponding to each frequency to the sound producing portion 85 to generate the "ROBOT SOUND A" or "ROBOT SOUND B" and makes the transistor 96 for turning on the illuminants 40L and 40R turn on and off to flicker the robot eyes 39L and 39R, respectively. Moreover, if the sound producing switch 57 or 58 is pushed when the switch lever 60 of the transmitter 50 is moved back and forth, the frequency of 3200 Hz, 3400 Hz, 3800 Hz or 4000 Hz is transmitted. Hence, the control signal generating device 72 outputs at output port Nos. 1 through 4 and to any of output port Nos. 8 and 9. The left and right motors 12L and 12R are rotated and, at the same time, the robot sound is generated and the eyes 39L and 39R are flickered by respective outputs.

Next, if the voice changing switch 55 is pushed, the frequency of 4600 Hz is transmitted. When this frequency signal is input to the control signal generating device 72 through the gate circuit 76 from the receiver 71, "1" is output to output port No. 5 to turn on the feed relay 81 to the speaker 82 and to feed the switching circuit 75 as the above-mentioned signal V0. Thereafter, the control signal generating device 72 does not receive any frequency signal except the frequency of 4600 Hz.

Then, if a voice is input through the microphone 62 of the transmitter 50, the voice signal is transmitted and sent to the switching circuit 75 from the receiver 71. At this time, as the two signals RC and V0 have been applied to the switching circuit 75, the above-mentioned voice signal is input to the mixing circuit 92 via the switching circuit 75, amplified by the main amplifier 93 and is output from the speaker 82 as a voice. Thus, when the voice changing switch 55 is pushed, it can be used as a wireless microphone.

2. Memorization mode (PRG)

When the electric source slide switch 33 is turned on and the PRG switch is pushed, the four interlocked, movable contact points associated with switch 35 are changed to the positions shown by dotted lines in Fig. 5 and, at the same time, the RC switch 34 is returned to the position shown by the full line. Therefore, the electric source voltage Vdd which is applied to the PRG switch 35 via the electric source slide switch 33 is fed to the receiver 71 and is also fed to the switching circuit 75 as the PRG signal. When

the sound recording button 24 of the tape recorder 21 is pushed to prepare for recording, the electric source voltage Vdd is fed to the switching circuit 75 and the gate circuit 76 as the above-mentioned signal R. As the motor driving switch 95 to the motor 83 is turned on by interlocking therewith, the tape of the cassette tape cartridge 22 begins to turn.

If the switch lever 60 for running the transmitter 50 is operated under these conditions, the frequence of 3000 Hz, 3600 Hz, 4200 Hz or 4400 Hz is transmitted. The frequency signal received by the receiver 71 of the robot toy 1 is fed to a sound recording head 99, through the mixing circuit 92, to the main amplifier 93, to the sound recording switch 24 from the switching circuit 75 and is recorded on the tape successively. On the other hand, the control signal generating device 72 outputs "1" at output port Nos. 1 through 4 in response to the frequency input and the left and right motors 12L and 12R are rotated by the respective outputs. At this time, "1" is output also to output port No. 6, and hence the timer device 74 outputs a signal to close the relay 84. However, the motor 83 is not effected by the opening and closing of the relay 84 because it is electrically supplied via RC switch 34. Thus, the toy body 3 memorizes the movement while moving. This memorizing movement is finished by halting the toy body 3 and pushing the halt button 23 to stop the tape from turning.

3. Reproduction of the memorized movements mode (automatic operation)

After the completion of the memorization mode described above in Section 2, if the sound reproduction (play) button 27 of the tape recorder 21 is pushed, the condition of the sound recording switch 24 becomes as shown in Fig. 5. At the same time, the tape begins to move and the movement recorded on the tape is input to the control signal generating device 72 through the preamplifier 91, the PRG switch 35 and the second gate circuit 77 from the tape head 99. Accordingly, the control signal generating device 72 outputs in the same manner as described above in Section 2 in response to the frequency of the input signal to make the toy body 3 move automatically.

4. Tape recorder movement mode (TR)

When the TR switch 36 of the robot toy 1 is pushed, the RC switch 34 and the PRG switch 35 are returned to the initial unpushed condition (positions shown by the full line in Fig. 5) and, at the same time, the electrical supply line from the electric source slide switch 33 to the control signal generating device 72 is cut off. This is done because the movement of the control signal generating device 72 is not needed when the tape recorder 21 is used and because the influence of noise or the like can be eliminated. The third gate circuit 86 is then able to send an audio signal from the microphone 94 to the mixing circuit 92. Therefore, the tape recorder 21 can be used as a usual tape recorder without any relation to the operation of the robot toy 1.

5. Timer mode

When the electric source switch 33 is set at the timer position, i.e., the far right, it becomes impossible to carry out the radio-control operation from the transmitter 50 because the electrical supply to the receiver 71 is cut off. In this case, an optional time is previously set by properly operating the group of the switches 32 on the front of the toy body 3 of the robot toy 1, and then the sound reproduction (play) button 27 of the tape recorder 21 is pushed. Thus, as the timer device 74 causes the relay 84 to be turned on when the preselected time comes, the tape starts rotation whereby the robot toy can be made to reproduce the memory (automatic operation) and perform the movements described above in Section 3.

As mentioned above, according to the radio-controlled robot toy 1 of the present invention, one of a plurality of frequency signals, each signal having a different frequency corresponding to one movement or a combination of two or more movements, is transmitted by a transmitter in response to one or more movements which are input at the same time from movement instructing switches on the transmitter. The toy body 3 includes a receiver for generating one or more control signals corresponding to the frequency of the received signal. Therefore, a small number of signals can distinguish each individual movement even if the number of the movements increases, and hence it is possible to avoid the conventional complexity usually associated with the construction of a signal generating device. Moreover, even if recording is carried out by storage means such as a magnetic tape, it is difficult to obtain accurate storage of the signal. However, with the present invention, the frequency of the signal can be reliably read at the time of reproduction. Accordingly, it is possible to record the movements in a storage device such as a tape recorder provided in a toy body and to reproduce the recorded movements for enjoying automatic operation whenever desired.

Claims

1. A radio-controlled toy, comprising:

a) a transmitter (50); and

b) a toy body (3) capable of one or a combination of movements

wherein the transmitter (50) includes

(i) switches (58—58) for inputting instructions for the one or a combination of movements of the toy body (3), and

(ii) movement signal generating device (64) for producing output signals,
wherein the toy body (3) includes
(i) receiver (71) for receiving each output signal from the movement signal generating device (64),
(ii) motors (7L, 7R, 8L, 8R, 9L, 9R, 10, 11, 12L, 12R, 78 and 79) for effecting the one or a combination of movements of the toy body (3), and
wherein the radio-controlled toy comprises
(iv) recording means (21, 22—73, 24, 40L, 40R, 82, 83, 86, 91—99) for recording each output signal,
characterized in that the movement signal generating device (64) is provided for producing pulsed output signals transmitted over a single channel, each of which has a different pulsed frequency corresponding to the one or a combination of movements which are input from said switches (51—58) for inputting instructions, the output signal being pulsed at only one frequency for each movement or combination of movements, that the toy body (3) includes a control signal generating device (72) feeding one or more control signals corresponding to the frequency of each output signal received by the receiver to the motors (7L, 7R, 8L, 8R, 9L, 9R, 10, 11, 12L, 12R, 78 and 79) and in that the recording means (21, 22—73, 24, 40L, 40R, 82, 83, 86, 91—99) which is encluded in the toy body (3) is provided for recording each output signal received by the receiver (71) in response to the one or more control signals from the control signal generating device (72), the recorder (21, 22—73, 24, 40L, 40R, 82, 86—91—99) feeds each recorded output signal to the control signal generating device (72), which in turn, feeds the one or more control signals to the respective motors (7L, 7R, 8L, 8R, 9L, 9R, 10, 11, 12L, 12R, 78 and 79).

2. The radio-controlled toy as recited in claim 1, wherein the recording means (21, 22—73—24, 40L, 40R, 82, 83, 86, 91—99) comprises:
a tape recorder (21—73—24, 40L, 40R, 82, 83, 86, 91—99), operation of which is controlled by the one or more control signals from the control signal generating device (72).

3. The radio-controlled toy as recited in claim 2, wherein the toy body (3) further comprises:
(i) a time setting switch (32), and
(ii) a time display portion (31), and
(iii) a timer device (74) which produces an output signal for starting the tape recorder (21, 22—73—24, 40L, 40R, 82, 83, 86, 91—99) to feed each recorded control signal at a predetermined time.

4. The radio controlled toy as recited in claims 1 or 2, wherein the toy body (3) further comprises:
(a) first sound producing means (24, 91, 92, 93 and 99) for outputting a stored audio signal corresponding to the one or more control signal from the control signal generating device (72), and
(b) a speaker (82) for converting the output audio signal into a voice.

5. The radio-controlled toy as recited in claim 4, wherein said timer means (31, 32 and 74) is provided for outputting an alarm sound signal at the same time as the first sound producing means (24, 91, 92, 93 and 99) outputs the stored audio signal.

6. The radio-controlled toy as recited in claim 4, wherein the transmitter further comprises a microphone (62), wherein, when the receiver (71) receives an output signal corresponding to one or a combination of movements, the control signal generating device (72) outputs a control signal for feeding only an audio signal from the microphone (62) and into the speaker (82) without accepting any other of the one or a combination of movements.

7. The radio-controlled toy as recited in claim 1, wherein each movement is indicated by at least two pulse frequencies and combination movements are indicated by a pulse frequency in common between the combination only the lowest frequency being transmitted when only a single movement is to be made and only the common frequency being transmitted when a combination movement is to be made.

Patentansprüche

1. Funkgesteuertes Spielzeug mit
a) einem Sender (50) und
b) einem Spielzeugkörper (3), der zur Ausführung einer Bewegung oder einer Kombination von Bewegungen geeignet ist,
wobei der Sender (50)
I) Schalter (51—58) zur Eingabe von Befehlen für eine Bewegung oder für eine Kombination von Bewegungen des Spielzeugkörpers (3), und
II) eine Bewegungssignalerzeugungseinrichtung (64) zur Erzeugung von Ausgabesignalen enthält, wobei der Spielzeugkörper (3)
I) Empfänger (71) zum Empfang jedes Ausgabesignals von der Bewegungssignalerzeugungseinrichtung (64), und
II) Motoren (7L, 7R, 8L, 8R, 9L, 9R, 10, 11, 12L, 12R, 78 und 79) zur Ausführung der einen Bewegung oder einer Kombination von Bewegungen des Spielzeugkörpers (3) enthält und
wobei das funkgesteuerte Spielzeug
IV) eine Aufzeichnungseinrichtung (21, 22—73, 24, 40L, 40R, 82, 83, 86, 91—99) zur Aufzeichnung jedes Ausgabesignals aufweist,
dadurch gekennzeichnet, dass die Bewegungssignalerzeugungseinrichtung (64) zur Erzeugung von gepulsten Ausgabesignalen vorgesehen ist, die über einen einzigen Kanal übertragen werden, wobei die

Ausgabesignale voneinander verschiedene gepulste Frequenzen haben, die der einen Bewegung oder der Kombination von Bewegungen entsprechen, die mittels der zur Befehlseingabe vorgesehen Schalter (51—58) eingegeben werden, wobei die Ausgabesignale nur mit einer einzigen Frequenz für jede Bewegung oder Kombination von Bewegungen gepulst sind, dass der Spielzeugkörper (3) eine Steuersignalerzeugungseinrichtung (72) enthält, die zur Eingabe eines oder mehrerer Steuersignale entsprechend der Frequenz jedes durch den Empfänger aufgenommenen Ausgabesignals an die Motoren (7L, 7R, 8L, 8R, 9L, 9R, 10, 11, 12L, 12R, 78 und 79) vorgesehen ist, und dass die im Spielzeugkörper (3) enthaltene Aufzeichnungseinrichtung (21, 22—73, 24, 40L, 40R, 82, 83, 86, 91—99) zum Aufzeichnen jedes Ausgabesignals vorgesehen ist, das vom Empfänger (71) entsprechend dem einen Steuersignal oder entsprechend der Anzahl Steuersignale von der Steuersignalerzeugungseinrichtung (72) empfangen wird, wobei die Aufzeichnungseinrichtung (21, 22—73, 24, 40L, 40R, 82, 86, 91—99) jedes aufgezeichnete Ausgabesignal in die Steuersignalerzeugungseinrichtung (72) eingibt, die nacheinander das eine Steuersignal oder die Anzahl Steuersignale in die jeweiligen Motoren (7L, 7R, 8L, 8R, 9L, 9R, 10, 11, 12L, 12R, 78 und 79) eingibt.

2. Funkgesteuertes Spielzeug nach Anspruch 1, dadurch gekennzeichnet, dass die Aufzeichnungseinrichtung (21, 22—73, 24, 40L, 40R, 82, 83, 86, 91—99) ein Bandaufzeichnungsgerät (21—73, 24, 40L, 40R, 82, 83, 86, 91—99) aufweist, dessen Betrieb durch das eine Steuersignal oder durch die Anzahl Steuersignale von der Steuersignalerzeugungseinrichtung (72) gesteuert wird.

3. Funkgesteuertes Spielzeug nach Anspruch 2, dadurch gekennzeichnet, dass der Spielzeugkörper (3) ausserdem

I) einen Zeiteinstellschalter (32),

II) ein Zeitanzeigeteil (31), und

III) einen Zeitgeber aufweist, der zum Starten des Bandaufzeichnungsgerätes (21, 22—73—24, 40L, 40R, 82, 83, 86, 91—99) ein Ausgabesignal erzeugt, um jedes aufgezeichnete Steuersignal zu einer vorgegebenen Zeit einzugeben.

4. Funkgesteuertes Spielzeug nach Anspruch 1 oder 2, dadurch gekennzeichnet, dass der Spielzeugkörper (3) ausserdem

a) eine erste Tonerzeugungseinrichtung (24, 91, 92, 93 und 99) zur Ausgabe eines gespeicherten Tonsignals entsprechend dem einen Steuersignal oder der Anzahl Steuersignale von der Steuersignalerzeugungseinrichtung (72), und

b) einen Lautsprecher (82) zum Umwandeln des ausgegebenen Tonsignals in eine Stimme aufweist.

5. Funkgesteuertes Spielzeug nach Anspruch 4, dadurch gekennzeichnet, dass die Zeitgebereinrichtung (31, 32 und 74) zur Ausgabe eines Alarmtonsignals zur selben Zeit, zu der die erste Tonerzeugungseinrichtung (24, 91, 92, 93 und 99) das gespeicherte Tonsignal abgibt, vorgesehen ist.

6. Funkgesteuertes Spielzeug nach Anspruch 4, dadurch gekennzeichnet, dass der Sender ausserdem ein Mikrofon (62) aufweist, wobei die Steuersignalerzeugungseinrichtung (72) ein Steuersignal zur Eingabe eines einzigen Tonsignales vom Mikrofon (62) in den Lautsprecher (82) erzeugt, ohne jedes andere Steuersignal einer einzelnen Bewegung oder einer Kombination von Bewegungen zu akzeptieren, wenn der Empfänger (71) ein einer Bewegung oder einer Kombination von Bewegungen entsprechendes Ausgabesignal empfängt.

7. Funkgesteuertes Spielzeug nach Anspruch 1, dadurch gekennzeichnet, dass jede Bewegung durch mindestens zwei Impulsfrequenzen angezeigt wird, und dass Kombinationsbewegungen durch eine Impulsfrequenz angezeigt werden, wobei gemeinsam zwischen der Kombination nur die niedrigste Frequenz übertragen wird, wenn nur eine einzige Bewegung ausgeführt werden soll, und wobei nur die gemeinsame Frequenz übertragen wird, wenn eine Kombinationsbewegung ausgeführt werden soll.

Revendications

1. Jouet radio-commandé, comprenant:

(a) un émetteur (50), et

(b) un corps de jouet (3) capable d'un mouvement ou d'une combinaison de mouvements, dans lequel l'émetteur (50) comporte

(i) des contacts (51—58) pour entrer des instructions pour le mouvement ou une combinaison de mouvements du corps de jouet (3), et

(ii) un dispositif de production de signal de mouvement (64) pour engendrer des signaux de sortie, dans lequel le corps de jouet (3) comporte

(i) un récepteur (71) pour recevoir chaque signal de sortie du dispositif de production de signal de mouvement (64),

(ii) des moteurs (7L, 7R, 8L, 8R, 9L, 9R, 10, 11, 12L, 12R, 78 et 79) pour exécuter le mouvement ou une combinaison de mouvements du corps de jouet (3), et

dans lequel le jouet radio-commandé comprend

(iv) des moyens d'enregistrement (21, 22—73, 24, 40L, 40R, 82, 83, 86, 91—99) pour enregistrer chaque signal de sortie,

caractérisé en ce que le dispositif de production de signal de mouvement (64) est conçu pour fournir des signaux de sortie pulsés transmis sur un canal unique, chacun de ces signaux ayant une fréquence

pulsée différente qui correspond au mouvement ou à une combinaison de mouvements qui sont entrés par lesdits contacts (51—58) d'entrée d'instructions, le signal de sortie étant pulsé à une seule fréquence pour chaque mouvement ou combinaison de mouvements, en ce que le corps de jouet (3) comprend un dispositif de production de signal de commande (72) qui envoie un ou plusieurs signaux de commande correspondant à la fréquence de chaque signal de sortie reçu par le récepteur, aux moteurs (7L, 7R, 8L, 8R, 9L, 9R, 10, 11, 12L, 12R, 78 et 79), et en ce que les moyens d'enregistrement (21, 22—73, 24, 40L, 40R, 82, 83, 86, 91—99) qui sont inclus dans le corps de jouet (3) sont prévus pour enregistrer chaque signal de sortie reçu par le récepteur (71) en réponse au signal ou à la pluralité de signaux de commande fourni par le dispositif de production de signal de commande (72), et l'enregistreur (21, 22—73, 24, 40L, 40R, 82, 86, 91—99) envoie chaque signal de sortie enregistré au dispositif de production de signal de commande (72) qui envoie à son tour le signal ou la pluralité de signaux de commande aux moteurs respectifs (7L, 7R, 8L, 8R, 9L, 9R, 10, 11, 12L, 12R, 78 et 79).

2. Jouet radio-commandé suivant la revendication 1, dans lequel les moyens d'enregistrement (21, 22—73, 24, 40L, 40R, 82, 83, 86, 91—99) comprennent:

un enregistreur à bande (21—73, 24, 40L, 40R, 82, 83, 86, 91—99) dont le fonctionnement est commandé par le signal ou la pluralité de signaux de commande venant du dispositif de production de signal de commande (72).

3. Jouet radio-commandé suivant la revendication 2, dans lequel le corps de jouet (3) comprend en outre:

(i) un commutateur de réglage de temps (32),

(ii) une partie d'affichage de temps (31), et

(iii) une minuterie (74) qui fournit un signal de sortie pour démarrer l'enregistreur à bande (21, 22—73, 24, 40L, 40R, 82, 83, 86, 91—99) de manière à envoyer chaque signal de commande enregistré, à un instant prédéterminé.

4. Jouet radio-commandé suivant les revendications 1 ou 2, dans lequel le corps de jouet (3) comprend en outre:

(a) des premiers moyens de production de son (24, 91, 92, 93 et 99) pour émettre un signal audio stocké correspondant au signal ou à la pluralité de signaux de commande fournis par le dispositif de production de signal de commande (72), et

(b) un haut-parleur (82) pour convertir le signal audio de sortie en une voix.

5. Jouet radio-commandé suivant la revendication 4, dans lequel ladite minuterie (31, 32 et 74) est prévue pour émettre un signal sonore d'alarme en même temps que les premiers moyens de production de son (24, 91, 92, 93 et 99) émettent le signal audio stocké.

6. Jouet radio-commandé suivant la revendication 4, dans lequel l'émetteur comprend en outre un microphone (62), et dans lequel, lorsque le récepteur (71) reçoit un signal de sortie correspondant à un mouvement ou une combinaison de mouvements, le dispositif de production de signal de commande (72) émet un signal de commande pour envoyer seulement un signal audio venant du microphone (62) et l'introduire dans le haut-parleur (82) sans accepter aucun autre mouvement ou combinaison de mouvements.

7. Jouet radio-commandé suivant la revendication 1, dans lequel chaque mouvement est indiqué par au moins deux fréquences d'impulsions et les mouvements combinés sont indiqués par une fréquence d'impulsions en commun entre la combinaison, seule la fréquence la plus basse étant transmise lorsqu'un seul mouvement doit être effectué, et seule la fréquence commune étant transmise lorsqu'un mouvement combiné doit être effectué.

FIG. 1

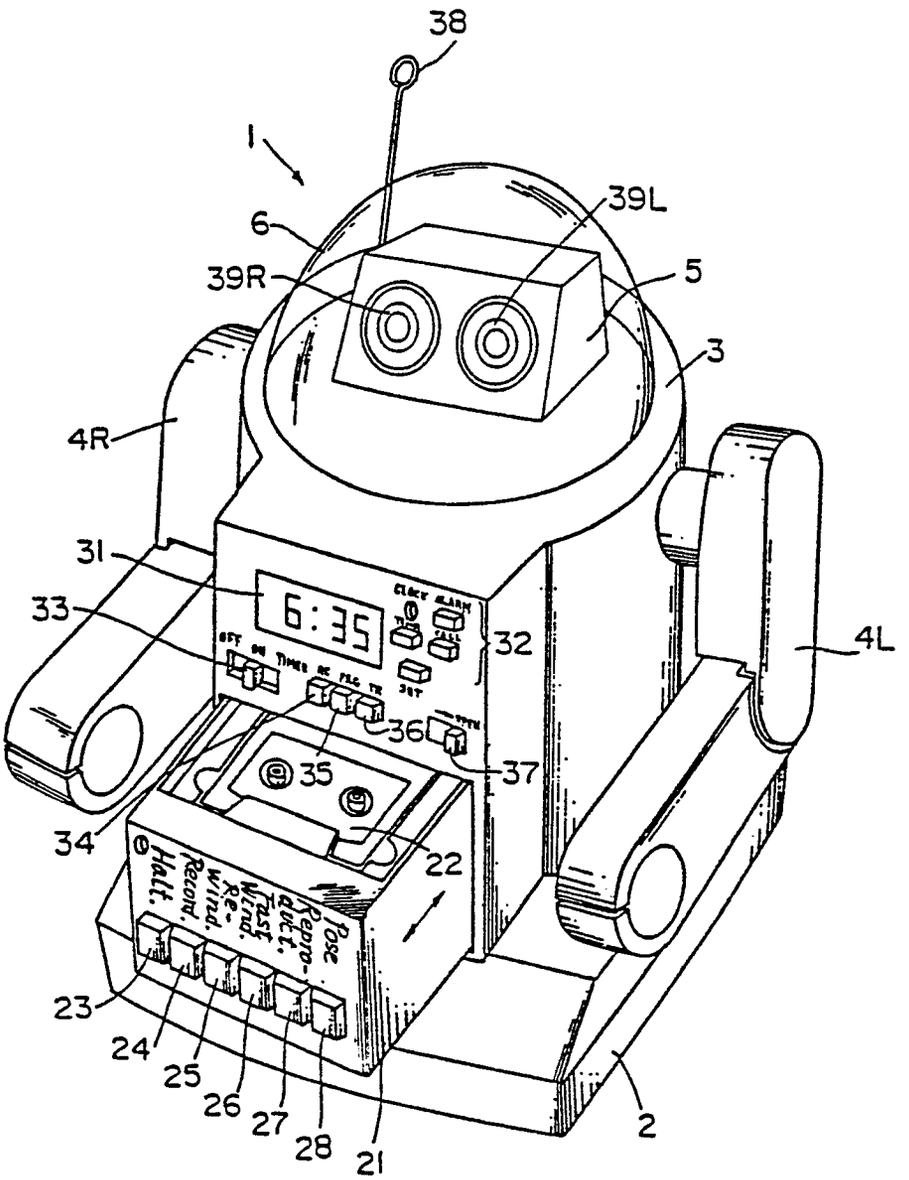

38
1
39L
6
39R
5
3
4R
31
33
6:35
32
4L
36
37
35
34
22
Halt.
Record.
Rewind.
Play.
Fast Wind.
Repeat.
Pose
23
24
25
26
27
28
21
2

FIG. 2

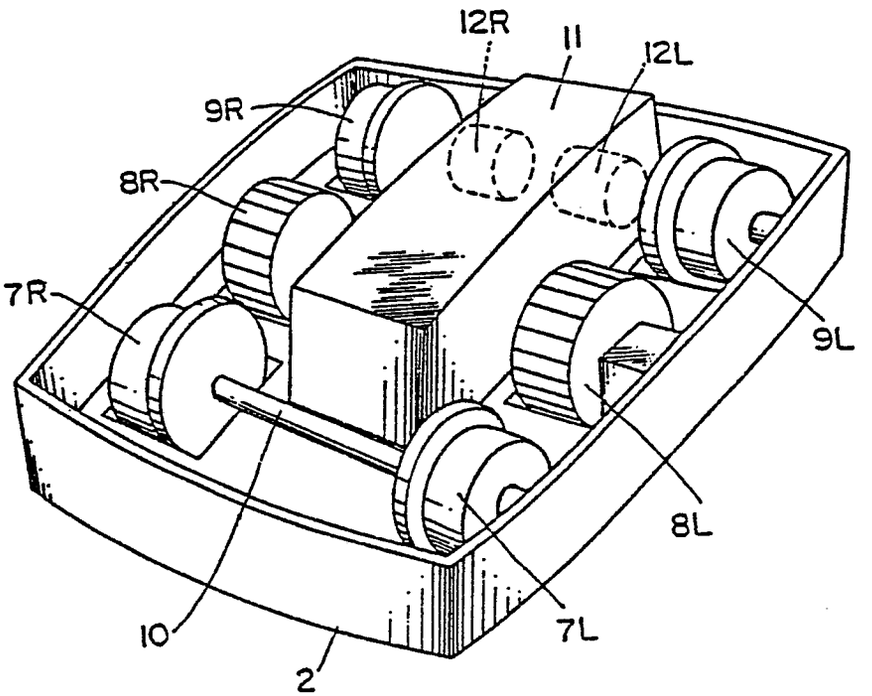


FIG. 3

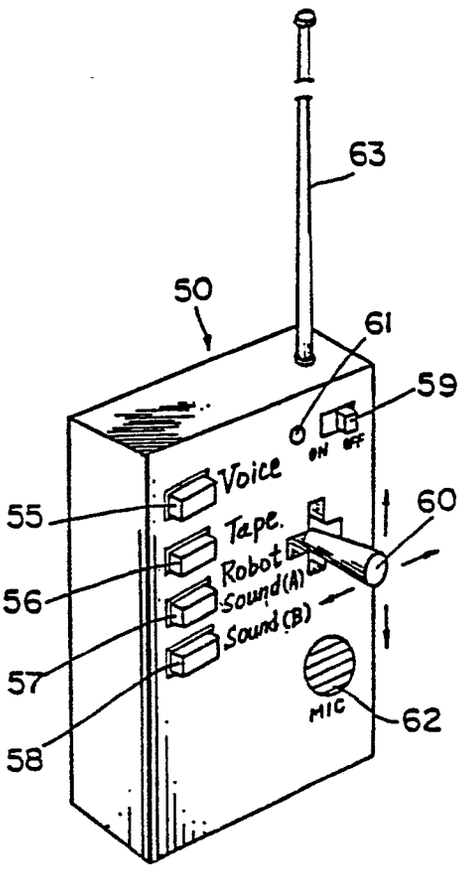

63
50
61
59
ON
OFF
Voice
55
Tape.
60
Robot
56
Sound(A)
Sound(B)
57
MIC
62
58

FIG. 4

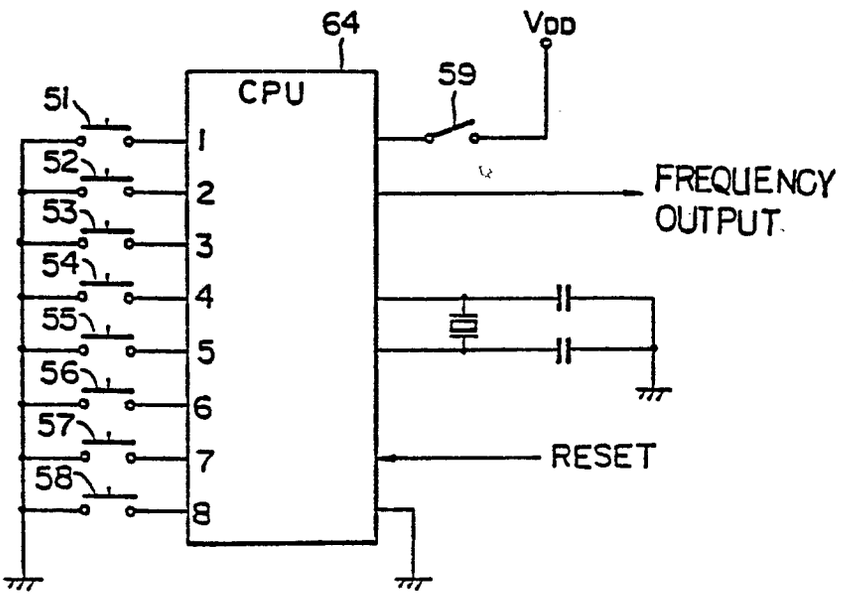
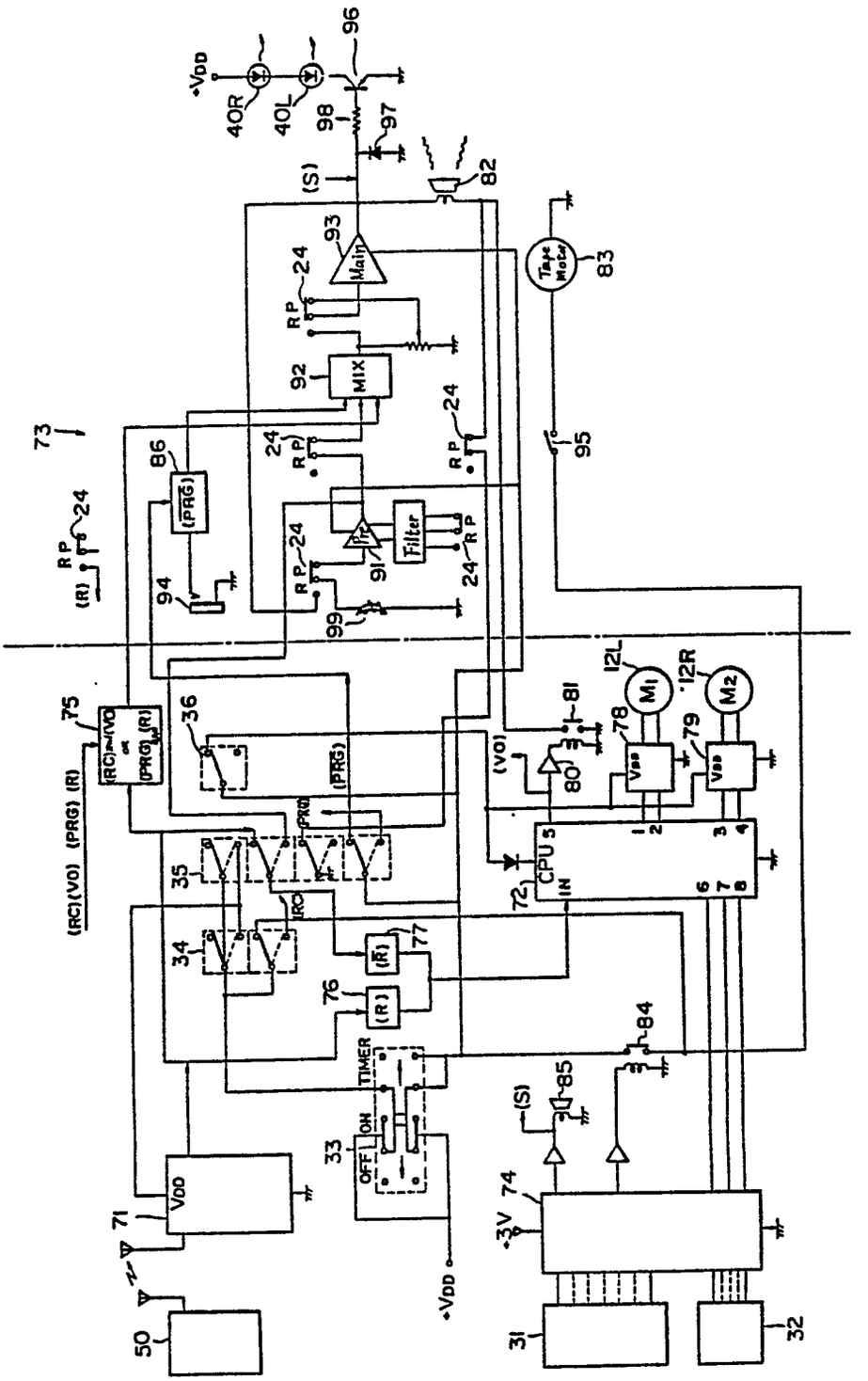

64
VDD
59
CPU
51
52
53
54
55
56
57
58
1
2
3
4
5
6
7
8
FREQUENCY
OUTPUT
RESET

FIG. 5


VDD
40R
40L
96
98
97
(S)
82
93
Main
24
RP
92
MIX
83
Tape Motor
95
73
86
(PRG)
94
91
Filter
99
(R)
75
(RC)/(VO) or (PRG) (R)
36
(PRG)
(RC)(VO) (PRG) (R)
35
34
(R)
77
76
(R)
TIMER
ON
OFF
33
71
VDD
50
(VO)
81
80
12L
M1
78
12R
M2
79
Vss
CPU
IN
72
84
85
(S)
74
3V
31
32