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(54) **Title:** DOLL SYSTEM WITH RESONANT RECOGNITION
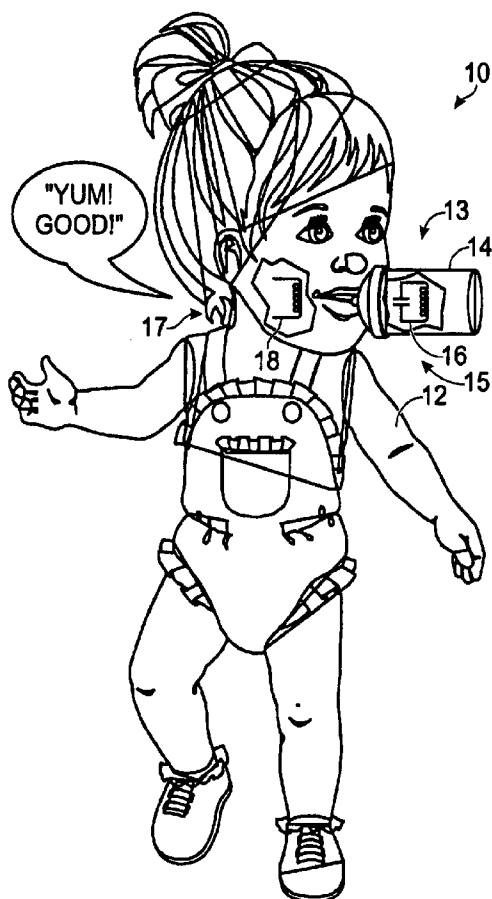
(57) **Abstract:** A doll system is disclosed that may detect objects or accessories that are proximate to the body of the doll. The system may differentiate between a plurality of accessories and generate sounds that are appropriate for the specific accessory. The doll body may have a sensor circuit with an inductor connected to a processor. The accessory may include a tank circuit. A drive signal in the sensor circuit may activate the tank circuit to generate a signal with a frequency. The tank signal circuit may generate a characteristic signal in the sensor circuit that is detected by the processor. An audio file may be selected from memory based on the characteristics of the detected signal.

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Doll System with Resonant Recognition

<u>Related Applications</u>

The present application claims the benefit of U.S. Patent Application Serial Number _____ filed March 23, 2007 and U.S. Provisional

5   Patent Application Serial Number 60/785,464 filed on March 24, 2006, the complete disclosure of which is hereby incorporated by reference herein in its entirety and for all purposes.

<u>Background</u>

The present disclosure relates generally to toy dolls with electronics, and

10   more specifically to toy dolls incorporating electronics to sense or identify accessories and generate sounds that correspond or relate to accessories that are sensed or identified.

Examples of known toys or dolls that identify accessories are disclosed in U.S. Publications 20020052238; 20020078363 and 20040259465, U.S. Patent

15   Nos. 5,661,470; 5,761,681; 5,823,782; 5,853,327; 5,873,765; 6,190,174; 6,361,396; 6,364,735; 6,471,565; 6,650,870 and 6,724,198 and Japan Patent No. JP07323159. The disclosures of all of these patents are incorporated herein by reference.

<u>Summary</u>

20   The present disclosure relates to a toy doll of an infant and accessories commonly associated with an infant such as a crib, a spoon or a stroller. The doll may have sensor circuits in specific body areas. The sensor circuits may be associated with specific accessories. The doll may be configured to respond to

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accessories that are close to the sensor circuits by making sounds or vocalizations appropriate to accessories that are sensed or identified.

For example, the doll may say "Yum" when a spoon is brought in proximity to the doll's mouth. If the doll is placed in the cradle on its back, the doll may say "Night-night." If the spoon is near the back or other parts of the doll, or if the doll is placed in the cradle on its front, no response may be generated by the doll.

The doll may differentiate the specific accessories using a plurality of sensor circuits in the doll and inductor/capacitor (LC) or tank circuits in the accessories. Each sensor circuit may be disposed at specific locations such as in the hand, the mouth, the back or the wrist. Each sensor circuit may be controlled by a processor or a switching mechanism to operate sequentially and independently from the other sensor circuits. The doll circuits may operate by emitting a drive signal and listening for a characteristic in a return signal.

A return signal frequency generated by a proximate accessory may be detected and characterized by the processor. The processor may detect characteristics of the return signal by selecting an audio file from memory and generating an appropriate infant sound at a speaker. The toy doll may have multiple appropriate responses to a specific object. For example, the doll may say "Yum" or "Good" or "More" when the bottle is near the doll's mouth.

The doll may have the ability to respond in different languages. The language spoken by the doll may be determined by an accessory worn by the doll. The accessory, for example, may be a bracelet with an LC circuit.

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The advantages of the present invention will be understood more readily after a consideration of the drawings and the Detailed Description of the Preferred Embodiment.

Brief Description of the Drawings

5   Fig. 1 is a perspective view of an exemplary toy doll with a toy bottle showing the bottle, including an LC circuit shown in cutaway, positioned close to the doll's mouth, with a sensor circuit in the doll's head shown in cutaway, and the doll generating an appropriate phrase in response to detection of the bottle in proximity to the doll's head.

10   Fig. 2 is a perspective view showing the toy doll and exemplary associated toy accessories including a toy, a spoon, a bottle, two bracelets, a stroller and a crib, each with a sensor circuit.

Fig. 3 is a block diagram of an exemplary object recognition circuit including sensor circuits, accessory LC circuits, a microprocessor, memory, a

15   signal analysis circuit, an output and a switch.

Fig. 4A is a diagram of a portion of the electronic doll diagram of Fig. 3 showing the function of drive signals in relation to sensor circuits, a processor or CPU, memory, a speaker and accessory circuits.

Fig. 4B is a diagram of a portion of the electronic doll components of Fig. 3

20   showing the function of return signals in relation to sensor circuits, a processor or CPU, memory, a speaker and accessory circuits.

Fig. 5 is an exemplary table that may be stored in memory to index audio files to frequencies.

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Fig. 6 is an exemplary table that may be stored in memory to index audio files to frequency ranges and associated sensor circuits.

Fig. 7 is a flow chart of steps that may be used for object recognition in a doll using sensor circuits and accessories with LC circuits.

5   Detailed Description

Referring to Fig. 1, an exemplary resonant object recognition system 10 is shown including a doll 12 and an accessory 13, such as a toy bottle 14. In this example, doll 12 is emitting the phrase "Yum! Good!" as a result of the doll detecting bottle 14 being near the mouth of doll 12. Doll 12 includes a sensor

10   circuit 17, such as a sensor circuit 18 shown in cutaway near the mouth of doll 12. Bottle 14 includes a transponder circuit 15 such as an inductor/capacitor or LC circuit 16 shown in cutaway. By detecting the proximity of circuit 16 in bottle 14 to sensor circuit 18, doll 12 may generate sounds.

Fig. 2 is a perspective view of a second exemplary toy doll 12 of Fig. 1

15   showing additional accessories 13 and sensor circuits 17. For clarity, similar numbering is used here and in subsequent figures for similar features and components. Fig. 2 includes sensor circuit 18 at the mouth of doll 12, sensor circuit 20 at the back of doll 12, sensor circuit 22 at the chest of doll 12 and sensor circuit 24 at the wrist of doll 12. The sensor circuits may have inductors

20   with the same or with different inductance values

In this example, accessories 13 include a spoon 26 with a circuit 28, a bottle 30 with a circuit 32, a toy 34 with a circuit 36, a stroller 38 with a circuit 40, a crib 42 with a circuit 44 and bracelets 46 and 48 with respective circuits 50 and

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52. These accessories may be associated with one or more sensor circuits 17 of doll 12.

Doll 12 and associated accessories may be configured so that when a specific accessory is proximate to a specific sensor circuit, appropriate sounds
5   and utterances are generated from doll 12. Other forms of outputs, such as visual or motion based outputs may also be used. As described for doll 12 of Fig. 1, bottle 30 near sensor circuit 18 at the mouth of doll 12 may cause the doll to generate a response. Bottle 30 near sensor circuit 24 at the wrist of doll 12 may generate no response from doll 12 or a different response.

10   Sensor circuits 17 may each comprise an inductor 54 with a value of inductance distinct from other sensor circuits. Each transponder circuit 15 associated with an accessory 13 may be as simple as an LC circuit including an inductor 56 and a capacitor 58 with a resonant frequency. Each accessory 13 and transponder circuit 15 may be configured to elicit a specific response from
15   each of one or more sensor circuit in doll 12.

An accessory may be associated with one, or more than one sensor circuit. For example, sensor circuit 18 may be associated with spoon 26 with circuit 28 and bottle 30 with circuit 32. Sensor circuit 20 may be on the back of doll 12. Sensor circuit 20 may be associated with stroller 38 and stroller circuit 40
20   and crib 42 and crib circuit 44. Sensor circuit 18 may be near the doll's mouth. Sensor circuit 22 may be associated with the chest of doll 12 and may also be associated with toy 34 with circuit 36.

Fig. 3 is an exemplary block diagram showing a circuit 100 used to implement the functionality of toy doll 12. Circuit 100 includes a processor 102, a

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signal analysis circuit 104, a switch 106, memory 108 a output or speaker 110, a drive circuit 111, sensor circuit 18 with an inductor 112, sensor circuit 20 with an inductor 114, and sensor circuit 22 with an inductor 116.

LC circuit 28 is shown inductively coupled to inductor 112, and LC circuit 5   32 is shown inductively coupled to inductor 114. LC circuit 36 is shown physically separated and inductively uncoupled from inductor 116.

Signal analysis circuit 104 is common in the art. Some examples of signal analysis circuits are peak detectors, edge detectors, waveform comparators, and comparators with binary counters. Some signal analysis circuits determine a 10   frequency for the signal. Some methods determine amplitude, rise time and/or signal decay. Signal analysis circuit 104 may include amplifier circuits, comparators, binary counters and/or other components. Optionally, signal analysis functions of circuit 104 may be included in a processor or controller 102'.

Switch 106 may function to selectively connect processor 102 to one or 15   more sensor circuits. Switch 106 functionality also may be performed by processor 102. Switch 106 also may function by action of an applied drive signal or by a separate control signal, such as a control signal 118 generated by processor 102. Optionally, switch functions may be included in processor or controller 102'.

20   Memory 108 may store software commands, algorithms, waveform characterization libraries and output files.

In this example, sensor circuits 18, 20, 22 each include respective signal lines 120, 122, 124 that function as both inputs and outputs for the sensor circuits. In some examples the inputs are connected to drive circuit 111 or

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controller 102', and separate outputs are connected to signal analysis circuit 104, through associated switches.

Drive circuit 111 may generate a drive signal that is applied to the selected sensor circuit. Drive circuit 111 may generate a square-wave pulse, a sinusoidal

5   signal or other suitable signal to which the accessory transponder circuits are responsive. Drive circuit functionality may also optionally be included in controller 102'.

Processor 102 may operate in a first mode and a second mode. Drive circuit 111 may apply a drive signal to a selected sensor circuit in the first mode.

10   In the second mode, processor 102 may record or detect characteristics of a signal received from a selected sensor circuit and analyzed by signal analysis circuit 104. Any signal characteristic may be used that operably differentiates specific signals that are consistent with the operation of transponder circuits 15. Signal frequency is used in the following examples and descriptions below for

15   clarity but other or different signal characteristics could be used.

Fig. 4A illustrates a simplified version of exemplary circuit 100 of Fig. 3 in the first mode of operation. Drive circuit 111 may energize inductor 112 of sensor circuit 18 with an appropriate signal on input 120, such as with a sinusoidal or a current-pulse drive signal 202. Circuit 18 when energized by drive signal 202 may

20   emit an electromagnetic and/or inductive drive signal 204 at inductor 112. Sensor circuit inductor 112 and accessory LC circuit 28 may be inductively coupled when sufficiently proximate to each other. When LC circuit 28 is proximate to inductor 112 while the inductor is emitting inductive drive signal 204, LC circuit 28

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resonates at a characteristic frequency, producing a resonant signal 206 with the frequency.

Fig. 4B illustrates simplified circuit 100 in the second mode of operation. In response to resonant signal 206 in LC circuit 28, an inductive return signal 208

5   with the frequency is generated. A conductive return signal 210 is correspondingly induced in inductor 112 of sensor circuit 18 by inductive return signal 208, which return signal exists on line 120. Processor 102 and/or signal analysis circuit 104 monitors return signal 210 for the frequency.

Processor 102 compares the determined signal characteristic, i.e. the

10   frequency, against a library or table of known characteristics. If the signal characteristic matches an entry in the library, processor 102 may select the corresponding indexed audio file from memory 108 and send an associated audio signal to speaker 110 to produce a corresponding sound.

If drive signal 202 is applied to sensor circuit 18 without LC circuit 28 being

15   proximate, a return signal 210 with library referenced characteristics may not be generated. Because accessory LC circuits use components with distinct values that produce signals with characteristic resonant frequencies, inductive return signal 208, and conductive return signal 210 in inductively coupled sensor circuit 18, may also have distinct frequency characteristics determined by these

20   components.

Each accessory LC circuit may have a resonant frequency determined by the inductance values and capacitance values of the LC circuit components. If L is the inductance in henries and C is the capacitance in farads, the resonant frequency of each LC circuit is determined by the equation $1/(2^*\pi^*(L^*C)^{\frac{1}{2}})$ where

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π is pi.   The effective inductance and subsequently the frequency of resonant

signal 206 generated in the LC circuit may be affected by nearby inductors not

connected to the circuit, such as inductor 112. The actual frequencies of signals

206, 208 and 210 may be a function of the LC circuit component values, sensor

5   circuit inductance values and the distance between LC circuit components and

sensor circuit inductors.

       Specific sensor circuits are used in the following examples for the purpose

of description and illustration. Any of sensor circuits 18, 20, 22 and 24 as well as

other accessory LC circuits may operate in a similar manner. Other forms of

10   inductive or electromagnetic communication may also be used.

       As an example of object recognition components, LC circuit 28 may be

part of toy spoon 26. Sensor circuit 18 may be located near the doll's mouth.

Accessory LC circuit 28 may include an inductor of 3.9 millihenry and a capacitor

of 470 picofarad. LC circuit 28 with these component values has a resonant

15   frequency of 118 kilohertz.

       Sensor circuit 18 located near the mouth of doll 12 may include inductor

112 with 400 turns of wire. Sensor circuit 20 may be located in the back of doll 12

and may include an inductor 114 with 200 turns of wire. The inductors may act as

antennas and may or may not be functionally associated with other passive

20   components. For example, doll sensor circuit 18 may comprise an inductor and a

capacitor or an inductor and a resistor.

       Referring again to Figs. 2, 3, 4A and 4B, in a first example of resonant

object recognition, toy spoon 26 is initially not located near doll 12. Sensor circuit

18 with inductor 112 positioned at the mouth of doll 12 may be connected to

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processor 102 by switch 106. A drive signal 202 may be generated by drive circuit 111 in sensor circuit 18 and inductor 112. Processor 102 may then monitor sensor circuit 18 to determine if a return signal 210 with a characteristic frequency exists. No characteristic frequency may be generated since LC circuit

5   28 and spoon 26 are not near doll 12.

Drive circuit 111 next may generate a drive signal 202 in sensor circuit 20. Processor 102 may monitor sensor circuit 20 for return signal 210 with a characteristic frequency. Processor 102 may continue to sequence serially through all sensor circuits in this manner.

10   During sequencing through the sensor circuit, toy spoon 26 and associated LC circuit 28 may be positioned near the mouth of doll 12. and inductor 112. Drive signal 202 in selected sensor circuit 18 and inductor 112 may then generate an inductive drive signal 204 from inductor 112 as has been described with reference to Fig. 4A. LC circuit 28 in accessory 26 being inductively coupled

15   to inductor 112, produces a resonant signal 206.

Resonant signal 206 in LC circuit 28 generates an associated inductive return signal 208 and a return signal 210 in the inductively coupled sensor circuit 18. This return signal 210 may be characterized at signal analysis circuit 104. Processor 102 may determine the peak count and/or frequency produced by

20   signal analysis circuit 104 and compares these parameters to the signal parameter library in memory 108.

Processor 102 may find specific signal characteristics in the library that match a determined signal characteristic and indexes an audio file. This may indicate that LC circuit 28 is proximate to inductor 112. Audio files in memory

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108 may be indexed to signal characteristics such as a specific frequency or proximity of an accessory to a sensor circuit. Processor 102 may select a specific audio file according to the determined signal criteria. Processor 102 may replay the selected files to generate appropriate sounds at speaker 110. The sounds

5   may be appropriate to the proximate accessory and the selected sensor circuit. Processor 102 may use other signal characteristics than peak count and/or frequency to select an audio file from the library.

Referring still to Figs. 2, 3, 4A and 4B, in another example, toy spoon 26 and associated LC circuit 28 are near the back of doll 12. Inductor 114 of sensor

10   circuit 20 is also located at the back of doll 12. Sensor circuit 20, in this example, is not configured to respond to toy spoon 26 and is not associated with it. Drive signal 202 to sensor circuit 20 will result in inductive drive signal 204 from inductor 114 of sensor circuit 20. The inductor of LC circuit 28 in accessory 26 will be inductively coupled to inductor 114 and a resonant signal 206 with a

15   frequency will be generated in LC circuit 28.

Processor 102 may compare the signal characteristic from the measured frequency and/or peak count and determine that this signal does not match any signals in the library associated with sensor circuit 20. Processor 102 may not generate a signal at speaker 110 in this example.

20   Again, use of sensor circuit 18, sensor circuit 20 and LC circuit 28 and the use of frequency as a signal characteristic are for the purpose of illustration and example. Other sensor circuits and LC circuits will perform in a similar manner. Other signal characteristics may be used instead.

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In some examples, processor 102 may not select an audio file by determining different frequencies for the same accessory at two different sensor circuits. Processor 102 may differentiate frequency values to within a range and identify the selected sensor circuit. Processor 102 may select an audio file using
5   both frequency and selected circuit parameters in the library.

Fig. 5 is an exemplary library or table 200 of audio files 302 indexed to frequencies 304 that may be stored in memory 108. Each row is an entry for one audio file. In the first row an audio file titled "Yum" is indexed to a frequency 400 kHz. When processor 102 determines a return signal has a characteristic
10   frequency of 400 kHz, processor 102 may select the file with this title from memory 108 and replay the file on speaker 110. Where other frequencies are detected, other files may be selected from memory by processor 102.

Fig. 6 is an exemplary library or table 300, similar to table 200 in Fig. 5, of audio files 352 indexed to frequency ranges 354 and selected sensor circuit
15   identifiers 356 that may be stored in memory 108. In this example table, the audio file titled "Yum" is indexed to a frequency range 100-150kHz and a sensor circuit A. When processor 102 is connected to circuit A by switch 106, the processor determines if a return signal 210 has a characteristic frequency between 100 and 150 kHz. Processor 102 may select the file with this title from memory 108 and
20   replay the file to generate sounds on speaker 110. Where other frequencies are detected on the same or on other selected circuits, other files may be selected from memory by processor 102. Table 300 may have additional reference information such as a text reference 358 for the accessory and location represented by the indexes.

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Some entries in table 300 may indicate the same frequency range and different sensor circuits to generate the same response. For example, entries 360 and 362 in table 300 both have references for a frequency range of 575-650kHz but entry 360 references selected sensor circuit C and entry 362 references

5   sensor circuit D. Both produce the same response at the output. Other entries may indicate two sets of references with the same frequencies, different sensor circuits selected and different responses generated at the output for each entry.

Drive signal 202 generated by drive circuit 111 may be any signal appropriate to produce a response in an associated accessory. When the

10   accessory includes an LC circuit, drive signals may be in the form of a single pulse or a signal with a frequency related to the resonant frequency of the one or more accessories associated with that sensor circuit. As a further example, drive circuit 111 may generate a first frequency for a first sensor circuit, a second frequency for a second sensor circuit, and a third frequency for a third sensor

15   circuit.

Each frequency of a drive signal 202 may be associated with the resonant frequency of the one or more accessories associated with each sensor circuit when the accessory is proximate to the sensor circuit. Drive circuit 111 may generate a first drive signal 202 and subsequently a second drive signal distinct

20   from the first in a selected sensor circuit.

Doll 12 may include other kinds of sensor circuits. Doll 12 may include motion sensor circuits. Doll 12 may include capacitive touch sensor circuits. Motion sensor circuits and touch sensor circuits may be operably connected to and controlled by processor 102.

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Fig. 7 is a flow chart 400 showing one example of steps that could be used to detect and index a signal in a sensor circuit. At step 402 processor 102 or switch 106 selects a sensor circuit. At step 404 drive circuit 111 may apply a drive signal 202 to the selected sensor circuit. At step 406 an inductive drive

5   signal 204 is transmitted from the selected sensor circuit inductor. Where an LC circuit is proximate to the inductor, the LC circuit is activated to generate a resonant signal 206 with a frequency at step 408, which in turn produces inductive return signal 208 at step 410.

Inductive return signal 208 induces return signal 210 in the selected sensor

10   circuit at step 412. Processor 102 and/or signal analysis circuit 104 may characterize (determine a characteristic of) return signal 210 at step 414. If a signal characteristic is determined at step 414 is in the library stored in memory 108, as determined at step 416, an audio file indexed to the characteristic may be selected at step 418 based on the determined characteristic. The indexed audio

15   file is then played at the speaker 110 in step 420. Control then returns to step 402. If no reference is found in the library in step 416, control also returns to step 402 and no sound is played at speaker 110.

This is an example of possible steps that might be used to recognize objects or accessories associated with a doll. Additional steps or fewer steps may

20   be used to implement the functionality and still fall within the scope of this disclosure.

Between the upper and lower limits, the characteristic frequencies of the accessory LC circuits may be preselected to have adequate separation such that the sensor circuit will be able to differentiate between two proximate frequencies.

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The practical limit of the number of accessories may be a function of the cost and performance of the components in the circuits.

The described system and assemblies are examples and are not to be used as limitations. The number of sensor circuits and/or accessories may be

5   more or fewer than those shown. The interconnection, orientation or position of components may vary from the examples. Any suitable configuration or combination of components presented, or equivalents to them that perform a similar function, may also be used.

While embodiments of a resonant object recognition system and methods

10   of use have been particularly shown and described, many variations may be made therein.   This disclosure may include one or more independent or interdependent inventions directed to various combinations of features, functions, elements and/or properties, one or more of which may be defined in the following claims.   Other combinations and sub-combinations of features, functions,

15   elements and/or properties may be claimed later in this or a related application. Such variations, whether they are directed to different combinations or directed to the same combinations, whether different, broader, narrower or equal in scope, are also regarded as included within the subject matter of the present disclosure. An appreciation of the availability or significance of claims not presently claimed

20   may not be presently realized.   Accordingly, the foregoing embodiments are illustrative, and no single feature or element, or combination thereof, is essential to all possible combinations that may be claimed in this or a later application. Each claim defines an invention disclosed in the foregoing disclosure, but any one claim does not necessarily encompass all features or combinations that may

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be claimed. Where the claims recite "a" or "a first" element or the equivalent thereof, such claims include one or more such elements, neither requiring nor excluding two or more such elements. Further, ordinal indicators, such as first, second or third, for identified elements are used to distinguish between the

5   elements, and do not indicate a required or limited number of such elements, and do not indicate a particular position or order of such elements unless otherwise specifically stated.

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We claim:

1. A doll system for associating accessories with a doll comprising:

a first doll accessory including an electronic circuit operable to produce an inductive return signal having a first frequency in response to a received inductive drive signal;

a doll including:

a doll body;

a first sensor circuit mounted on the doll body and having a first input, a first output, and a first inductor, the first sensor circuit for transmitting inductively from the first inductor a first drive signal received on the first input, and outputting on the first output a first return signal received inductively on the first inductor;

a second sensor circuit mounted on the doll body, and having a second input, a second output, and a second inductor, the second sensor circuit for transmitting inductively from the second inductor a second drive signal received on the second input, and outputting on the second output a second return signal received inductively on the second inductor;

a drive circuit for producing the first and second drive signals;

an output device adapted to produce a sensible output in response to an output signal; and

a controller mounted to the doll body and coupled to the first and second sensor circuits and the drive circuit, selectively applying the first and second drive signals to the respective first and second inputs of the respective first and second sensor circuits;

5   detecting on the first and second outputs of the respective first and second sensor circuits, the respective first and second return signals; determining if the return signal has a frequency that is the first frequency; and sending the output signal to the output device on determining that the return signal frequency is the first

10   frequency.

2. The doll system of claim 1 further including a second doll accessory including an electronic circuit operable to produce an inductive return signal having a second frequency in response to a received inductive drive signal

15   and wherein the return signal frequency in the first sensor circuit is:

the first frequency when the first return signal is received from the first doll accessory circuit; and

a second frequency when the second return signal is received from the second doll accessory circuit.

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3. The doll system of claim 2 wherein the doll further includes memory operatively connected to the controller for storing a first audio file associated with the first frequency and a second audio file associated with the second

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frequency, the output device is a speaker, and the controller, in response to determining a return signal frequency is the first or second frequency, selects the audio file associated with the determined return signal frequency from memory, and sends the selected audio file to the speaker as an acoustic

5   signal.

4. The doll system of claim 2 wherein the return signal frequency in the second sensor circuit is:

     a third frequency when produced in response to a received third

10   inductive return signal generated in response to the inductive drive signal activating the first doll accessory circuit; and

     a fourth frequency when produced in response to a received fourth inductive return signal generated in response to the inductive drive signal activating the second doll accessory circuit.

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5. The doll system of claim 1 wherein the first and second inductors have different inductance values.

6. The doll system of claim 1 wherein the first inductor is physically spaced

20   from and substantially inductively uncoupled from the second inductor.

7. The doll system of claim 6 wherein the doll has a mouth and a hand and the first inductor is near the mouth and the second inductor is near the hand.

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8. The doll system of claim 1 wherein the controller includes a drive signal generator, the doll further including a switching mechanism controlled by the controller and mounted to the doll body to selectively connect the drive signal generator to the first and second sensor circuits .

9. The doll system of claim 1 wherein the first drive signal is generated by a square-wave pulse in the first inductor having a duration appropriate to generate the inductive return signal from the first doll accessory circuit.

10. The doll system of claim 1 wherein the first drive signal includes an alternating current having a frequency.

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11. A method of generating an output signal in a doll comprising:

inductively transmitting a first drive signal from a first transceiver circuit located in a doll body;

inductively receiving the transmitted first drive signal in a first

5   transponder circuit of a first doll accessory spaced from the doll body;

inductively transmitting from the first transponder circuit a first response signal in response to the received first drive signal;

inductively receiving the first response signal in the first transceiver

10   circuit;

determining if the first response signal has a first frequency;

inductively transmitting a second drive signal in a second transceiver circuit located in the doll body;

inductively receiving the transmitted second drive signal in a second

15   transponder circuit of a second doll accessory spaced from the doll body;

inductively transmitting from the second transponder circuit a second response signal in response to the received second drive signal;

inductively receiving the second response signal in the second

20   transceiver circuit;

determining if the second response signal has a second frequency; and

generating a first sensible output from the doll body if the first response signal has the first frequency; and

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generating a second sensible output from the doll body, different than the first output, if the second response signal has the second frequency.

5   12. The method of generating a doll signal of claim 11 wherein transmitting the first and second drive signals includes transmitting the first and second drive signals at different times.

13. The method of generating a doll signal of claim 11 wherein receiving the

10   first and second response signals includes receiving the first and second response signals from different parts of the doll body.

14. The method of generating a doll signal of claim 11 further comprising producing a resonating signal in first and second transponder circuits that

15   each includes an inductor and a capacitor on inductively receiving the drive signal.

15. The method of generating a doll signal of claim 11 further including storing a plurality of audio files in a memory in the doll, and generating a first and

20   second sensible output includes selecting respective audio files associated with the first and second sensible outputs.

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16. The method of generating a doll signal of claim 15 wherein selecting an audio file includes selecting an audio file based at least in part on the frequency of the received response signal.

5   17. The method of generating a doll signal of claim 11 wherein transmitting the first and second drive signals includes transmitting the first and second drive signals as square-wave pulses.

18. The method of generating a doll signal of claim 11 wherein transmitting the

10   first and second drive signals includes transmitting the first and second drive signals as alternating currents having respective frequencies.

19. An accessory identification system for a doll comprising:

a doll accessory including a circuit configured to generate a current

15   signal with a given frequency in the circuit and to transmit an inductive response signal with the given frequency on receiving a transmitted inductive drive signal; and

a doll including:

a doll body;

20   a controller with:

a processor for executing software commands;

memory for storing files and software commands;

a signal analysis circuit for determining the frequency of a response signal; and

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a drive signal circuit for generating a drive signal;

a first inductor operably connected to the controller to generate:

a first inductive signal on receiving a first drive signal from the controller; and

a first response signal with a first frequency on receiving an inductive response signal having the first frequency; and

a second inductor operably connected to the controller to generate:

a second inductive signal on receiving a second drive signal from the controller; and

a second response signal with a second frequency on receiving an inductive response signal having the second frequency; and
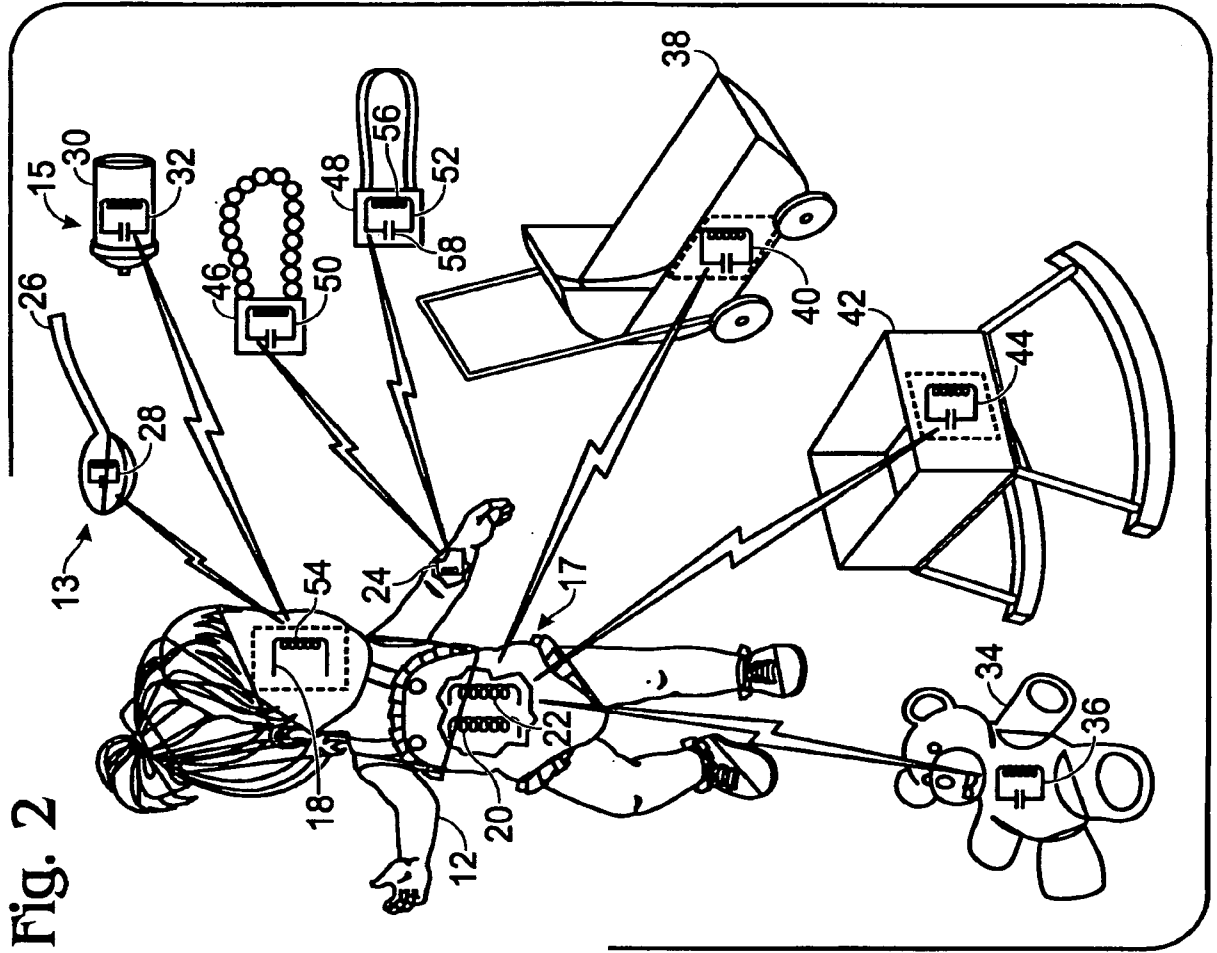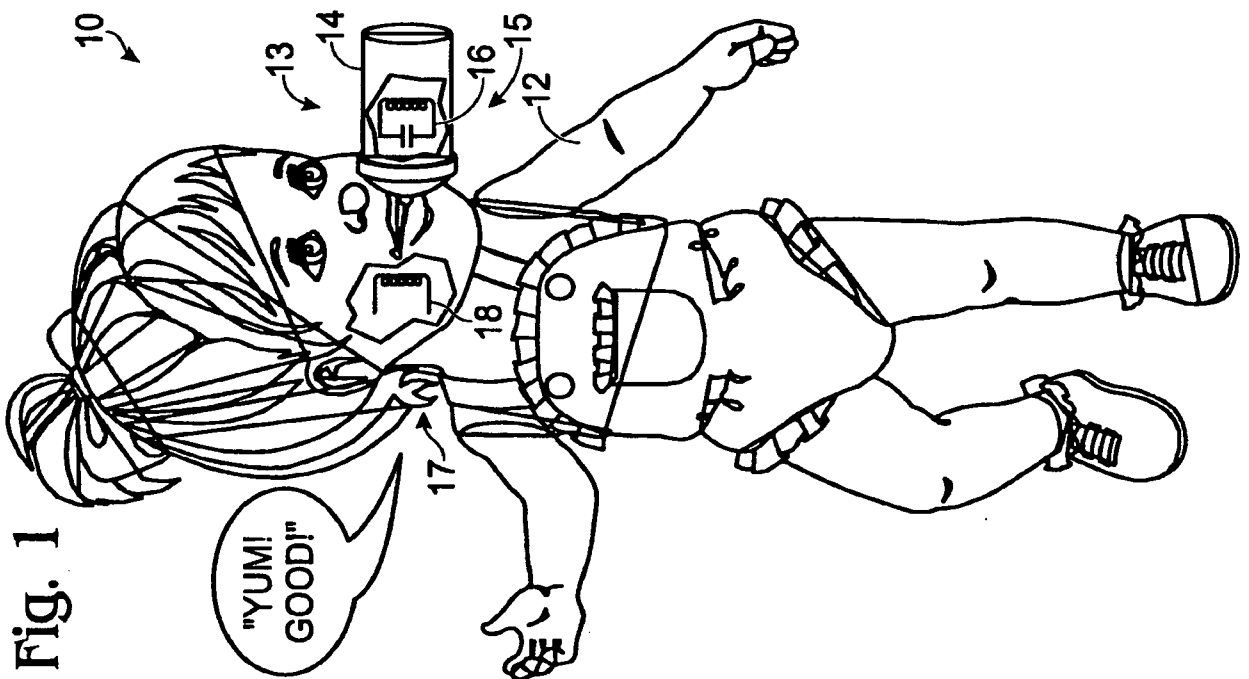
an output device for producing a sensible output in response to an output signal;

wherein the processor selects a first file from memory and sends a first output signal representative of the first file to the output device on the signal analysis circuit detecting a first frequency in a response signal; and

the processor selects a second file from memory and sends a second output signal representative of the second file to the output device on the signal analysis circuit detecting a second frequency in a response signal.

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20. The accessory identification system of claim 19 wherein the first inductor is physically spaced on the doll body and inductively uncoupled from the second conductor.
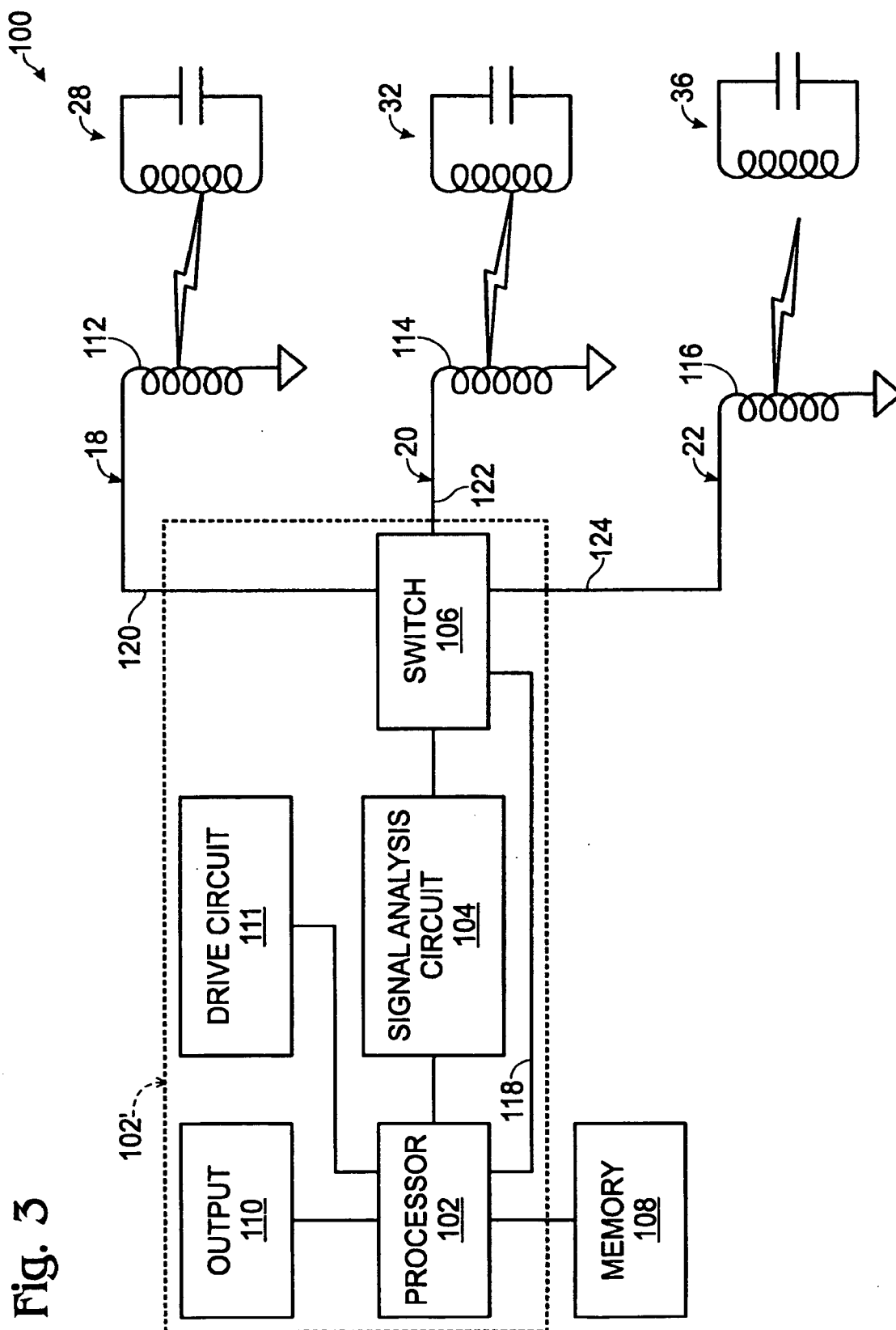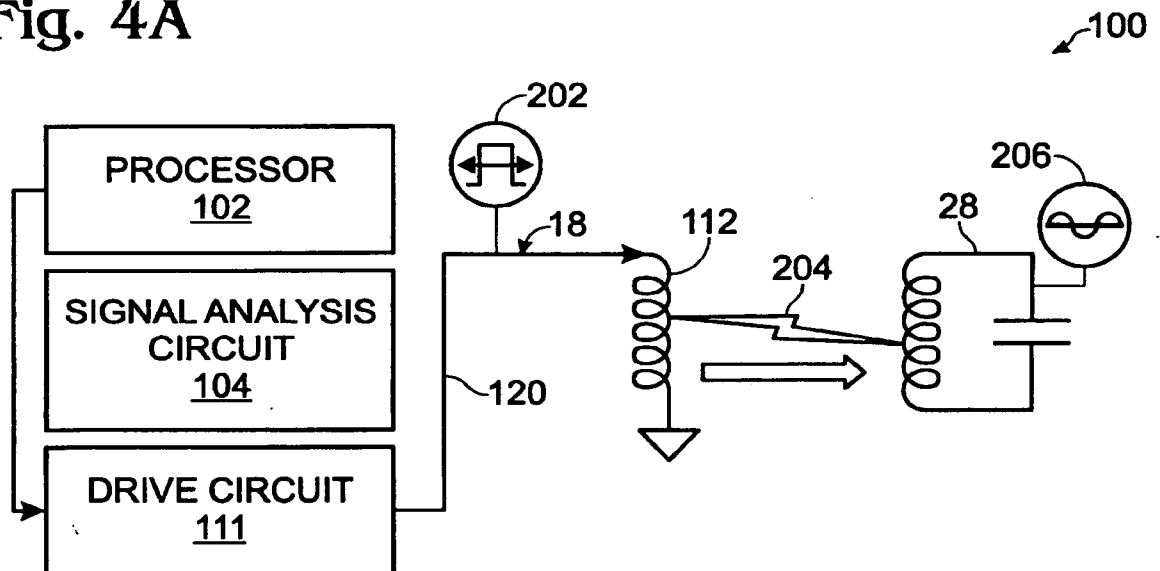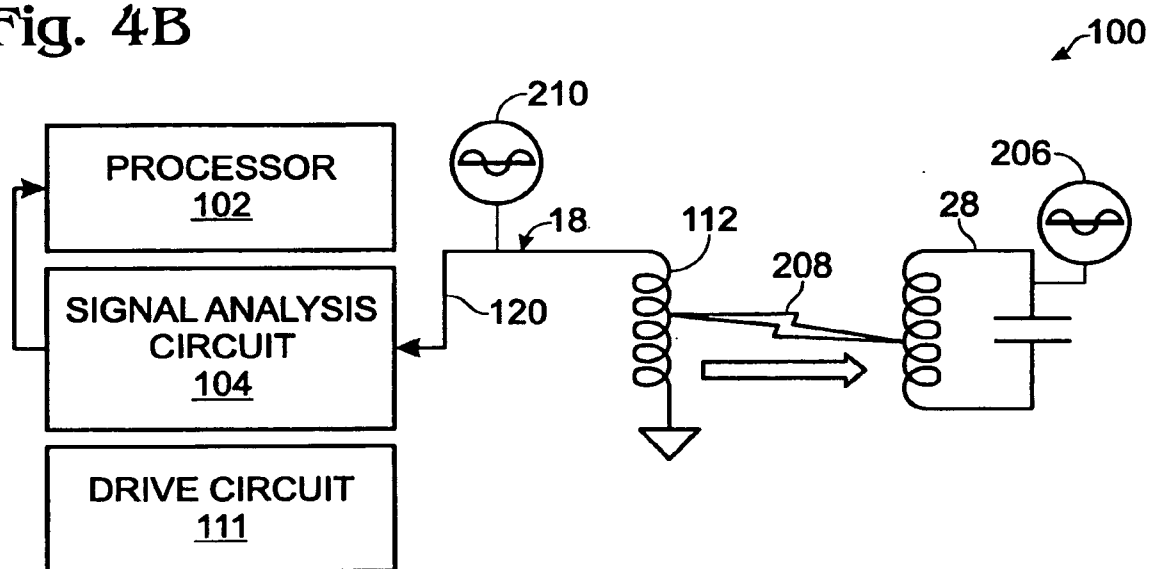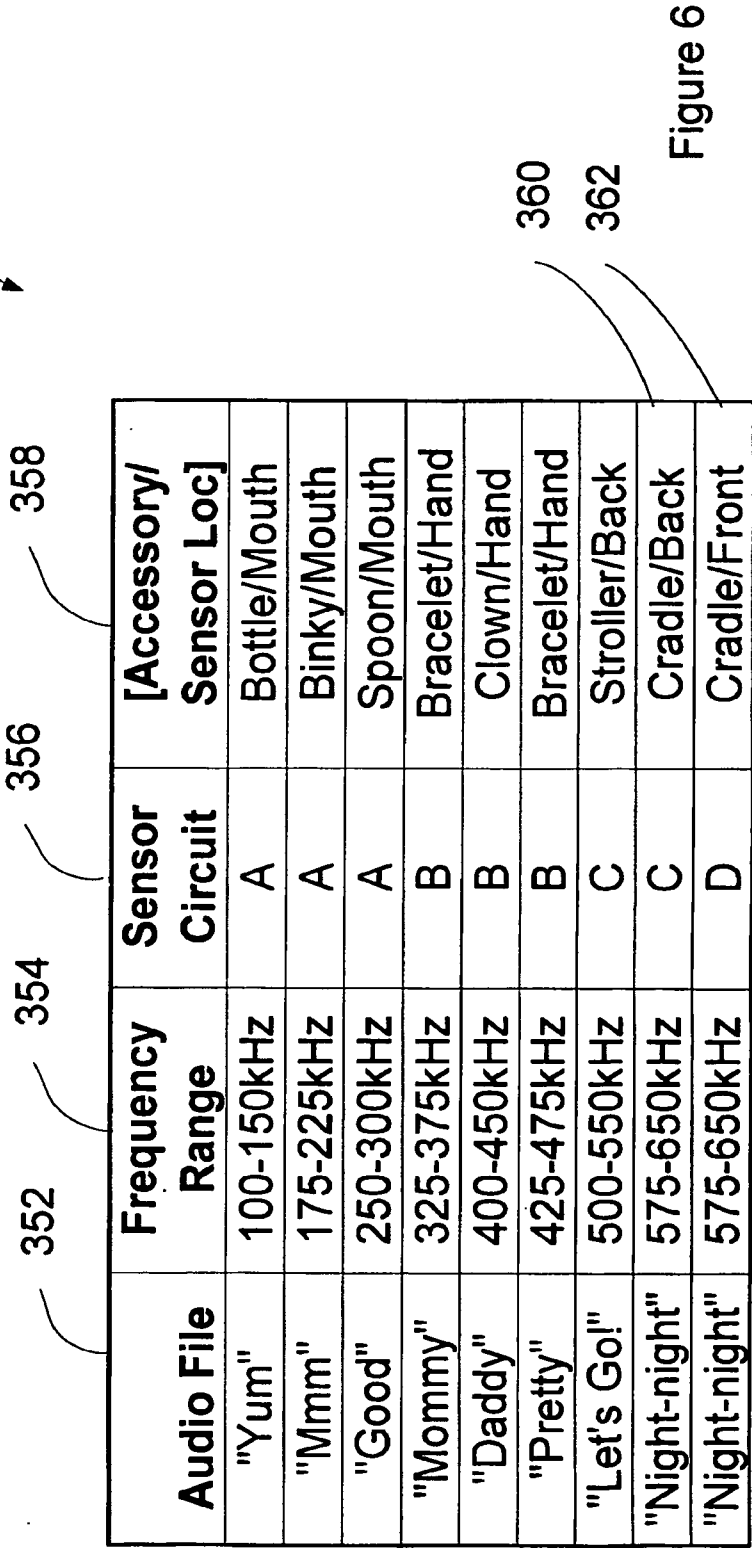
5

Fig. 2

Fig. 1

"YUM! GOOD!"

Fig. 3

Fig. 4A

Fig. 4B

200

304

302

Audio File	Frequency
"Yum"	400kHz
"Night-Night"	500kHz
"Mommy"	600kHz
"Daddy"	700kHz

Figure 5

300

358

356

354

352

360

362

Audio File	Frequency Range	Sensor Circuit	[Accessory/ Sensor Loc]
"Yum"	100-150kHz	A	Bottle/Mouth
"Mmm"	175-225kHz	A	Binky/Mouth
"Good"	250-300kHz	A	Spoon/Mouth
"Mommy"	325-375kHz	B	Bracelet/Hand
"Daddy"	400-450kHz	B	Clown/Hand
"Pretty"	425-475kHz	B	Bracelet/Hand
"Let's Go!"	500-550kHz	C	Stroller/Back
"Night-night"	575-650kHz	C	Cradle/Back
"Night-night"	575-650kHz	D	Cradle/Front

Figure 6

Figure 7