KEYING TOY VEHICLE ACCESSORIES

Inventors: Raphael Avila, Providence, RI (US);
            David Lewinski, Cumberland, RI (US);
            Francis Valerio, Swansea, MA (US)

Correspondence Address:
FISH & RICHARDSON P.C.
1425 K STREET, N.W.
11TH FLOOR
WASHINGTON, DC 20005-3500 (US)

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ABSTRACT
A toy vehicle includes a plug to recognize a keyed accessory of the toy vehicle, circuitry connected to the plug and operable to select a functional feature in response to recognition of the keyed accessory, and a feature generator to produce the selected functional feature.
KEYING TOY VEHICLE ACCESSORIES

BACKGROUND

[0001] This disclosure relates to the keying of toy vehicle accessories.

[0002] Many children and adults enjoy playing with miniaturized vehicles. In order to make miniaturized vehicles more enjoyable, toy designers often endow miniaturized vehicles with functional features. Exemplary functional features include illuminated headlights on miniaturized cars, smoking stacks on miniaturized trains, blazoning sirens on miniaturized fire trucks, and firing cannons on miniaturized military vehicles.

SUMMARY

[0003] The range of functional features of a toy vehicle can be expanded by keying toy accessories for recognition by the toy vehicle. When the toy vehicle recognizes the keyed accessory, a selected functional feature may be exhibited.

[0004] In one general aspect, a toy vehicle includes a plug to recognize a keyed accessory attached to the toy vehicle, circuitry connected to the plug and operable to select a functional feature in response to recognition of the keyed accessory, and a feature generator to produce the selected functional feature.

[0005] In another general aspect, a combat toy includes a plug to recognize a keyed weapon, circuitry connected to the plug and operable to select a functional feature in response to recognition of the keyed weapon, and a feature generator to produce the selected functional feature.

[0006] Implementations of the toys may include one or more of the following features. For example, the feature generator may be a speaker and the functional feature may be a sound. The selected functional feature may generally resemble a functional feature of a real accessory of a real vehicle.

[0007] The circuitry may be operable to select a unique functional feature in response to recognition of each keyed accessory by the plug. The plug may be an electronic switch. The toy vehicle may also include a mount to mount the keyed accessory to the toy vehicle. The mount may be shaped to establish an interference fit with the keyed accessory. The mount may include an alignment guide, such as an asymmetric opening in the mount, to ensure alignment of the keyed accessory.

[0008] The toy vehicle may be a toy combat vehicle, such as a toy helicopter, and the keyed accessory may be a keyed weapon, such as a missile or gun. The keyed accessory may be interchangeable with a second keyed accessory for recognition by the plug. The plug may include a pressure responsive surface or multiple pressure responsive surfaces.

[0009] The details of one or more implementations are set forth in the accompanying drawings and the description below. Other features and advantages will be apparent from the description and drawings, and from the claims.

DESCRIPTION OF DRAWINGS

[0010] FIG. 1 is a side view of a toy vehicle with a detachable missile.

[0011] FIG. 2 is a side view of the toy vehicle of FIG. 1 after detachment of the missile.

[0012] FIG. 3 is an enlarged diagrammatic view of a plug of the toy vehicle of FIG. 1.

[0013] FIG. 4 is a diagrammatic view of the keyed accessory missile of FIG. 1.

[0014] FIG. 5 is an enlarged diagrammatic view of the key of the keyed accessory missile of FIG. 1.

[0015] FIGS. 6-9 are side views of various keyed accessory weapons for use with the toy vehicle of FIG. 1.

[0016] FIG. 10 is a block diagram of internal components of the toy vehicle of FIG. 1.

[0017] FIG. 11 is a data structure for a sound feature database stored in the toy vehicle of FIG. 1.

[0018] FIG. 12 is a perspective view of another toy vehicle with a plug for recognizing a keyed accessory.

[0019] Like reference symbols in the various drawings indicate like elements.

DETAILED DESCRIPTION

[0020] Referring to FIG. 1, a toy vehicle 100 generally resembles a combat helicopter and includes a body casing 105, a cockpit 110, and a helicopter blade 115. Body casing 105 houses various electronic components including a speaker 120 and a button switch 125. Toy vehicle 100 also carries a detachable missile 125 that is keyed for recognition by electronic components housed by body casing 105.

[0021] Referring also to FIG. 2, which shows the toy vehicle 100 with the missile detached, a weapon mount 200 extends from the side of body casing 105 to support a key plug 205. Plug 205 recognizes a key of missile 125 that causes vehicle 100 to play an associated sound using speaker 120 when button 125 is pressed.

[0022] Referring to FIG. 3, plug 205 includes a flat top wall 300, a bottom wall 305, and a pair of opposing side walls 310 that together define a key receptacle chamber 315. Key receptacle chamber 315 opens at a slot 320 in the side of plug 205. Each side wall 310 includes a positioning groove 325 disposed a distance D below top wall 300 to make slot 320 asymmetric about a centerline C. Bottom wall 305 supports a row of four key switches 330. Each key switch 330 includes a contact face 335 that is substantially parallel to the top and bottom walls 300 and 305. Each key switch 330 is displaceable downward to change state upon the application of a force F to contact face 335.

[0023] Referring to FIG. 4, missile 125 includes a cylindrical body 400 that extends between a tip 405 and an exhaust 410 and is contoured to resemble a missile. Referring also to FIG. 5, missile 125 also includes a key 415 that extends longitudinally from the side of body 400. Key 415 is dimensioned to establish an interference fit with key receptacle chamber 315 to mount missile 125 to vehicle 100, as shown in FIG. 1.
As shown in FIG. 5, key 415 includes a front face 505, a pair of side faces 510, a flat face 515, and a keyed face 520 opposite the flat face 515. Each side face 510 includes a positioning protuberance 525. Protuberances 525 are disposed a distance D from flat face 515 and are dimensioned to slidably fit into positioning grooves 325 when properly aligned. Key 415 also includes up to four ridges 530 that extend outward from keyed face 520 to define a pattern that is recognizable by plug 205 of toy vehicle 100. Each ridge 530 includes a rounded front portion 535 that slopes toward keyed face 520 approaching front face 505.

Referring to FIGS. 6-9, other weapons that may be attached to vehicle 100 include a first rifle 600 (FIG. 6), a second rifle 700 (FIG. 7), a spear gun 800 (FIG. 8), and a chainsaw 900 (FIG. 9). Each weapon 600, 700, 800, 900 includes a key 415 with up to four ridges 530 that define a pattern recognizable by plug 205 of toy vehicle 100. Weapons 125, 600, 700, 800, and 900 may be dimensioned for use by an action figure (not shown) that is correspondingly dimensioned to fit in cockpit 110. Such joint sizing allows a child or other user to flexibly engage in a variety of play activities using toy vehicle 100.

Referring to FIG. 10, in addition to supporting speaker 120, button switch 125, and key switches 330, body casing 105 also houses a battery 1000, a controller 1005, and a memory 1010. Battery 1000 supplies power to the components inside body casing 105 and is replaceable upon removal of a face plate (not shown) on body casing 105. Key switches 330, button switch 125, speaker 120, and memory 1010 are coupled to controller 1005.

Referring also to FIG. 11, memory 1010 stores, in a format that is readable by controller 1005, a sound database 1100 of individually addressable sound feature data records 1105. Records 1105 each encode sounds generally resembling the sounds associated with a real item. For example, Sound Feature 1 may encode the sounds of a missile launch, flight, and explosion, while Sound Feature 2 may encode the sounds of a machine gun fire. Controller 1005 determines the state of key switches 330 to recognize an accessory that has been attached to key receptacle chamber 315. When button switch 125 is pressed, controller 1005 selects an associated sound feature record 1105 from memory 1010 and controls speaker 120 to generate sound corresponding to a converted version of the sound feature record.

In use, a child first selects one accessory 125, 600, 700, 800, or 900 and aligns key 415 of the selected weapon with slot 320 in body casing 105. When key 415 is properly aligned, positioning protuberances 525 smoothly enter positioning grooves 325 as the operator slides key 415 into slot 320. However, if the selected accessory is misaligned, for example, if key 415 is inverted so that keyed face 520 would abut flat top wall 300 when inserted, positioning protuberances 525 are unable to enter positioning grooves 325 and insertion is prevented. This prevents a young child from inadvertently preventing recognition of key 415 by plug 205 by sliding flat face 515 over contact faces 335.

As key 415 slides into slot 320, one or more rounded front portions 535 of ridges 530 apply a force F to corresponding contact faces 335 to displace one or more key switches 330 downward. This downward displacement changes the state of the corresponding key switches 330 to define a pattern that is detected by controller 1005 to recognize the selected accessory 125, 600, 700, 800, or 900. When button switch 125 is pressed, controller 1005 selects a sound feature record 1105 corresponding to the pressed switches 330 from memory 1010, and causes the speaker 120 to play the associated sound. Since accessories are keyed for recognition by plug 205, the range of sound features can be expanded to include unique or semi-unique sounds for a variety of accessories.

A number of implementations have been described. Nevertheless, it will be understood that various modifications may be made. For example, more than four key switches may be used. The accessories need not be mounted to the vehicle at the plug. For example, non-contact wireless recognition plugs may be used. Functional features other than sounds, or additional sound features, also may be exhibited. For example, vehicle 100 may play rotors sounds when helicopter blade 115 is rotated. Keys 415 may be mounted to accessories 125, 600, 700, 800, or 900 at any relative orientation. Any of a variety of vehicles or action figures may recognize accessories. For example, referring to FIG. 12, an armored vehicle 1200 may include a plug 205. The number of unique functional features may correspond to the number of unique keys recognizable by the plug. For example, sound database 1100 may include sixteen sound feature data records 1105. Of these sound feature data records 1105, fifteen sound feature data records may encode sounds generally resembling the sounds associated with a real item, while the sixteenth sound may indicate the absence of a real item and may be selected by controller 1005 when the plug is empty. There may be more than one accessory for each functional feature. For example, rifles 600 and 700 may be identically keyed and controller 1005 may select the same sound feature data record 1105 when either rifle 600 and 700 is recognized by the plug. Pistols, flamethrowers, and grenade launchers may also serve as accessories.

Accordingly, other implementations are within the scope of the following claims.

What is claimed is:

1. A toy vehicle comprising:
   a plug to recognize a keyed accessory attached to the toy vehicle;
   circuitry connected to the plug and operable to select a functional feature in response to recognition of the keyed accessory; and
   a feature generator to produce the selected functional feature.

2. The toy vehicle of claim 1 wherein:
   the feature generator comprises a speaker; and
   the functional feature is a sound.

3. The toy vehicle of claim 1 wherein the selected functional feature generally resembles a functional feature of a real accessory of a real vehicle.

4. The toy vehicle of claim 1 wherein the plug comprises an electronic switch.

5. The toy vehicle of claim 1 further comprising a mount to mount the keyed accessory to the toy vehicle.

6. The toy vehicle of claim 5 wherein the mount is shaped to establish an interference fit with the keyed accessory.
7. The toy vehicle of claim 5 wherein the mount comprises an alignment guide to ensure alignment of the keyed accessory.

8. The toy vehicle of claim 7 wherein the alignment guide comprises an asymmetric opening in the mount.

9. The toy vehicle of claim 1 wherein:
   the toy vehicle comprise a toy combat vehicle; and
   the keyed accessory comprises a keyed weapon.

10. The toy vehicle of claim 1 wherein the keyed accessory is interchangeable with a second keyed accessory for recognition by the plug.

11. The toy vehicle of claim 1 wherein the plug comprises a pressure responsive surface.

12. The toy vehicle of claim 11 wherein the plug comprises multiple pressure responsive surfaces.

13. The toy vehicle of claim 1 further comprising the keyed accessory.

14. A combat toy comprising:
   a plug to recognize a keyed weapon;
   circuitry connected to the plug and operable to select a functional feature in response to recognition of the keyed weapon; and
   a feature generator to produce the selected functional feature.

15. The combat toy of claim 14 wherein the combat toy comprises a toy combat vehicle.

16. The combat toy of claim 15 wherein the toy combat vehicle comprises a toy combat helicopter.

17. The combat toy of claim 14 further comprising the keyed weapon.

18. The combat toy of claim 14 wherein:
   the feature generator comprises a speaker; and
   the functional feature is a sound.

19. The combat toy of claim 14 wherein the selected functional feature generally resembles a functional feature of a real weapon.

20. The combat toy of claim 14 wherein the circuitry is operable to select a unique functional feature in response to recognition of each keyed weapon.

21. The combat toy of claim 14 further comprising a mount to mount the keyed weapon.

22. The toy vehicle of claim 14 wherein the keyed weapon is interchangeable with a second keyed weapon for recognition by the plug.

23. A method for entertaining a child comprising:
   recognizing a keyed accessory of a toy vehicle;
   selecting a functional feature in response to the recognition of the keyed accessory; and
   producing the selected functional feature.

24. The method of claim 23 wherein producing the selected functional feature comprising emitting a sound feature.

25. The method of claim 23 wherein selecting the functional feature comprises selecting a unique functional feature in response to recognition of each keyed accessory.

26. The method of claim 23 wherein recognizing the keyed accessory comprises closing an electrical switch.

27. The method of claim 23 further comprising mounting the keyed accessory to the toy vehicle.

28. The method of claim 27 wherein mounting the keyed accessory comprises guiding the keyed accessory into a mount on the toy vehicle.

29. The method of claim 23 further comprising interchangeably recognizing a second keyed accessory of the toy vehicle.

30. The method of claim 23 wherein recognizing the keyed accessory comprises recognizing a keyed weapon of a toy combat vehicle.

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