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(54) STEERING CONTROL SENSOR FOR AN AUTOMATIC VACUUM CLEANER

(76) Inventor: **Jason Yan**, Taipei (TW)

Correspondence Address:
PAI PATENT & TRADEMARK LAW FIRM
1001 FOURTH AVENUE, SUITE 3200
SEATTLE, WA 98154 (US)

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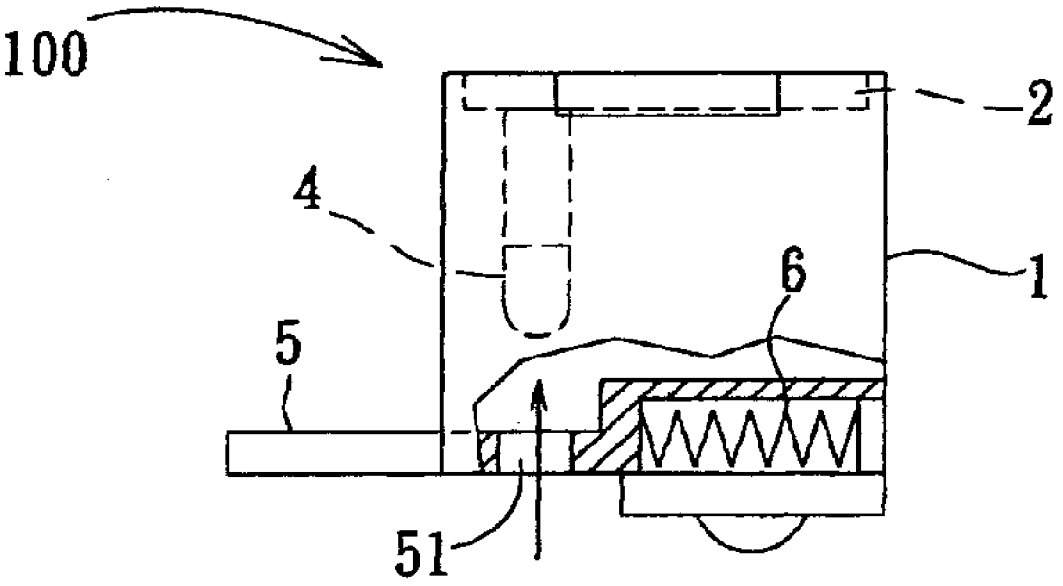
(57) **ABSTRACT**

A steering control sensor installed in an automatic vacuum cleaner for controlling the steering direction of the automatic vacuum cleaner is disclosed to include a LED for emitting light onto the floor to produce a reflected light signal, a photo sensor for receiving the light signal, and a spring-supported contact member, which allows the photo sensor to receive the light signal when the automatic vacuum cleaner encounters no obstacle when moving on the floor, or blocks the light signal from the photo sensor to cause the photo sensor to output a signal to drive the automatic vacuum cleaner to change the steering direction when the automatic vacuum cleaner encounters an obstacle during movement.



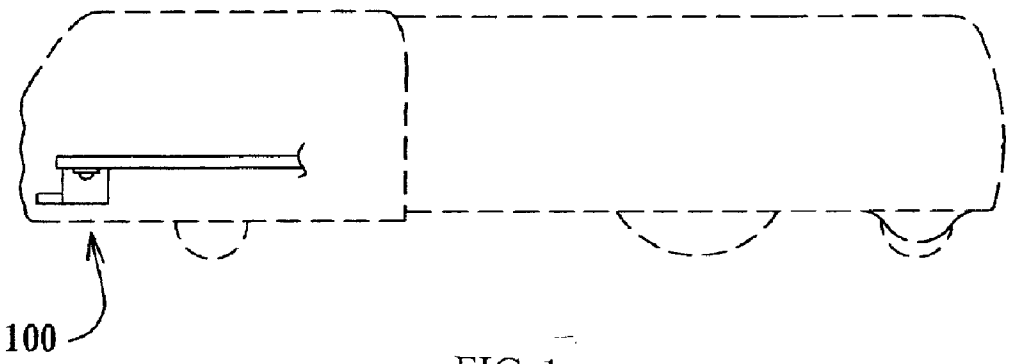


FIG. 1

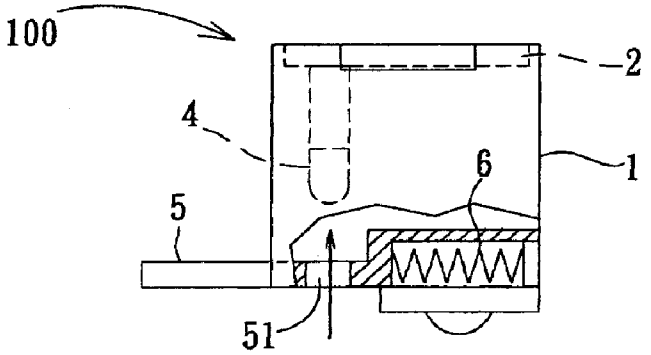


FIG. 3

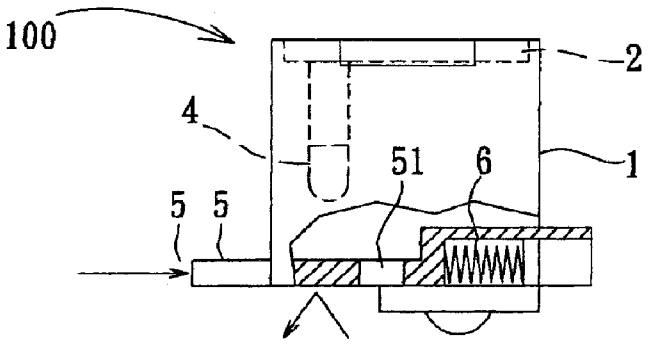


FIG. 4

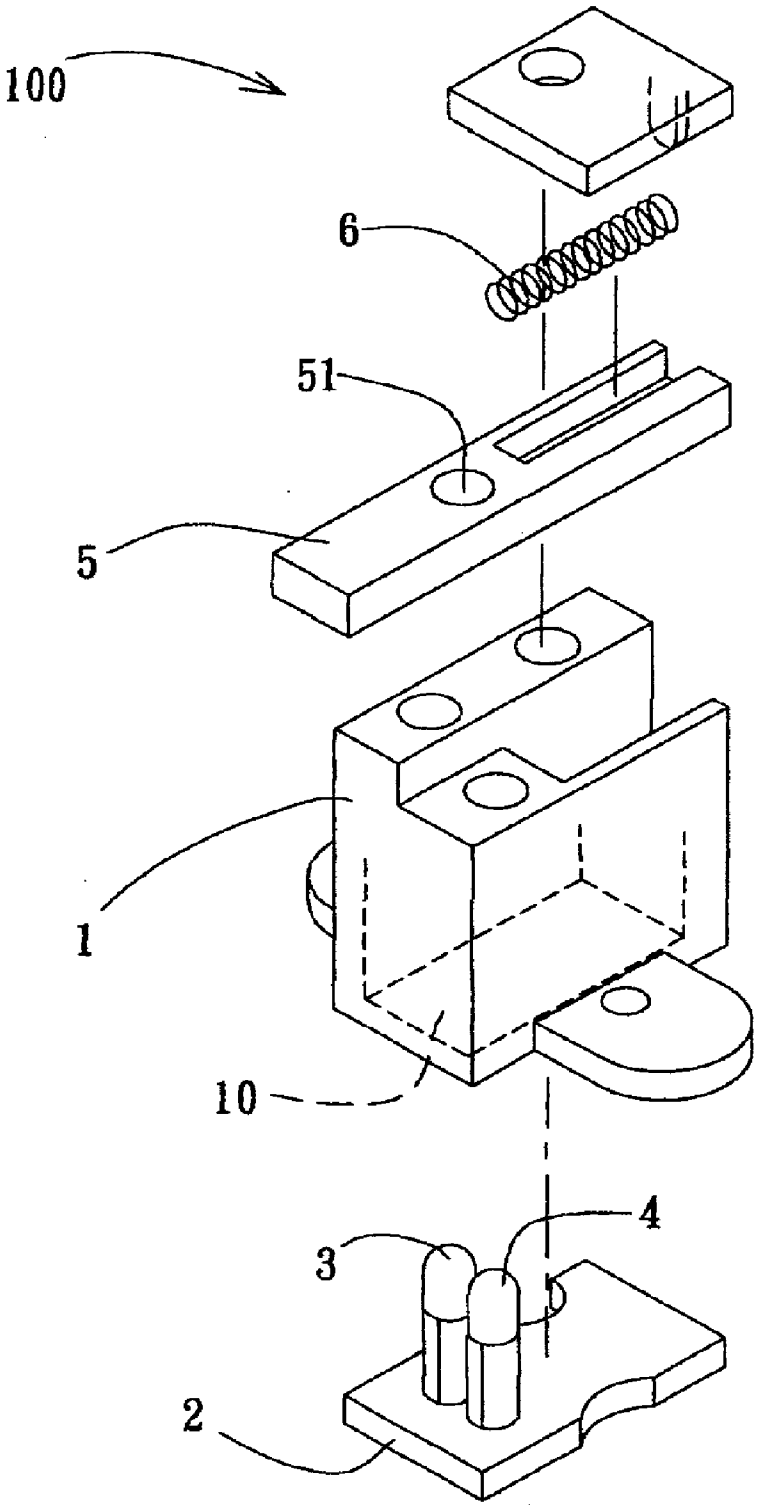


FIG. 2

STEERING CONTROL SENSOR FOR AN AUTOMATIC VACUUM CLEANER

BACKGROUND OF THE INVENTION

[0001] 1, Field of the Invention

[0002] The present invention relates to an automatic vacuum cleaner and more specifically to a control sensor for use in an automatic vacuum cleaner to control the steering of the automatic vacuum cleaner.

[0003] 2. Description of the Related Art

[0004] Most people spend a lot of time in working and have a relatively shorter time for entertainment. Therefore, cleaning one's own house is a heavy work to most people. In order to help people clean the house without labor, automatic vacuum cleaners have been developed. These automatic vacuum cleaners move on the floor automatically, and draw in air and dust together when moving on the floor. Similar designs are seen in Taiwan Patent Nos. 7220383 and M247107. An automatic vacuum cleaner has multiple infrared transmitters and receivers for detecting a floor edge or an obstacle in the traveling path. Because multiple infrared transmitters and infrared receivers are used, the cost of the automatic vacuum cleaner is high.

SUMMARY OF THE INVENTION

[0005] The present invention has been accomplished under the circumstances in view. It is the main object of the present invention to provide a steering control sensor for automatic vacuum cleaner, which automatically drives the automatic vacuum cleaner to change the steering direction when the automatic vacuum cleaner reaches a floor edge or encounters an obstacle. To achieve this and other objects of the present invention, the steering control sensor is installed in an automatic vacuum cleaner and electrically connected to a central processing unit of the automatic vacuum cleaner for driving the automatic vacuum cleaner to change the steering direction when the automatic vacuum cleaner reaches a floor edge or is stopped against an obstacle or a wall during movement on the floor. The steering control sensor comprises a casing mounted in the automatic vacuum cleaner, a circuit board mounted inside the casing, a light emitting device installed in the circuit board and adapted to emit light onto the floor on which the automatic vacuum cleaner is placed so as to produce a light signal, a photo sensor installed in the circuit board and adapted to detect the light signal, and a contact member mounted in the casing and movable relative to the casing and the photo sensor between an extended open position where the contact member receives no external pressure and a retracted close position where the contact member is stopped against an external object. The photo sensor detects the presence of the light signal and outputs a first signal to the CPU of the automatic vacuum cleaner when the contact member receives no external pressure and is moved to the extended open position; the contact member blocks the light signal from the photo sensor and the photo sensor outputs a second signal to the CPU of the automatic vacuum cleaner when the contact member is stopped against an external object and moved to the retracted close position.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] FIG. **1** is a schematic drawing showing a steering control sensor installed in a vacuum cleaner according to the present invention.

[0007] FIG. **2** is an exploded view of the steering control sensor according to the present invention.

[0008] FIG. **3** is a schematic drawing of the present invention, showing the contact member of the steering control sensor in the open position.

[0009] FIG. **4** is similar to FIG. **3**, but showing the contact member moved to the close position.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0010] Referring to FIG. **1**, a steering control sensor **100** is installed in the front bottom side of an automatic vacuum cleaner to detect the surroundings. The steering control sensor **100** outputs a signal to the CPU (not shown) of the automatic vacuum cleaner when the automatic vacuum cleaner moves to a floor edge or is stopped against an obstacle or a wall, causing the CPU to change the steering direction of the automatic vacuum cleaner.

[0011] Referring to FIGS. **2~4**, the steering control sensor **100** comprises a casing **1**, a circuit device **2**, a light emitting device **3**, a photo sensor **4**, and a contact member **5**.

[0012] The casing **1** is mounted in the front bottom side of the vacuum cleaner, defining an accommodating chamber **10**.

[0013] The circuit device **2** is a circuit board mounted inside the accommodating chamber **10** of the casing **1**.

[0014] The light emitting device **3** according to this embodiment is a LED (light emitting diode) soldered to the circuit board **2** and adapted to emit light onto the floor.

[0015] The photo sensor **4** is installed in the circuit board **2**, and adapted to detect the reflection of the light emitted onto the floor by the light emitting device **3** and to convert the received reflected light into a corresponding electronic signal.

[0016] The contact member **5** is supported on a spring member **6** in the casing **1** and movable relative to the casing **1** between an open position (the extended position) and a close position (the retracted position). The contact member **5** has a through hole **51**. When the contact member **5** is in the open (extended) position as shown in FIG. **3**, the through hole **51** is in vertical alignment with the photo sensor **4**, and the photo sensor **4** can catch the light reflected by the floor. On the contrary, when the contact member **5** is in the close (retracted) position as shown in FIG. **4**, the through hole **51** is not in vertical alignment with the photo sensor **4**, i.e., the contact member **5** blocks the reflected light from the floor, and the photo sensor **4** receives no signal of the reflected light.

[0017] When the contact member **5** is in the open (extended) position as the automatic vacuum cleaner is moving on the floor, the photo sensor **4** keeps receiving the light signal of the light emitted by the light emitting device **3** and reflected by the floor. When the automatic vacuum cleaner moves to a floor edge, the photo sensor **4** receives no reflection of light. At this time, the photo sensor **4** outputs a signal to the CPU of the automatic vacuum cleaner, causing the CPU to change the steering direction of the automatic vacuum cleaner. Further, if the contact member **5** is stopped against an obstacle or a wall during forward movement of

the automatic vacuum cleaner, the contact member **5** is forced backwards against the spring **6** and moved to the close (retracted) position to block the photo sensor **4**, thereby causing the photo sensor **4** to change the output signal to the CPU of the automatic vacuum cleaner, and therefore the CPU drives the automatic vacuum cleaner to change the steering direction.

[**0018**] As indicated above, with the use of the retractable design of the contact member **5**, the steering control sensor **100** automatically drives the automatic vacuum cleaner to change the steering direction when the automatic vacuum cleaner reaches a floor edge or is stopped against an obstacle or a wall during movement.

[**0019**] Although a particular embodiment of the invention has been described in detail for purposes of illustration, various modifications and enhancements may be made without departing from the spirit and scope of the invention.

What is claimed is:

1. A steering control sensor installed in an automatic vacuum cleaner and electrically connected to a central processing unit of said automatic vacuum cleaner for driving said automatic vacuum cleaner to change the steering direction when said automatic vacuum cleaner reaches a floor edge or is stopped against an obstacle or a wall during movement on a floor, the steering control sensor comprising:

a casing mounted in said automatic vacuum cleaner;

a circuit board mounted inside said casing;

a light emitting device installed in said circuit board and adapted to emit light onto the floor on which said automatic vacuum cleaner is placed, thereby producing a light signal;

a photo sensor installed in said circuit board and adapted to detect said light signal; and

a contact member mounted in said casing and movable relative to said casing and said photo sensor between an extended open position where said contact member receives no external pressure, and a retracted close position where said contact member is stopped against an external object;

wherein said photo sensor detects the presence of said light signal and outputs a first signal to the CPU of said automatic vacuum cleaner when said contact member receives no external pressure and is moved to said extended open position; and said contact member blocks said light signal from said photo sensor and said photo sensor outputs a second signal to the CPU of said automatic vacuum cleaner when said contact member is stopped against an external object and moved to said retracted close position.

2. The steering control sensor as claimed in claim 1, further comprising a spring member mounted in said casing and adapted to support said contact member in said extended open position.

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