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(54) **FIXING STRUCTURE AND ELECTRONIC DEVICE THEREWITH**

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H05K 7/00	(2006.01)
H04R 1/02	(2006.01)
H05K 7/20	(2006.01)
H05K 7/12	(2006.01)

(52) **U.S. Cl.**

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(58) **Field of Classification Search**

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USPC 361/807, 679.48, 679.49, 679.51, 361/679.46, 679.01, 679.02, 679.26, 679.3, 361/679.55, 679.56; 418/101; 454/237
See application file for complete search history.

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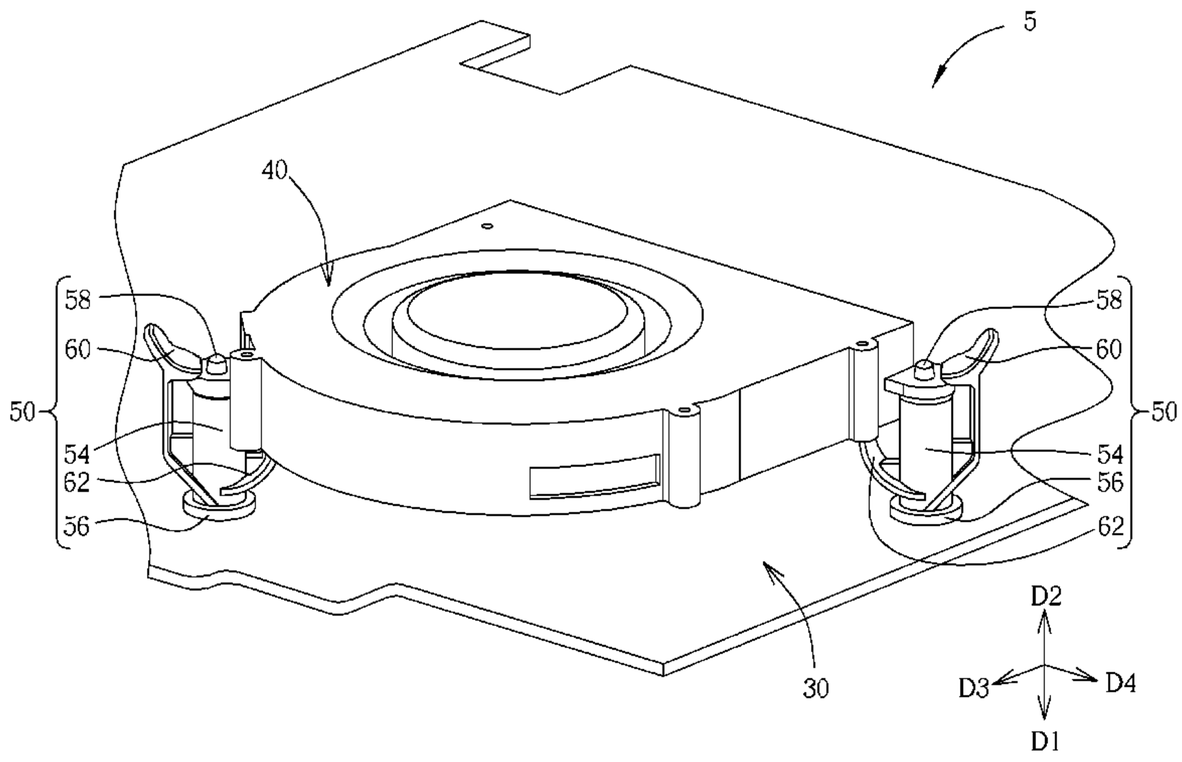
(57) **ABSTRACT**

An electronic device includes an electronic component and a fixing structure. The electronic component includes a fixing portion, and a fixing hole is formed on the fixing portion. The fixing structure is for fixing the electronic component on a base plate. The fixing structure includes a main body, a fastening portion, a fixing pillar and an engaging component. A supporting plane is formed on an end of the main body. The fastening portion is connected to the other end of the main body and for fastening the main body on the base plate. The fixing pillar is disposed on the supporting plane. The fixing pillar is inserted into the fixing hole for constraining the electronic component. The engaging component is connected to a side of the main body, and the engaging component presses the electronic component so as to engage the electronic component on the supporting plane.

18 Claims, 7 Drawing Sheets



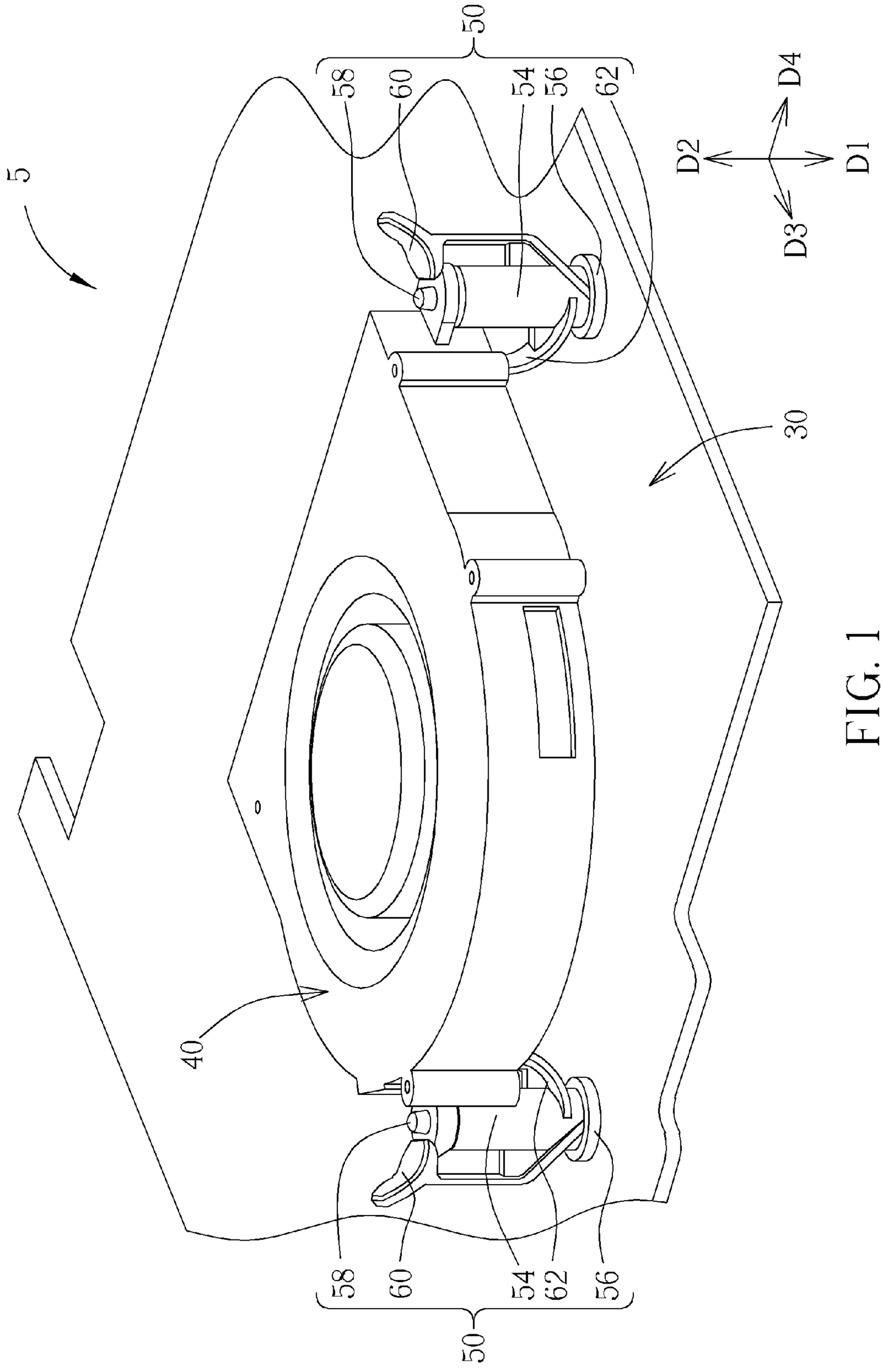


FIG. 1

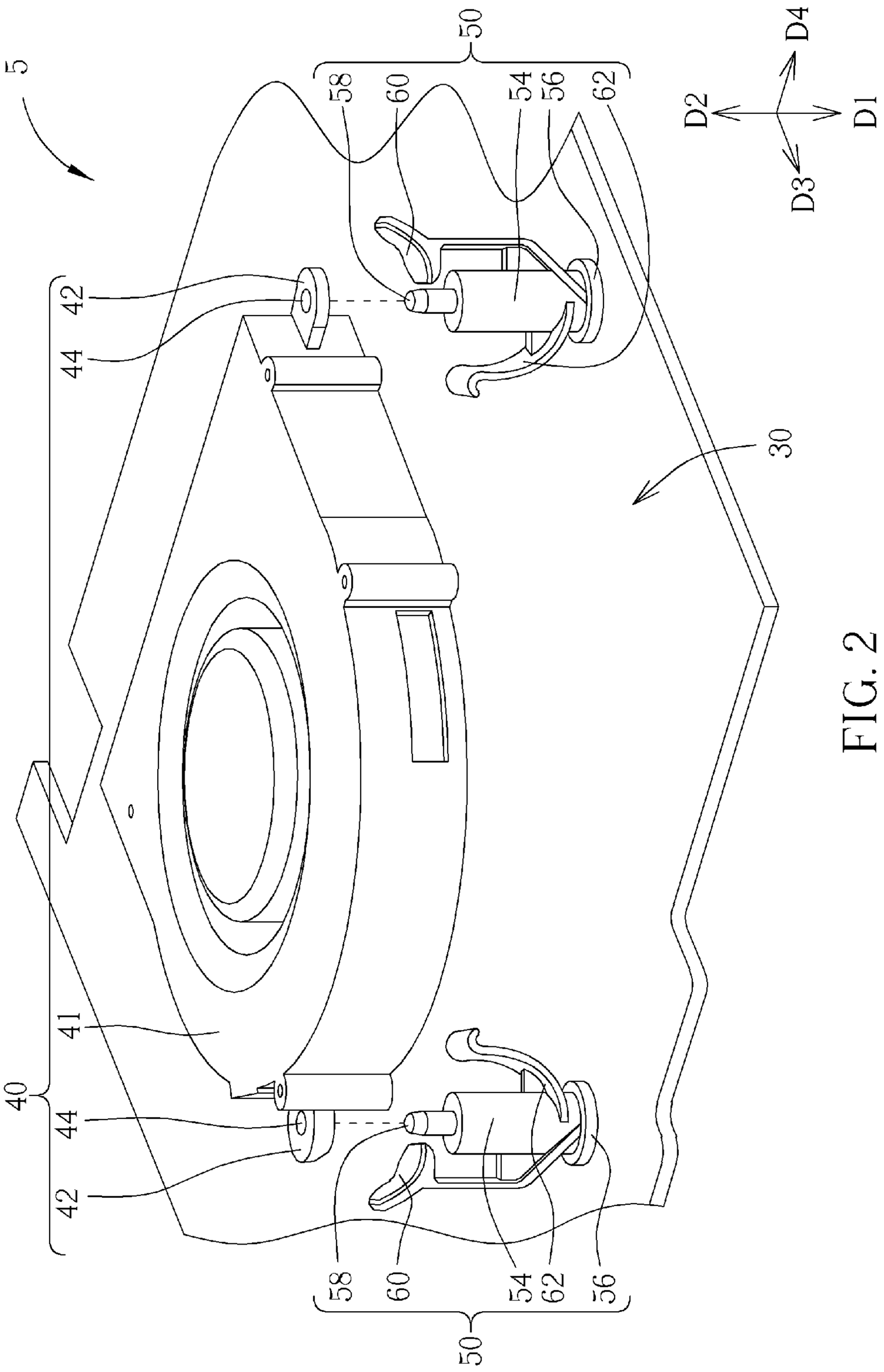


FIG. 2

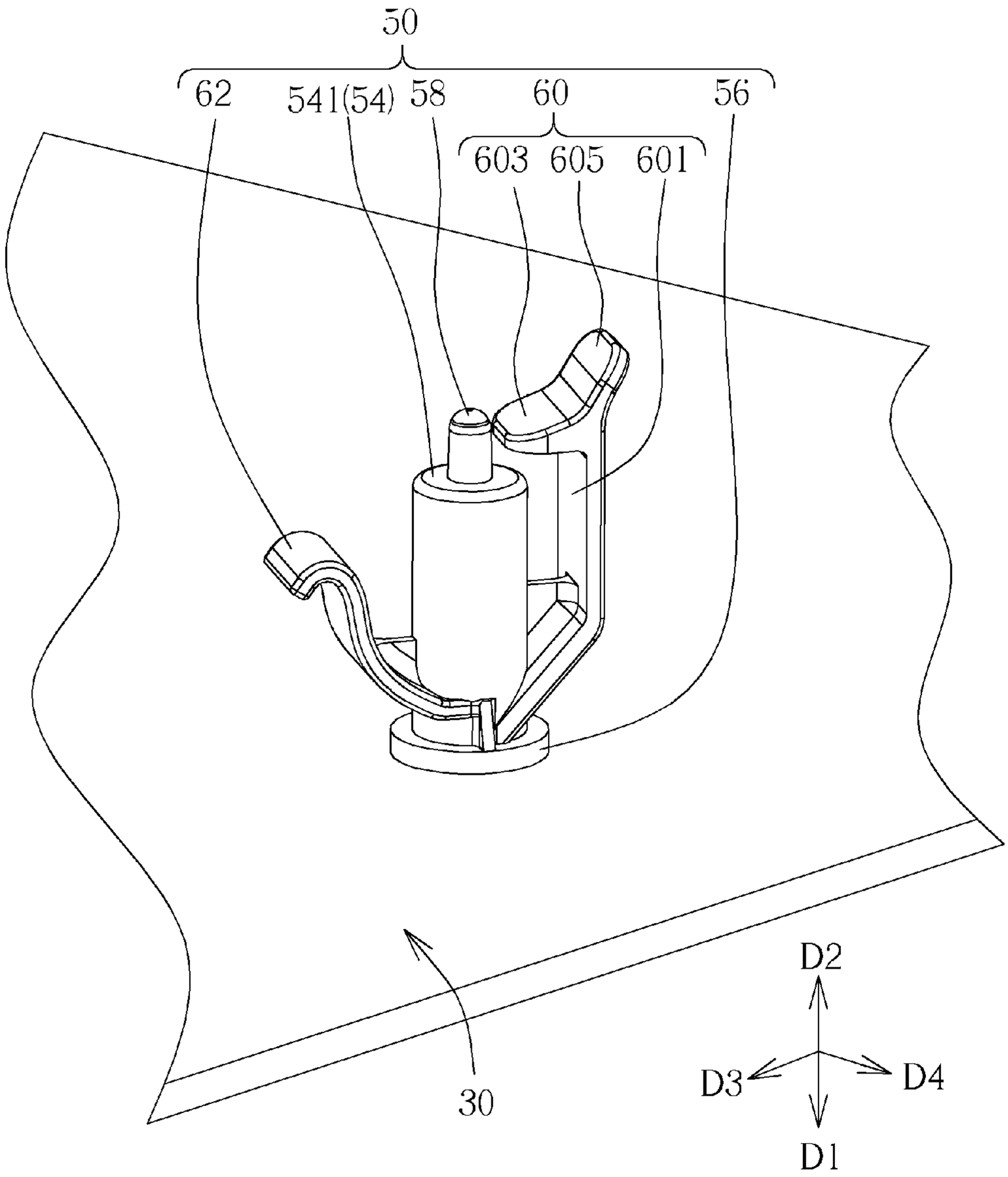


FIG. 3

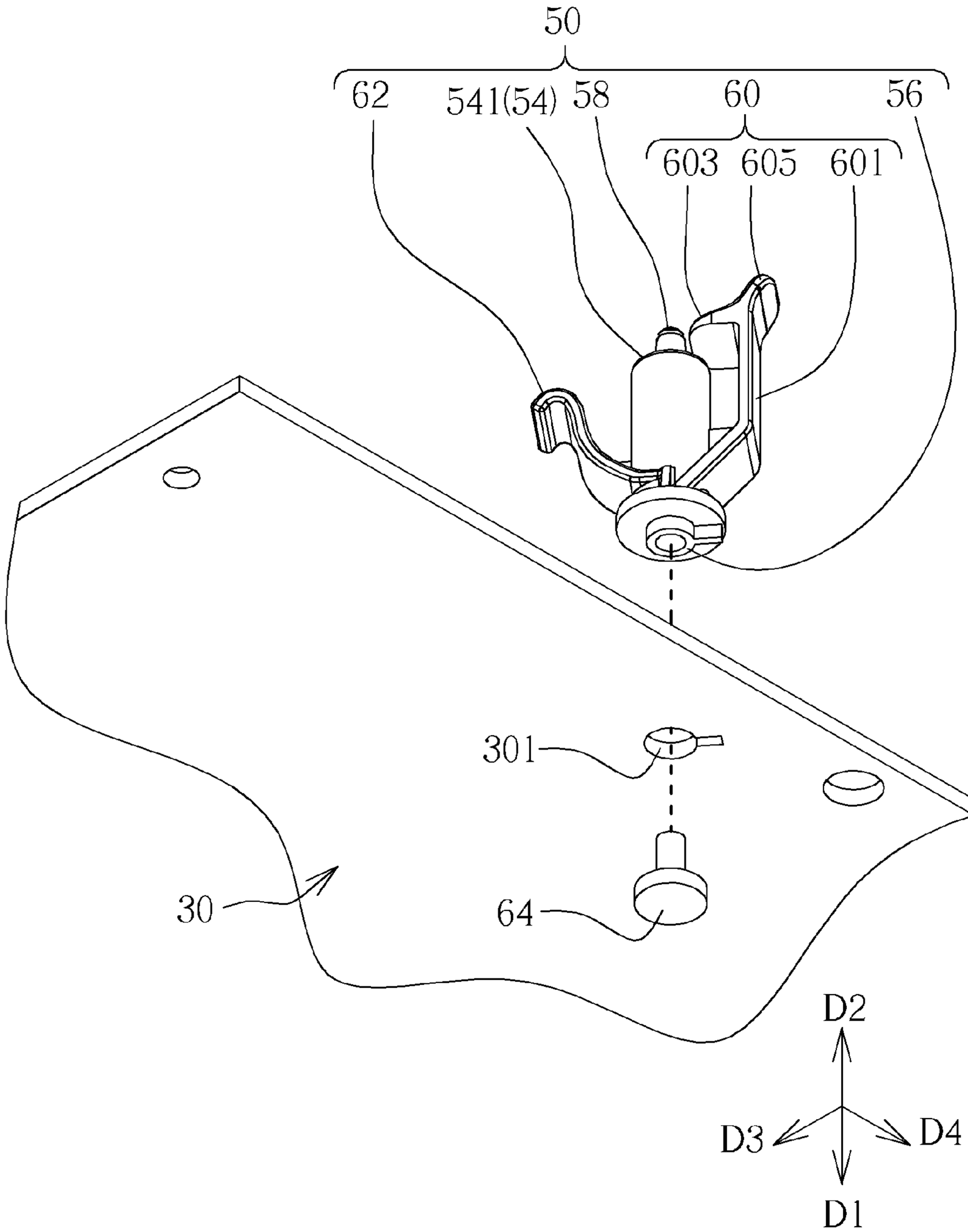


FIG. 4

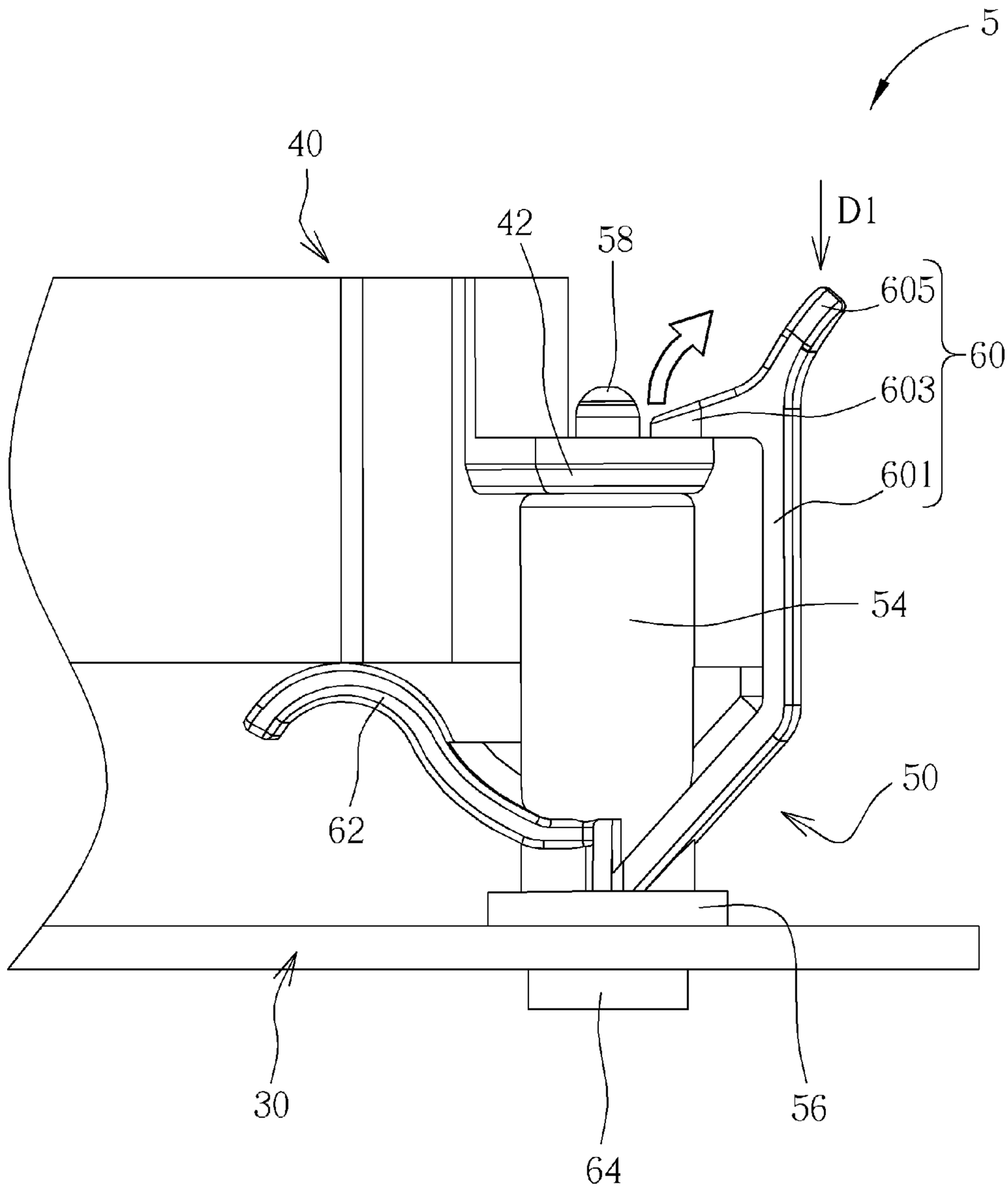


FIG. 5

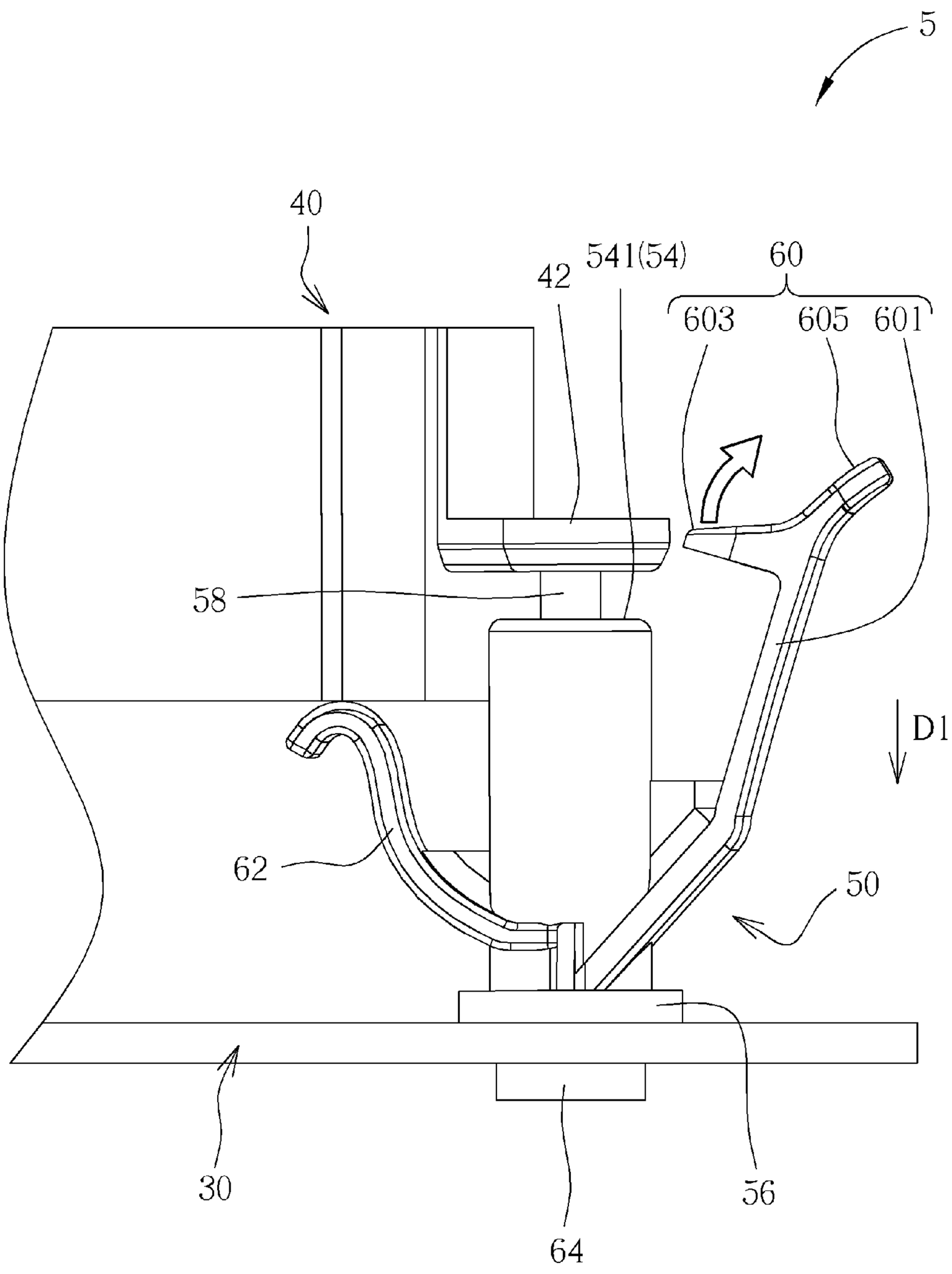


FIG. 6

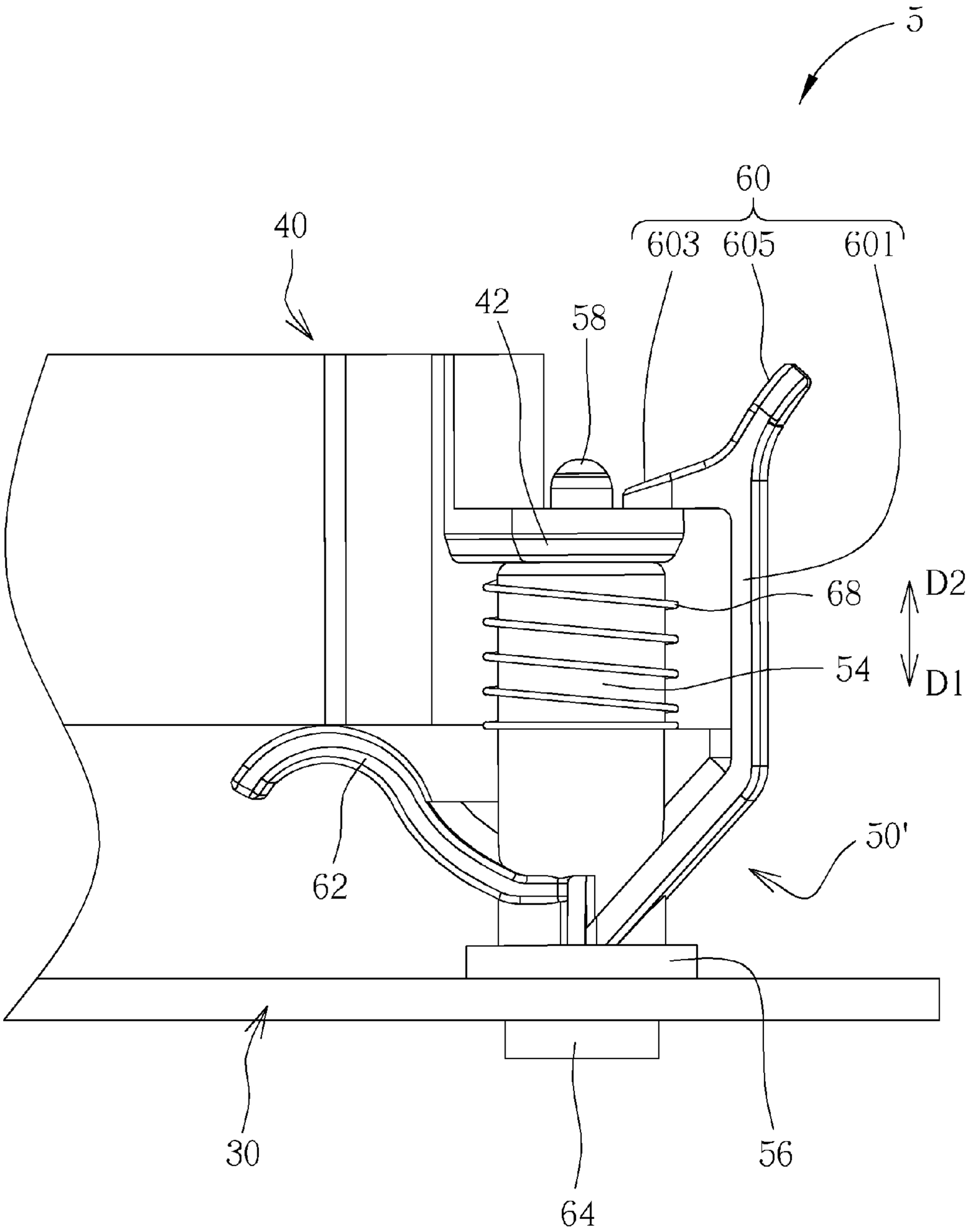


FIG. 7

FIXING STRUCTURE AND ELECTRONIC DEVICE THEREWITH

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a fixing structure and an electronic device therewith for fixing an electronic component, and more specifically, to a fixing structure and an electronic device therewith for convenient assembly.

2. Description of the Prior Art

With the progress of technology, consumer electronic products have various functions. A common electronic product, such as a personal computer or a notebook computer, includes variety of internal electronic components so as to fit different requirements. However, the heat generated by the internal electronic components affects the stability and efficiency of the electronic product during operation. Hence, it is necessary to install a cooling device on a circuit board or on a casing of the electronic product, such as a conventional fan device, to reduce the temperature of the internal electronic components during operation, so that the electronic product can operate normally. The fan device is preferably to be assembled and disassembled easily and rapidly without tools, so that a user can conveniently maintain the fan device. However, the conventional fan device is often assembled with screws, and it results in inconvenience in disassembly and increase of cost. Therefore, it is an important issue to design a fixing structure of the fan device for easy assembly and disassembly with low cost.

SUMMARY OF THE INVENTION

The present invention is to provide a fixing structure and an electronic device therewith for fixing an electronic component to solve the above drawbacks.

According to the disclosure, a fixing structure is for fixing an electronic component on a base plate. The electronic component has a fixing hole, and the fixing structure includes a main body, a fastening portion, a fixing pillar and an engaging component. The supporting plane is formed on an end of the main body. The fastening portion is connected to the other end of the main body and for fixing the main body on the base plate. The fixing pillar is disposed on the supporting plane of the main body and for inserting into the fixing hole of the electronic component, so as to constrain the electronic component from moving in a direction parallel to the supporting plane. The engaging component is connected to a side of the main body. The engaging component presses a part of the electronic component in a first direction perpendicular to the supporting plane as the fixing pillar is inserted into the fixing hole of the electronic component, so as to engage the electronic component on the supporting plane.

According to the disclosure, the electronic component further includes a fixing portion, the fixing portion includes the fixing hole, and the engaging component presses the fixing portion of the electronic component so as to engage the fixing portion on the supporting plane.

According to the disclosure, the fixing structure further includes a resilient supporting portion connected to another side of the main body different from the side connected to the engaging component, the resilient supporting portion supports the electronic component in a second direction opposite to the first direction with the supporting plane of the main body, and the engaging component presses the resilient supporting portion as the engaging component engages the electronic component on the supporting plane so that the resilient supporting portion resiliently deforms and provides resilient restoring force to the electronic component. The resilient supporting portion drives the electronic component to move in the first direction to separate the electronic component from the supporting plane as the engaging component is not engaged with the electronic component.

According to the disclosure, the main body, the fastening portion, the fixing pillar, the engaging component and the resilient supporting portion are integrally formed.

According to the disclosure, the fastening portion is a thread hole, the fixing structure further includes a fastening component, a through hole is formed on the base plate, and the fastening component is inserted into the through hole to fasten on the fastening portion so as to fix the main body on the base plate.

According to the disclosure, the engaging component includes an engaging portion, an resilient arm portion and an operation portion, the engaging portion is for engaging with the fixing portion, an end of the resilient arm portion is connected to the main body and the other end is connected to the engaging portion, the operation portion is connected to the engaging portion, and the operation portion drives the engaging portion to move as the operation portion is pressed so that the engaging portion separates from the fixing portion.

According to the disclosure, the fixing structure further includes a resilient component disposed on the main body and contacting with the main body and the fixing portion, and the resilient component absorbs vibration generated by the electronic component during operation.

According to the disclosure, the fixing structure further includes a resilient component disposed on the main body and contacting with the main body and the fixing portion, the resilient component provides resilient restoring force to the electronic component as the engaging component is engaged with the electronic component, and the resilient component absorbs vibration generated by the electronic component during operation.

According to the disclosure, an electronic device includes a base plate, an electronic component and a fixing structure. The electronic component includes a fixing portion, and a fixing hole is formed on the fixing portion. The fixing structure is for fixing the electronic component on the base plate. The fixing structure includes a main body, a fastening portion, a fixing pillar and an engaging component. The supporting plane is formed on an end of the main body. The fastening portion is connected to the other end of the main body and for fixing the main body on the base plate. The fixing pillar is disposed on the supporting plane of the main body and for inserting into the fixing hole of the electronic component, so as to constrain the electronic component from moving in a direction parallel to the supporting plane. The engaging component is connected to a side of the main body. The engaging component presses a part of the electronic component in a first direction perpendicular to the supporting plane as the fixing pillar is inserted into the fixing hole of the electronic component, so as to engage the electronic component on the supporting plane.

According to the disclosure, the electronic component is a cooling fan module or a speaker component.

Therefore, the electronic component, such as a cooling fan module, can be installed on the fixing structure directly. The main body and the fixing pillar can engage with the electronic component so as to constrain the electronic component from moving in the three axial directions perpendicular to one another, so that the electronic component can be firmly fixed on the fixing structure. Because the electronic component is directly installed on the fixing structure, it is unnecessary to

fix the electronic component with any tools or screws, and the assembly of the electronic device becomes more convenient. In addition, the resilient supporting component and the resilient component can provide resilient recovering force to drive the electronic component to separate from the fixing structure more easily during disassembly. Furthermore, the main body, the fasting potion, the fixing pillar, the engaging component and the resilient supporting component portion can be integrally formed so as to reduce the cost of mold manufacture and assembly. In conclusion, the present invention provides the fixing structure and the electronic device therewith capable of easy assembly and disassembly with low cost.

These and other objectives of the present invention will no doubt become obvious to those of ordinary skill in the art after reading the following detailed description of the preferred embodiment that is illustrated in the various figures and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a schematic diagram of an electronic device according to the embodiment of the present invention.

FIG. **2** is a partial exploded diagram of the electronic device according to the embodiment of the present invention.

FIG. **3** is a diagram of a fixing structure according to the embodiment of the present invention.

FIG. **4** is an exploded diagram of the fixing structure according to the embodiment of the present invention.

FIG. **5** and FIG. **6** are partial enlarged diagrams of the electronic device in different statuses according to the embodiment of the present invention.

FIG. **7** is a diagram of a fixing structure according to another embodiment of the present invention.

DETAILED DESCRIPTION

Please refer to FIG. **1** and FIG. **2**. FIG. **1** is a schematic diagram of an electronic device **5** according to the embodiment of the present invention. FIG. **2** is a partial exploded diagram of the electronic device **5** according to the embodiment of the present invention. The electronic device **5** includes abase plate **30**, an electronic component **40**, and at least one fixing structure **50** for fixing the electronic component **40** on the base plate **30**. In this embodiment, the electronic component **40** can be a cooling fan module. The electronic component **40** includes a body **41** and at least one fixing portion **42**, the fixing portion **42** protrudes from the body **41**, and a fixing hole **44** is formed on the fixing portion **42**. In this embodiment, the electronic component **40** includes two fixing portions **42**, and each fixing portion **42** can be a protruding ear. The electronic component **40** is not limited to a cooling fan module, and the electronic component **40** can be a speaker component, a storage device or an internal electronic component for computer operation. The fixing structure **50** is for fixing the electronic component **40**, and the fixing structure **50** includes a main body **54**, a fastening portion **56**, a fixing pillar **58** and an engaging component **60**. In this embodiment, the electronic component **40** includes two fixing portions **42**, and the electronic device **5** includes two fixing structures **50** correspondingly. The numbers and positions of the above-mentioned components are not limited to this embodiment, and it depends on the practical requirement.

Please refer to FIG. **2** and FIG. **3**. FIG. **3** is a diagram of the fixing structure **50** according to the embodiment of the present invention. A supporting plane **541** is formed on an end of the main body **54**. A fastening portion **56** is connected to the other end of the main body **54** and is for fixing the main body **54** on the base plate **30**. The engaging component **60** is connected to a side of the main body **54**, and the engaging component **60** includes a resilient arm portion **601** and an engaging portion **603**. An end of the resilient arm portion **601** is connected to the main body **54**, and a free end of the resilient arm portion **601** is connected to the engaging portion **601**. The engaging portion **603** presses the fixing portion **42** of the electronic component **40** in a first direction D**1** perpendicular to the supporting plane **541** as the fixing pillar **58** is inserted into the fixing hole **44** of the electronic component **40**, so as to engage the fixing portion **42** of the electronic component **40** on the supporting plane **541** to constrain the electronic component **40** from moving perpendicularly to the supporting plane **541**. Simultaneously, the supporting surface **541** supports the fixing portion **42** in a second direction D**2** opposite to the first direction D**1**.

The engaging portion **603** can be a plate structure, a hook structure or a collar structure. The fixing pillar **58** is disposed on the supporting plane **541** of the main body **54** and for inserting into the fixing hole **44** of the electronic component **42**, so as to constrain the electronic component **40** from moving in a third direction D**3** parallel to the supporting plane **541** and a fourth direction D**4** perpendicular to the third direction D**3**, so that a parallel movement of the electronic component **40** can be constrained. The first direction D**1**, the third direction D**3** and the fourth direction D**4** are perpendicular to one another, so that the main body **54**, the fixing pillar **58** and the engaging portion **603** constrain the electronic component **40** from moving in three directions of the first direction D**1**, the second direction D**2** and the third direction D**3**, that is the perpendicular direction and the parallel direction. Hence, the electronic component **40** can be constrained in three axial directions, and the electronic component **40** can be firmly fixed on the fixing structure **50**.

Furthermore, the fixing structure **50** includes a resilient supporting portion **62** connected to another side of the main body **54** different from the side connected to the engaging component **60**. In this embodiment, the main body **54**, the fastening portion **56**, the fixing pillar **58**, the engaging component **60** and the resilient supporting portion **62** can be integrally formed so as to reduce the cost of mold manufacture and assembly, and the above-mentioned components can be made of resilient plastic material. The resilient supporting portion **62** supports the electronic component **40** in the second direction D**2** with the supporting plane **541** of the main body **54**. The electronic component **40** presses the resilient supporting portion **62** as the engaging portion **603** engages the fixing portion **42** of the electronic component **40** on the supporting plane **541**, so that the resilient supporting portion **62** resiliently deforms and provides resilient restoring force to the electronic component **40** in the second direction D**2** so as to support the electronic component **40**. In addition, the resilient supporting portion **62** drives the electronic component **40** to move in the second direction D**2** to separate the electronic component **40** from the supporting plane **541** as the engaging portion **603** is not engaged with the electronic component **40**, so that the electronic component **40** can be disassembled more easily.

Please refer to FIG. **4**. FIG. **4** is an exploded diagram of the fixing structure **50** according to the embodiment of the present invention. The fixing structure **50** further includes a fastening component **64**, a through hole **301** is formed on the base plate **30**, and the fastening component **64** is inserted into the through hole **301** to fasten on the fastening portion **56** so as to fix the main body **54** on the base plate **30**. In this embodiment, the fastening portion **56** can be a thread hole, and the fastening component **64** can be correspondingly a

screw for screwing in the thread hole. The present invention is not limited to this embodiment, the fastening portion **56** can be a tenon or a hook structure, and the fastening component **64** can be a C-shaped ring. The fastening component **64** can be omitted, and the fastening portion **56** can be directly fixed on the base plate **30**. Besides, the base plate **30** can be a circuit board or a casing such as a computer casing, and it depends on the practical requirements.

Please refer to FIG. **5** and FIG. **6**. FIG. **5** and FIG. **6** are partial enlarged diagrams of the electronic device **5** in different statuses according to the embodiment of the present invention. The engaging component **60** further includes an operation portion **605** connected to the engaging portion **603**. The operation portion **605** can be operated to drive the engaging portion **603** to move so that the engaging portion **603** can engage with or separate from the fixing portion **42** of the electronic component **40**. For example, the operation portion **605** can be pressed downward in the first direction D**1**, and the operation portion **605** drives the engaging portion **603** to rotate in a direction of an arrow shown in FIG. **5** so as to separate the engaging portion **603** from the fixing portion **42**. That is, the status of the engaging portion **603** shown in FIG. **5** is switched to another status in FIG. **6**. Simultaneously, the resilient supporting portion **62** provides resilient restoring force to the electronic component **40** so as to drive the electronic component **40** to move in the second direction D**2**. That is, the electronic component **40** pops up to separate from the supporting plane **541** and the engaging portion **603**, so that the electronic component **40** can be disassembled and taken away much easier.

Please refer to FIG. **7**. FIG. **7** is a diagram of a fixing structure **50'** according to another embodiment of the present invention. Components with same structure of the fixing structure **50'** as ones in the fixing structure **50** of the aforesaid embodiment are not reiterated here. The difference between the fixing structure **50'** in this embodiment and the fixing structure **50** of the aforesaid embodiment is that the fixing structure **50'** further includes a resilient component **68** sheathing on the main body **54**. Two ends of the resilient component **68** respectively contact with a protruding structure of the man body **54**, such as a root portion of the resilient arm portion **601** or somewhere appropriate, and the fixing portion **42**. The resilient component **68** absorbs vibration generated by the electronic component **40** during operation, as the electronic component **40** is pressed by the engaging portion **603** in the first direction D**1**. The resilient component **68** further provides resilient restoring force to the electronic component **40** as the operation portion **605** drives the engaging portion **603** to rotate to separate the engaging portion **603** from the fixing portion **42**, so that the electronic component **40** can be disassembled and taken away much easier. The resilient component **68** can be a spring or an elastic rubber. In another embodiment, the resilient component **68** can be disposed inside the main body **54**. Besides, in another embodiment, the fixing structure **50** can include no resilient supporting portion **62** and only include the resilient component **68**.

In contrast to the prior art, the electronic component, such as a cooling fan module, can be installed on the fixing structure directly. The main body and the fixing pillar can engage with the electronic component so as to constrain the electronic component from moving in the three axial directions perpendicular to one another, so that the electronic component can be firmly fixed on the fixing structure. Because the electronic component is directly installed on the fixing structure, it is unnecessary to fix the electronic component with any tools or screws, and the assembly of the electronic device becomes more convenient. In addition, the resilient supporting component and the resilient component can provide resilient recovering force to drive the electronic component to separate from the fixing structure more easily during disassembly. Furthermore, the main body, the fasting portion, the fixing pillar, the engaging component and the resilient supporting component portion can be integrally formed so as to reduce the cost of mold manufacture and assembly. In conclusion, the present invention provides the fixing structure and the electronic device therewith capable of easy assembly and disassembly with low cost.

Those skilled in the art will readily observe that numerous modifications and alterations of the device and method may be made while retaining the teachings of the invention. Accordingly, the above disclosure should be construed as limited only by the metes and bounds of the appended claims.

What is claimed is:

1. A fixing structure for fixing an electronic component on a base plate, the electronic component having a fixing hole, and the fixing structure comprising:

a main body, a supporting plane being formed on an end of the main body;

a fastening portion connected to the other end of the main body and for fixing the main body on the base plate;

a fixing pillar disposed on the supporting plane of the main body and for inserting into the fixing hole of the electronic component, so as to constrain the electronic component from moving in a direction parallel to the supporting plane; and

an engaging component connected to a side of the main body, the engaging component pressing apart of the electronic component in a first direction perpendicular to the supporting plane as the fixing pillar is inserted into the fixing hole of the electronic component, so as to engage the electronic component on the supporting plane.

2. The fixing structure of claim **1**, wherein the electronic component further comprises a fixing portion, the fixing portion comprises the fixing hole, and the engaging component presses the fixing portion of the electronic component so as to engage the fixing portion on the supporting plane.

3. The fixing structure of claim **1**, further comprising a resilient supporting portion connected to another side of the main body different from the side connected to the engaging component, the resilient supporting portion supporting the electronic component in a second direction opposite to the first direction with the supporting plane of the main body, the engaging component pressing the resilient supporting portion as the engaging component engages the electronic component on the supporting plane so that the resilient supporting portion resiliently deforms and provides resilient restoring force to the electronic component, and the resilient supporting portion driving the electronic component to move in the second direction to separate the electronic component from the supporting plane as the engaging component is not engaged with the electronic component.

4. The fixing structure of claim **3**, wherein the main body, the fastening portion, the fixing pillar, the engaging component and the resilient supporting portion are integrally formed.

5. The fixing structure of claim **1**, wherein the fastening portion is a thread hole, the fixing structure further comprises a fastening component, a through hole is formed on the base plate, and the fastening component is inserted into the through hole to fasten on the fastening portion so as to fix the main body on the base plate.

6. The fixing structure of claim **2**, wherein the engaging component comprises an engaging portion, a resilient arm

portion and an operation portion, the engaging portion is for engaging with the fixing portion, an end of the resilient arm portion is connected to the main body and the other end is connected to the engaging portion, the operation portion is connected to the engaging portion, and the operation portion drives the engaging portion to move as the operation portion is pressed so that the engaging portion separates from the fixing portion.

7. The fixing structure of claim **3**, further comprising a resilient component disposed on the main body and contacting with the main body and the fixing portion, the resilient component absorbing vibration generated by the electronic component during operation.

8. The fixing structure of claim **2**, further comprising a resilient component disposed on the main body and contacting with the main body and the fixing portion, the resilient component providing resilient restoring force to the electronic component as the engaging component is engaged with the electronic component, and the resilient component absorbing vibration generated by the electronic component during operation.

9. The fixing component of claim **1**, wherein the base plate is a circuit board or a casing.

10. An electronic device comprising:

a base plate;

an electronic component comprising a fixing portion, and a fixing hole being formed on the fixing portion; and

a fixing structure for fixing the electronic component on the base plate, the fixing structure comprising:

a main body, a supporting plane being formed on an end of the main body;

a fastening portion connected to the other end of the main body and for fixing the main body on the base plate;

a fixing pillar disposed on the supporting plane of the main body and for inserting into the fixing hole of the electronic component, so as to constrain the electronic component from moving in a direction parallel to the supporting plane; and

an engaging component connected to a side of the main body, the engaging component pressing a part of the electronic component in a first direction perpendicular to the supporting plane as the fixing pillar is inserted into the fixing hole of the electronic component, so as to engage the electronic component on the supporting plane.

11. The electronic device of claim **10**, wherein the fixing structure further comprises a resilient supporting portion connected to another side of the main body different from the side connected to the engaging component, the resilient supporting portion supports the electronic component in a second direction opposite to the first direction with the supporting plane of the main body, the engaging component presses the resilient supporting portion as the engaging component engage the electronic component on the supporting plane so that the resilient supporting portion resiliently deforms and provides resilient restoring force to the electronic component, and the resilient supporting portion drives the electronic component to move in the second direction to separate the electronic component from the supporting plane as the engaging component is not engaged with the electronic component.

12. The electronic device of claim **11**, wherein the main body, the fastening portion, the fixing pillar, the engaging component and the resilient supporting portion are integrally formed.

13. The electronic device of claim **10**, wherein the fastening portion is a thread hole, the fixing structure further comprises a fastening component, a through hole is formed on the base plate, and the fastening component is inserted into the through hole to fasten on the fastening portion so as to fix the main body on the base plate.

14. The electronic device of claim **10**, wherein the engaging component comprises an engaging portion, a resilient arm portion and an operation portion, the engaging portion is for engaging with the fixing portion, an end of the resilient arm portion is connected to the main body and the other end is connected to the engaging portion, the operation portion is connected to the engaging portion, and the operation portion drives the engaging portion to move as the operation portion is pressed so that the engaging portion separates from the fixing portion.

15. The electronic device of claim **11**, wherein the fixing structure further comprises a resilient component disposed on the main body and contacting with the main body and the fixing portion, and the resilient component absorbs vibration generated by the electronic component during operation.

16. The electronic device of claim **10**, wherein the fixing structure further comprises a resilient component disposed on the main body and contacting with the main body and the fixing portion, the resilient component provides resilient restoring force to the electronic component as the engaging component is engaged with the electronic component, and the resilient component absorbs vibration generated by the electronic component during operation.

17. The electronic device of claim **10**, wherein the base plate is a circuit board or a casing.

18. The electronic device of claim **10**, wherein the electronic component is a cooling fan module or a speaker component.

* * * * *