



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
10.02.2010 Bulletin 2010/06

(51) Int Cl.:
H01Q 1/08 (2006.01) **H01Q 1/24** (2006.01)
H01Q 1/38 (2006.01) **H01Q 1/22** (2006.01)

(21) Application number: **08161977.7**

(22) Date of filing: **07.08.2008**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA MK RS

(72) Inventors:
• **Cheng, Chia-Hua**
231, Xindian City (TW)
• **Li, Chih-Chi**
231, Xindian City (TW)

(71) Applicants:
• **Giga-Byte Communications, Inc.**
Hsin-Tien, Taipei County 231 (TW)
• **Giga-Byte Technology Co., Ltd.**
Taipei-Hsien
231 (TW)

(74) Representative: **Viering, Jentschura & Partner**
Postfach 22 14 43
80504 München (DE)

(54) **Wireless transceiver having double rotary antenna**

(57) This invention relates to a double rotary antenna and a wireless transceiver carrying the antenna. The antenna includes a sleeve, a shaft, a spring, a pivot portion and an antenna portion. The sleeve is provided to be connected with a circuit board of the wireless transceiver and has a first retaining portion. The shaft is received in the sleeve and capable of linearly moving and rotating and has a first end extending outside the sleeve and a

second end formed with a second retaining portion. The spring is received around the shaft and biased between the first and second retaining portions. The pivot portion is engaged with the first end of the shaft and capable of swinging with respect to the shaft in order to drive the shaft to move linearly. Additionally, the antenna portion is secured on the pivot portion and configured to transmit or receive wireless signals.

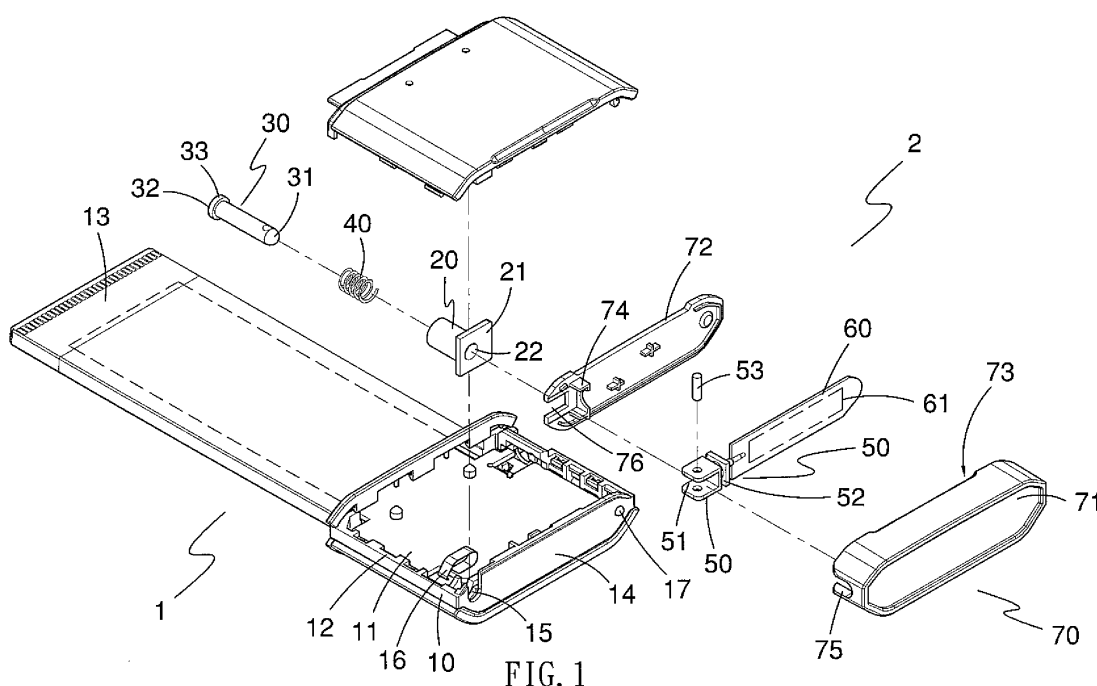


FIG. 1

Description

BACKGROUND OF INVENTION

1. Field of Invention

[0001] This invention relates to a wireless transceiver having a rotary antenna and, particularly, to a wireless transceiver having a double rotary antenna.

2. Related Prior Art

[0002] Wireless transceivers are in growing use, many of them having a rotary or swivel antenna so that the antenna can be directed in the most favorable direction for transmission and receipt of signals. An example of the swivel antenna is found in Taiwan Pat. No. M317082, wherein the antenna is carried by a connection member which is attached to an electronic device. The direction of swiveling of the antenna is basically in line with a longitudinal axis of the connection member or perpendicular to the connection member, generally about an axis that is perpendicular to the longitudinal axis of the connection member. This results in a system in which rotation of the antenna is limited.

[0003] Also, a conventional swivel antenna tends to lose itself positioning, desired characteristic so that the antenna will not stay in a desired position, but will rather fall downwardly by gravity, since the retention provided to the swivel antenna can wear, and the frictional retention is reduced. In an attempt to remedy this, the swivel antenna disclosed in the aforementioned Taiwan Pat. No. M317082 further includes a positioning button and a spring biased by the positioning button. The positioning button abuts against an end of the connection member in order to cause the antenna to be retained in position.

[0004] Another example of swivel antenna is of the formed disclosed in Taiwan Pat. No. M299931. The antenna includes a spring and a metallic buffer sustained by the spring. The metallic buffer frictionally upholds a bottom of the antenna portion in order to cause the antenna portion to be retained in a desired position. Nevertheless, the swivel antenna may still be oriented in limited angles.

SUMMARY OF INVENTION

[0005] In this invention, a wireless transceiver carrying a double rotary antenna is provided. The wireless transceiver includes a body and the antenna. The body includes a housing and a circuit board disposed in the housing. The housing of the body has a receiving portion and a connecting portion. The receiving portion defines an opening in a sidewall. The connecting portion is to be detachably plugged into a slot of a computer. The antenna includes a sleeve, a shaft, a spring, a pivot portion and an antenna portion. The sleeve is disposed in the receiving portion, electrically connected to the circuit

board, and has a first retaining portion therein. The shaft is received in the sleeve and capable of linearly moving and rotating, and has a first end extending outside the sleeve and a second end formed with a second retaining portion. The spring is received around the shaft and biased between the first and second retaining portions. The pivot portion is joined with the first end of the shaft and capable of swinging with respect to the shaft in order to drive the shaft to move linearly. The antenna portion is secured on an end of the pivot portion and configured to transmit or receive wireless signals.

[0006] Due to the rotatable shaft within the sleeve, the antenna is allowed to rotate 360 degrees with respect to the body. On the other hand, the antenna is allowed to swing or bend 90 degrees as a result of the swingable pivot portion and the shaft. Hence the double rotary antenna is designed to enable 360-degree rotation and 90-degree bending, so one can more easily orient it in the direction needed. Moreover, because of the spring, the shaft exerts a force on the pivot portion to retain the antenna in desired rotary position.

[0007] The present invention and the advantages thereof will become more apparent upon consideration of the following detailed description when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF DRAWINGS

[0008]

FIG. 1 is an exploded view of a wireless transceiver in accordance with the preferred embodiment of the invention;

FIG. 2 is a perspective view of the wireless transceiver of FIG. 1;

FIG. 3 is a partly cross-sectional view of the wireless transceiver of FIG. 2, showing an antenna of the wireless transceiver in a retracted position;

FIG. 4 is an operational perspective view of the wireless transceiver of FIG. 2, showing an antenna of the wireless transceiver capable of rotating 360 degrees;

FIG. 5 is a view similar to FIG. 3 except that, the antenna is bent 90 degrees to an extended position; and

FIG. 6 is an operational perspective view of the wireless transceiver of FIG. 5.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

[0009] Referring to FIGS. 1 through 3, a wireless transceiver is shown having a body 1 and an antenna 2 according to the preferred embodiment of the present invention.

[0010] The body 1 includes a housing 10 and a circuit board 11. The housing 10 of the body 1 includes a receiving portion 12 and a connecting portion 13. The re-

ceiving portion 12 defines an opening 15 in a sidewall 14 thereof. The opening 15 is in communication with the inside of the receiving portion 12. The connecting portion 13 of the housing 10 is to be detachably plugged into a slot of a computer (not shown). The circuit board 11 is disposed in the housing 10 and includes an elastic conductive plate 16.

[0011] The antenna 2 includes a sleeve 20, a shaft 30, a spring 40, a pivot portion 50, an antenna portion 60 and a casing 70.

[0012] The sleeve 20 of the antenna 2 is formed with a shoulder 21 outside to be lodged in a recess of the receiving portion 12 of the body 1. The sleeve 20 is further formed inside with a first retaining portion 22 which defines a through hole in the central part.

[0013] The shaft 30 is received in the sleeve 20 and is capable of linearly moving and rotating relative to the sleeve 20. Furthermore, the shaft 30 has a first end 31 and a second end 32. The first end 21 passes through the sleeve 20 and the opening 15 and extends outside the sleeve 20. The second end 32 is formed with a second retaining portion 33.

[0014] The spring 40 is received around the shaft 30 and biased between the first and second retaining portions 22, 33.

[0015] The pivot portion 50 defines a joint groove 51 and a separate annular groove 52. The joint groove 51 is provided to receive the first end 31 of the shaft 30. A stem 53 is applied to pass through the pivot portion 50 and the first end 31 of the shaft 30 so as to enable the pivot portion 50 to rotate about the stem 53 with respect to the shaft 30.

[0016] The antenna portion 60 is secured on an end of the pivot portion 50 and is formed thereon with an antenna pattern 61 to transmit or receive wireless signals. The antenna pattern 61 may be designed in any needed shape.

[0017] The casing 70 of the antenna 2 includes a shell 71 and a cover 72 coupled with the shell 71. The shell 71 defines a room 73 therein to receive the pivot portion 50 and the antenna portion 60. The cover 72 covers the room 73. The shell 71 and the cover 72 both were formed with a latch 74 to be lodged in the annular groove 52 of the pivot portion 50. Additionally, the shell 71 defines a first notch 75 in a sidewall to receive the shaft 30. Likewise, the cover 72 defines a second notch 76 in communication with the first notch 75 of the shell 71. That is, the shell 71 and the cover 72 together define a notch in a corner of the casing 70. The notch is in communication with the room 73.

[0018] In this preferred embodiment, the sleeve 20, the shaft 30, the spring 40 and the pivot portion 50 are made of metal/conductive material. The antenna pattern 61 of the antenna portion 60 is electrically connected to the pivot portion 50. The elastic conductive plate 16 of the circuit board 11 contacts with a side of the sleeve 20, as shown in FIG. 3.

[0019] Referring yet to FIG. 3, a positioning bulge 17

is formed on the sidewall 14 of the receiving portion 12 of the body 1. The cover 72 of the casing 70 of the antenna 2 defines a positioning dent 77 to receive the positioning bulge 17 of the body 1.

[0020] As depicted above, the antenna 2 is allowed to rotate 360 degrees outside the body due to the rotatable shaft 30 within the sleeve 20, as shown in FIG. 4.

[0021] FIGS. 5 and 6 illustrate that the antenna 2 swings outwardly to an extended position where the cover 71 abuts at one end against the sidewall 14 of the body 1, and the first end 31 of the shaft 30 is shifted from the second notch 76 of the cover 72 to the first notch 75 of the shell 71. Specifically, while performing the operation, the pivot portion 50 rotates with the shell 71 and pulls the shaft 30 to move linearly while the spring 40 remains biased by the first and second retaining portions 22, 33. Due to the restoring force of the spring 40, the shaft 30 exerts a reverse, pulling force on the pivot portion 50 in order to retrain the antenna 2 in the extended position, perpendicular to the sidewall 14. On the contrary, when the antenna 2 swings inwardly to the retracted position as shown in FIGS. 2 and 3, the shaft 30 is shifted from the first notch 75 of the shell 71 back to the second notch 76 of the cover 72, where it is the cover 72 which abuts against the sidewall 14. Likewise, because of the spring 40, the shaft 30 exerts the pulling force on the pivot portion 50 to retrain the antenna 2 on the retracted position, parallel to the sidewall 14. In the meantime, the positioning bulge 17 of the sidewall 14 of the body 1 is exactly lodged in the positioning recess 77 of the cover 71 of the antenna 2 to prevent the antenna 2 from arbitrary rotating.

[0022] It is noted that, in this preferred embodiment, the casing 70 of the antenna 2 and the housing 10 of the body 1 are designed and shaped as a whole, especially when the casing 70 is in its retracted position.

[0023] It will be appreciated that although a particular embodiment of the invention has been shown and described, modifications may be made. It is intended in the claims to cover such modifications which come within the spirit and scope of the invention.

Claims

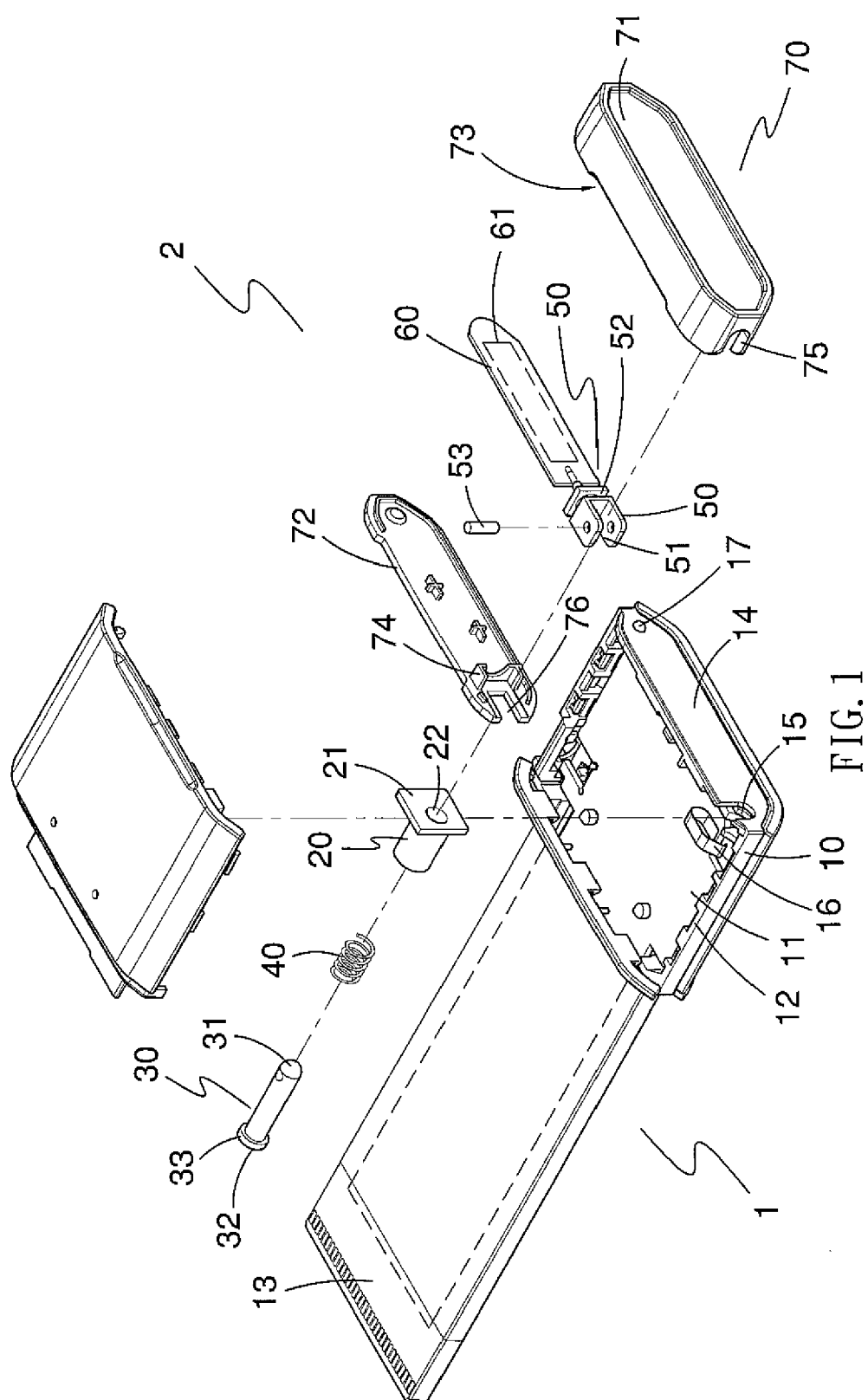
1. An antenna for use in a wireless transceiver, comprising:

a sleeve provided to be connected to said wireless transceiver and having a first retaining portion;

a shaft received in said sleeve and being capable of linearly moving and rotating, wherein said shaft has a first end extending outside said sleeve and a second end formed with a second retaining portion;

a spring received around said shaft and biased between said first and second retaining portions; and
a pivot portion joined to said first end of said

- shaft and being capable of swinging with respect to said shaft in order to drive said shaft to move linearly; and
an antenna portion secured on said pivot portion and configured to transmit or receive wireless signals.
2. The antenna of claim 1 further comprising a casing, wherein said casing defines a room inside to receive said pivot portion and said antenna portion and a notch in a corner of said casing; and said notch is in communication with said room to receive said shaft.
 3. The antenna of claim 2 wherein said antenna portion is formed thereon with an antenna pattern.
 4. The antenna of claim 2, wherein said casing includes a shell and a cover coupled with said shell, and said shell and said cover both were formed with a latch to be lodged in an annular groove which is defined in a peripheral of said pivot portion.
 5. The antenna of claim 2 further comprising a stem, wherein said pivot portion defines a joint groove to receive said first end of said shaft, and said stem passes through said pivot portion and said shaft so as to enable said pivot portion to rotate about said stem with respect to said shaft.
 6. A wireless transceiver comprising:
 - a body including a housing and a circuit board disposed in said housing; said housing having a receiving portion and a connecting portion; said receiving portion defining an opening in a sidewall thereof; and said connecting portion configured to be detachably plugged into a slot of a computer; and
 - an antenna including a sleeve, a shaft, a spring, a pivot portion and an antenna portion; said sleeve disposed in said receiving portion, electrically connected to said circuit board and having a first retaining portion therein; said shaft received in said sleeve and capable of linearly moving and rotating, wherein said shaft has a first end extending outside said sleeve and a second end formed with a second retaining portion; said spring received around said shaft and biased between said first and second retaining portions; said pivot portion joined to said first end of said shaft and being capable of swinging with respect to said shaft in order to drive said shaft to move linearly; and said antenna portion secured on said pivot portion and configured to transmit or receive wireless signals.
 7. The wireless transceiver of claim 6, wherein said sleeve, said shaft, said spring and said pivot portion
- are made of metal, and said circuit board includes an elastic conductive plate in contact with said sleeve.
8. The wireless transceiver of claim 6, wherein said antenna further comprising a casing which defines a room to receive said pivot portion and said antenna portion and a notch in a corner of said casing and in communication with said room to receive said shaft.
 9. The wireless transceiver of claim 8 wherein said antenna portion is formed thereon with an antenna pattern.
 10. The wireless transceiver of claim 8, wherein said casing of said antenna includes a shell and a cover coupled with said shell, and said shell and said cover both were formed with a latch to be lodged in an annular groove which is defined in a peripheral of said pivot portion.
 11. The wireless transceiver of claim 8 further comprising a stem, wherein said pivot portion defines a joint groove to receive said first end of said shaft and said stem passes through said pivot portion and said shaft so as to enable said pivot portion to rotate about said stem with respect to said shaft.



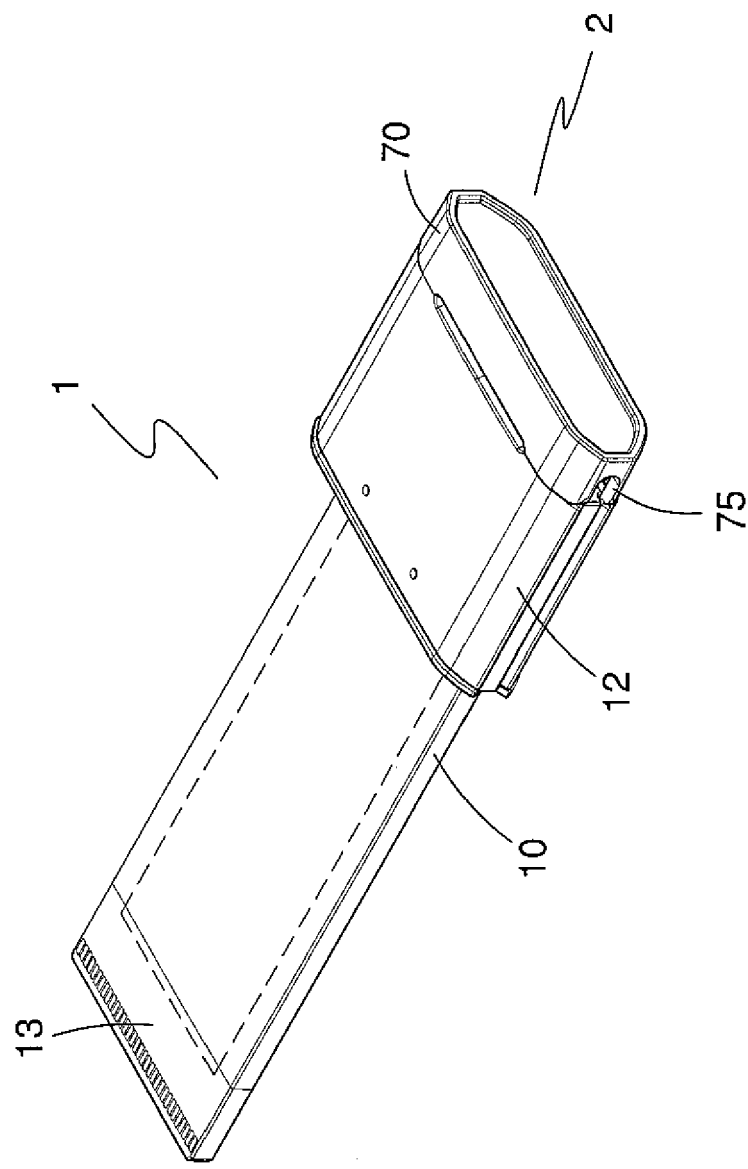


FIG. 2

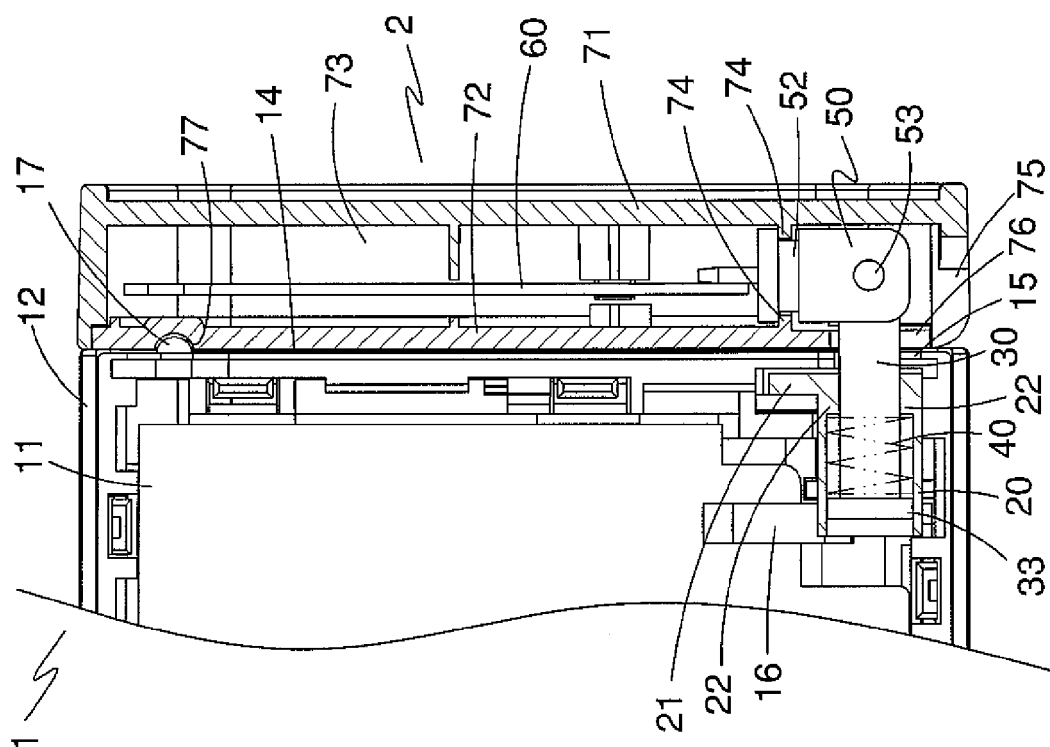


FIG. 3

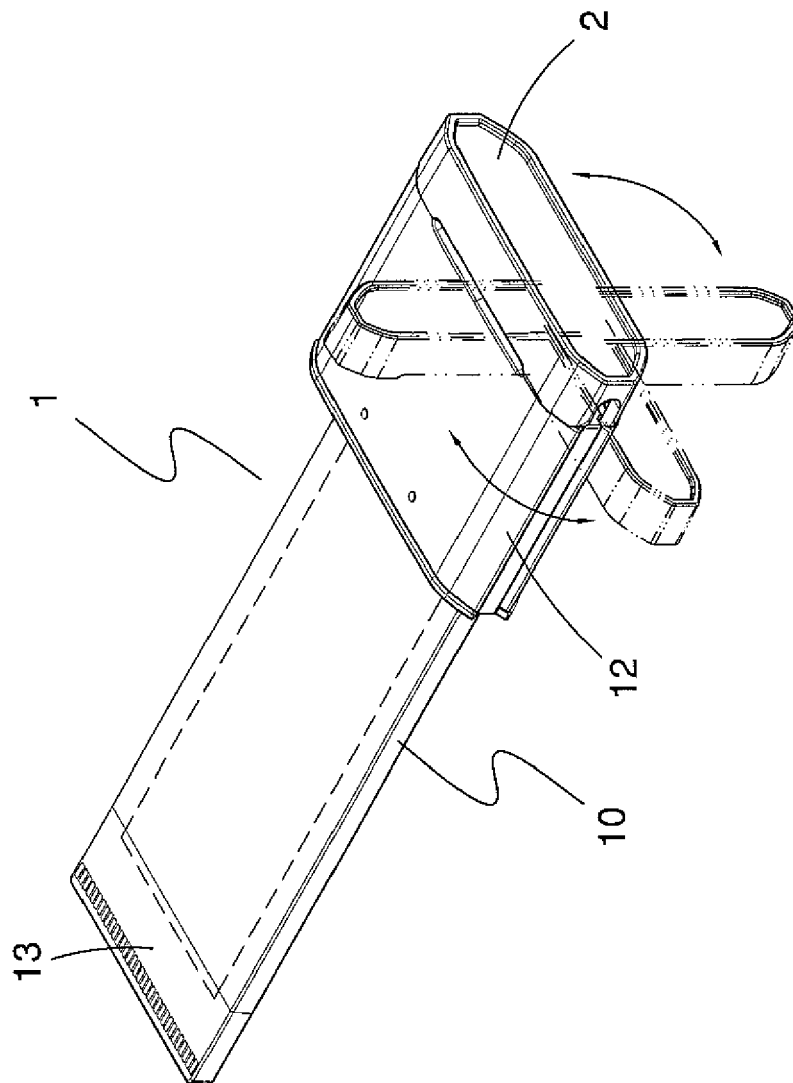
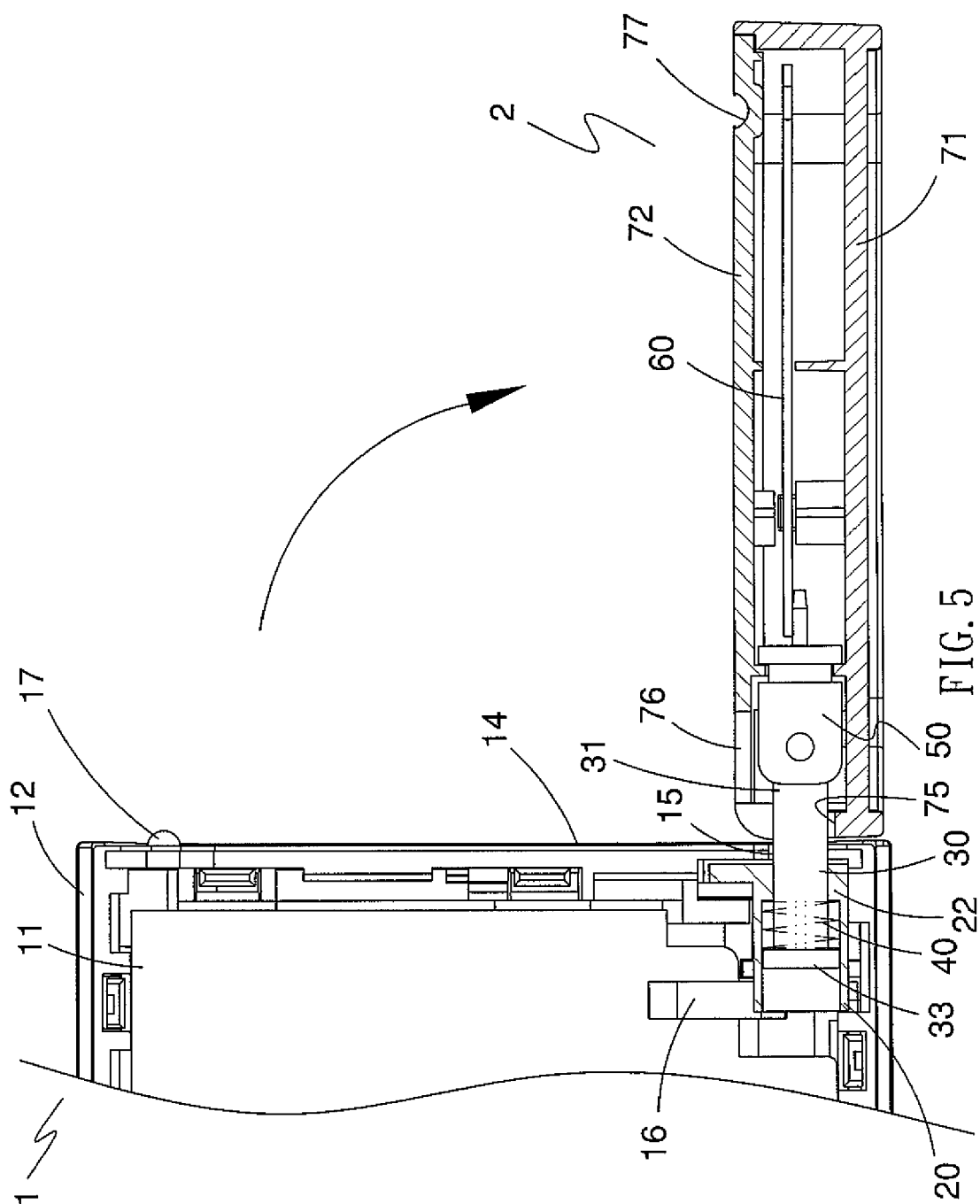


FIG. 4



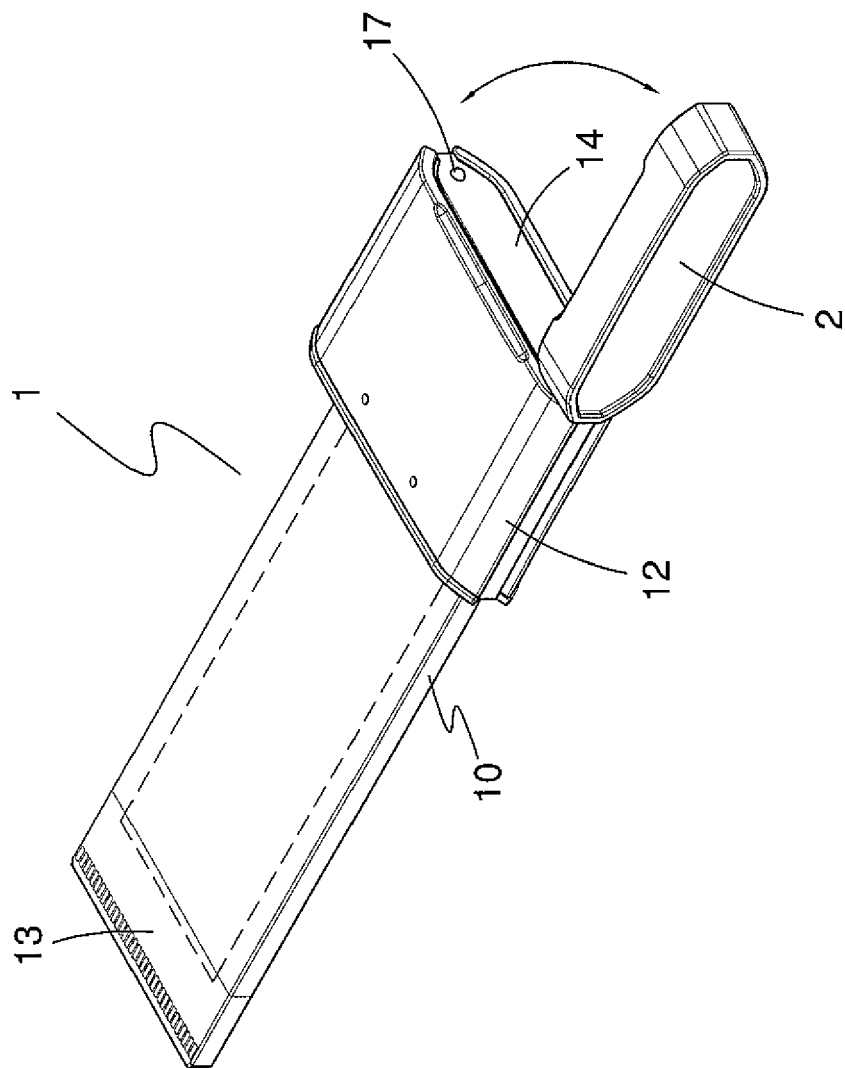


FIG. 6



EUROPEAN SEARCH REPORT

Application Number
EP 08 16 1977

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	JP 55 147806 A (MATSUSHITA ELECTRIC IND CO LTD) 18 November 1980 (1980-11-18) * abstract; figures 1-6 * -----	1-11	INV. H01Q1/08 H01Q1/24 H01Q1/38 H01Q1/22
X	US 2008/117109 A1 (CHA KWANG-HWAN [KR] ET AL) 22 May 2008 (2008-05-22) * the whole document * -----	1-11	
X	US 4 376 939 A (REID JAMES B) 15 March 1983 (1983-03-15) * columns 1-3; figures 1,2 * -----	1,6	
X	JP 2000 307331 A (MATSUSHITA ELECTRIC IND CO LTD) 2 November 2000 (2000-11-02) * abstract; figures 2,9,15-21 * -----	1-11	
A	JP 2001 320212 A (MATSUSHITA ELECTRIC IND CO LTD) 16 November 2001 (2001-11-16) * the whole document * -----	1-11	
			TECHNICAL FIELDS SEARCHED (IPC)
			H01Q
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 26 February 2009	Examiner Fredj, Aziz
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

 2
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 08 16 1977

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

26-02-2009

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
JP 55147806	A	18-11-1980	NONE	
US 2008117109	A1	22-05-2008	KR 100790189 B1	02-01-2008
US 4376939	A	15-03-1983	NONE	
JP 2000307331	A	02-11-2000	NONE	
JP 2001320212	A	16-11-2001	NONE	

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- TW M317082 [0002] [0003]
- TW M299931 [0004]