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(54) An electric device having a circuit wiring in a band.

(57) A watch-type electric device having circuit wiring like an antenna in a band, which comprises a containing portion (1a) in a band, a piling portion (1b) extending to the circumference where a case (3) overlaps with a case back (4), and a connecting portion (1c) disposed inwardly from the piling portion, which are formed on a wiring substrate (1) having plasticity. Thus the connection of the antenna in the band is achieved with no mechanical connections and hence the band can rotate on the case.

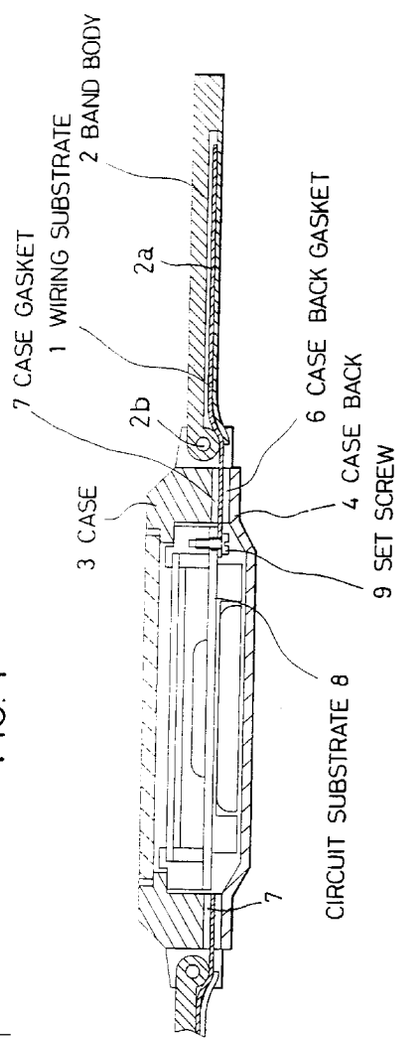

FIG. 1

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The present invention relates to a watch-type electric device having circuit wiring, like an antenna, in a band.

As shown in Fig. 4, a band antenna conventionally has a construction such that a connecting terminal 14 is inserted into synthetic rubber so as to expose one end thereof toward a case 11 in a band body 12.

In order to connect electrically the connecting terminal 14 with a circuit substrate on which an electronic circuit is provided, one end of the connecting terminal 14 projects from the band body 12 and is connected electrically and mechanically with a connector 15 by calking. The connector 15 is inserted into a through hole 11a formed at the side of the case 11. The edge of the connector 15 is connected electrically with an elastically deformed contact spring 17 which is conductive with the electronic circuit provided in the inside of the case. Furthermore, in order to enable the case to be waterproof, a connector gasket 16 is provided so as to fit into the through hole 11a. The construction, as shown in Fig. 5, has been known such that the band body 12 is fixed to the case 11 with a band fixing screw 19 in order that any external force doesn't affect the calking portion between the connector 15 and the connecting terminal 14. The above conventional construction is disclosed for example in Japanese laid-open patent JP-A-4-25224 (1992).

However, a conventional watch-type electric device having circuit wiring like an antenna in a band has the following problem.

As shown in Fig. 5, the band body 12 is fastened to the case 11 with a screw. This disables the band body 12 from rotating on the case 11. Therefore, when the band body 12 is put on the arm, there appears an opening between the arm and the band. That means the fit between the two is inferior.

When wiring is provided to both sides of the band, the connecting parts should be disposed at both sides thereof on the constitution of the electronic circuit even if both sides share the same wiring.

An aim of the present invention is to improve the fit of a band and to reduce the number of parts, thereby improving the waterproof characteristics of the watch.

According to the present invention, there is provided an electronic device having circuit wiring in a board comprising:

a wiring substrate having a portion in the band;

a case having a piling portion of the wiring substrate and a connecting portion sandwiched by two gaskets; and

whereby said portion of the wiring substrate is coupled to the piling portion by the connecting portion which is disposed inward from the piling portion.

In order to solve the above problem, the present invention is constituted of a containing portion in a band for containing circuit wiring, a piling portion extending to the circumference where a case overlaps with a case back, and a connected portion disposed inward than the piling portion, which are formed on a wiring substrate having plasticity. A circuit substrate is provided in a case, on which an electric circuit is provided. The circuit wiring plate is stored in the case and has a connecting means for connecting a circuit substrate with the connecting portion of the wiring substrate electrically. It further includes a case gasket between the case and the piling portion of the wiring substrate, and a case back gasket between the case back and the piling portion of the wiring substate.

In the foregoing device having circuit wiring in a band, the wiring substrate is sufficient to lead wiring in the band into the inside of the case. Therefore it doesn't need to provide any connecting means to the outside of the case. Thus a connecting portion doesn't need to be fastened mechanically, which enables the band to be fastened so as to be rotatable on the case, as is of an ordinary watch, and not by fastening a band body to the case with a screw.

Additionally, the piling of the wiring substrate connects wiring portions in the band on both sides, and wiring is provided in the piling portion of the wiring substrate. Thus, providing a connecting means for connecting the circuit substrate in the case to either side of the band is enough to enable the connection of the wiring on both sides of the band. Since the case gasket and the case back gasket are mounted between the case and the piling portion of the wiring substrate and between the case back and the piling portion of the wiring substrate respectively, the case can be kept waterproof, as is conventional.

Embodiments of the present invention will now be described with reference to the accompanying drawings, of which:

Fig. 1 is a cross section showing the inventive watch-type electric device;

Fig. 2 is an exploded view showing the inventive watch-type electric device;

Fig. 3 is a cross section showing another embodiment of the inventive watch-type electric device;

Fig. 4 is a cross section showing a conventional watch-type electric device; and

Fig. 5 is another cross section showing a conventional watch-type electric device.

Hereinafter, embodiments of the present invention will be explained referring to the drawings. In Figs 1, and 2 a wiring substrate 1 is inserted into or formed with a wiring substrate containing portion 2a formed in a band body 2, so that it works as a band antenna. The wiring substrate has pattern wiring for forming an antenna therein and is constituted such that containing portions 1a are formed on both sides. A through hole 2b is formed at the side of the band body 2. A band fixing pin is passed through a band fixing pin

guide hole 3a and the through hole 2b of a case 3, which bears the band body 2 so as to be rotatable on the case 3.

As shown in Fig. 2, a case back 4 is fastened to the case 3 with a set screw 5. A case back gasket 6 and a case gasket 7 are each elastically deformed. The case gasket 7 provides waterproof security for a piling portion lb of the wiring substrate 1 and the case 3. The case back gasket 6 provides waterproof security for the piling portion 1b of the wiring substrate 1 and the case back 4.

A connecting portion 1c of the wiring substrate 1 is disposed so as to overlap with a contacting portion 8a of a circuit substrate 8 on which an electronic circuit is provided, and is fixed to the case with a set screw 9 to provide an electrical connection.

Fig. 3 is an embodiment of the present invention used for a band switch. The containing portion la in the band of the wiring substrate 1 is bent and then is inserted into the band. A spacer 10 is disposed in the wiring substrate 1 for making a space. A pattern of a switch input terminal and a pattern of a power source voltage terminal are formed in the wiring substrate 1 so as to overlap with each other. When pressed from the surface of the band, the patterns short-circuit in order to switch on. On the other hand, when they are not pressed together the patterns separate to switch off.

As explained above, according to the present invention, the following effects are obtained;

(1) It is not necessary to fix the band to the case with a screw, which enables the band to rotate on the case. Thus, the fit of the band to an arm is improved.

(2) When the connecting parts are provided on one side, the wiring can be connected with both sides of the band.

The aforegoing description has been given by way of example only and it will be appreciated by a person skilled in the art that modifications can be made without departing from the scope of the present invention.

Claims

1. An electronic device having circuit wiring in a board comprising:

   a wiring substrate (1) having a portion (1a) in the band; and

   a case (3,4) having a piling portion (1b) of the wiring substrate and a connecting portion (1c) sandwiched by two gaskets (6,7);

   whereby said portion (1a) of the wiring substrate (1) is coupled to the piling portion (1b) by the connecting portion (1c) which is disposed inward from the piling portion.

2. A watch-type electric device having circuit wiring in a band comprising:

   a wiring substrate (1) having plasticity comprising a containing portion (1a) in a band for containing in the band, a piling portion (1b) extending to circumference where a case (3,4) overlaps with a case back (4), and a connecting portion (1c) disposed inward than the piling portion;

   a case gasket (7) converging whole circumference between the case and the piling portion of the wiring substrate;

   a circuit substrate in a case, on which an electric circuit is provided;

   connecting means (1c) for connecting the circuit substrate with the connecting portion of the wiring substrate electrically; and

   a case back gasket (6) covering whole circumference between the case back and the piling portion of the wiring substrate.

3. A device as claimed in claim 1 or 2, wherein the wiring to be an antenna is formed in the wiring substrate.

4. A device as claimed in Claim 1 or 2, wherein the wiring to be a switch is formed in the wiring substrate.

FIG. 1

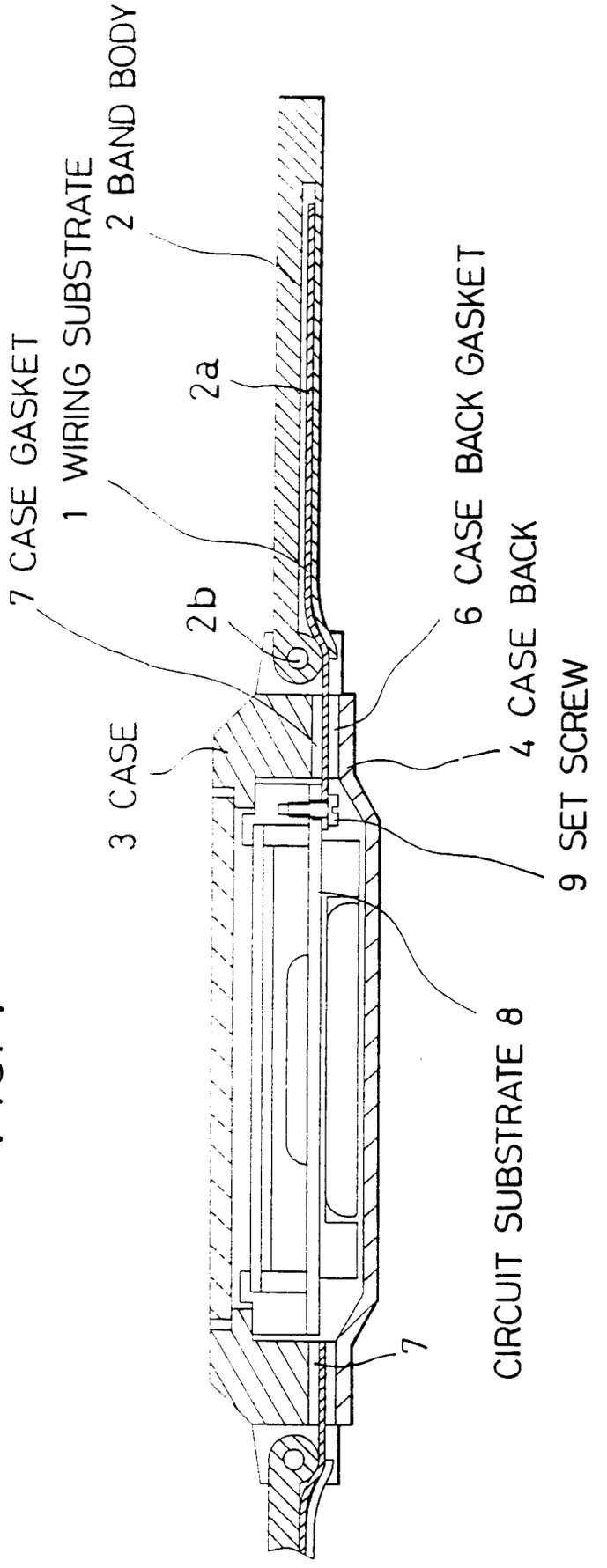

7 CASE GASKET
1 WIRING SUBSTRATE
2 BAND BODY
2a
2b
6 CASE BACK GASKET
4 CASE BACK
3 CASE
9 SET SCREW
7
CIRCUIT SUBSTRATE 8

FIG. 2

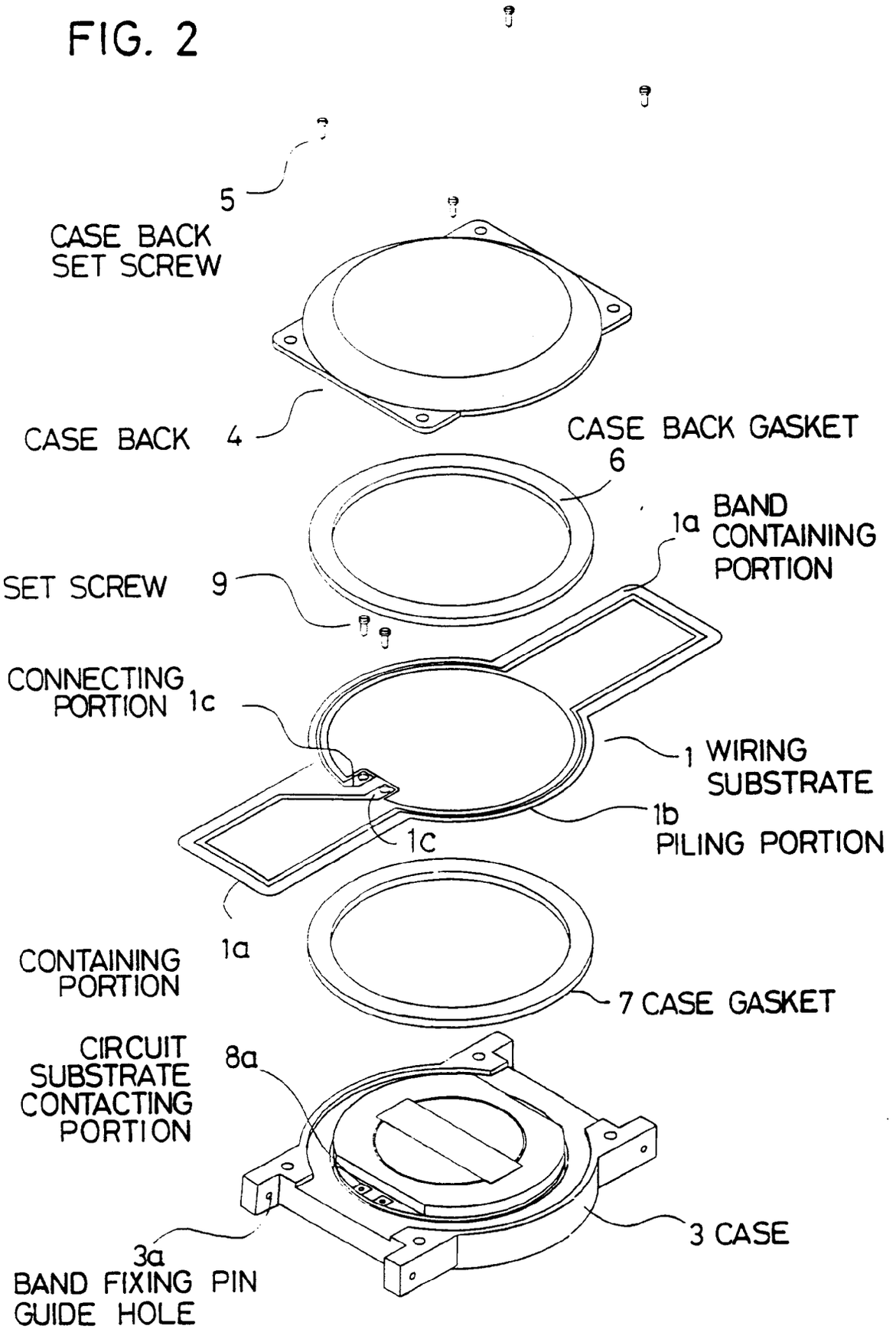

5
CASE BACK SET SCREW
CASE BACK 4
CASE BACK GASKET 6
1a BAND CONTAINING PORTION
SET SCREW 9
CONNECTING PORTION 1c
1 WIRING SUBSTRATE
1b PILING PORTION
1c
1a
CONTAINING PORTION
7 CASE GASKET
CIRCUIT SUBSTRATE CONTACTING PORTION
8a
3 CASE
3a BAND FIXING PIN GUIDE HOLE

FIG. 3

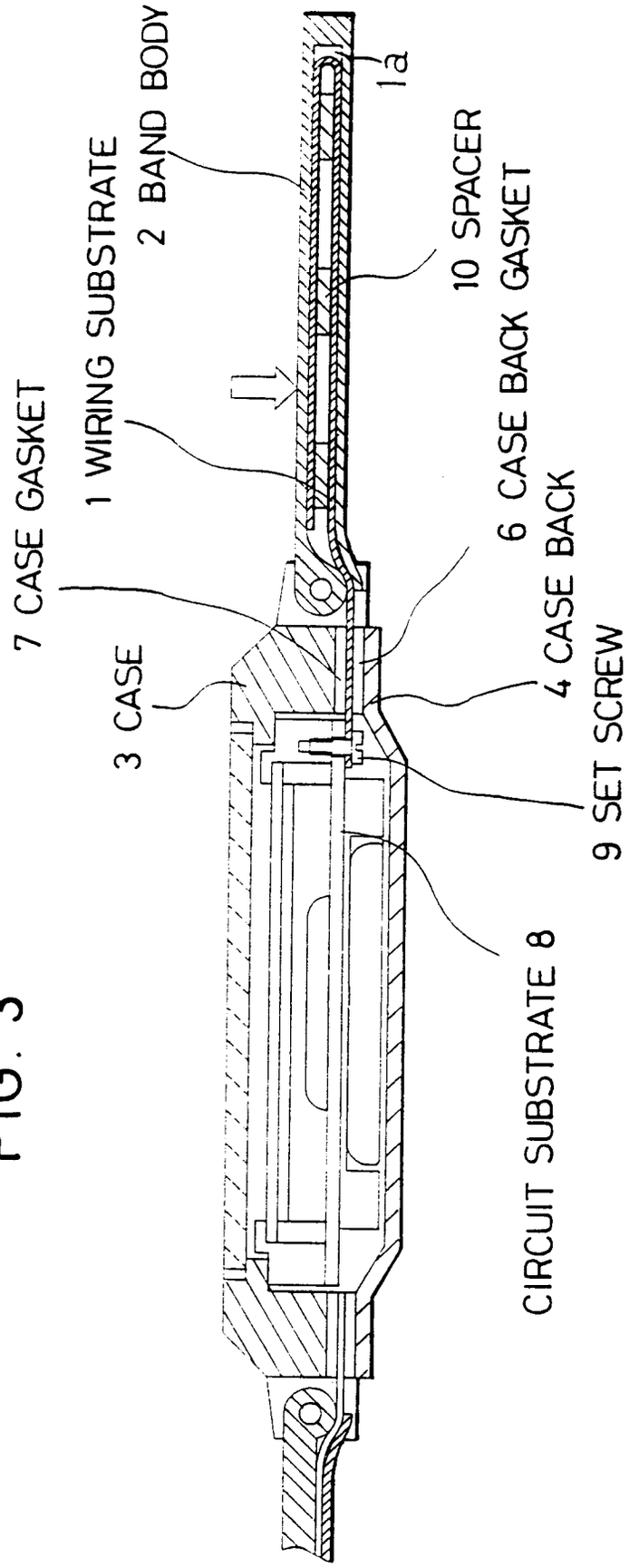

7 CASE GASKET
1 WIRING SUBSTRATE
2 BAND BODY
1a
10 SPACER
6 CASE BACK GASKET
3 CASE
6 CASE BACK
4 CASE BACK
9 SET SCREW
CIRCUIT SUBSTRATE 8

FIG. 4 PRIOR ART

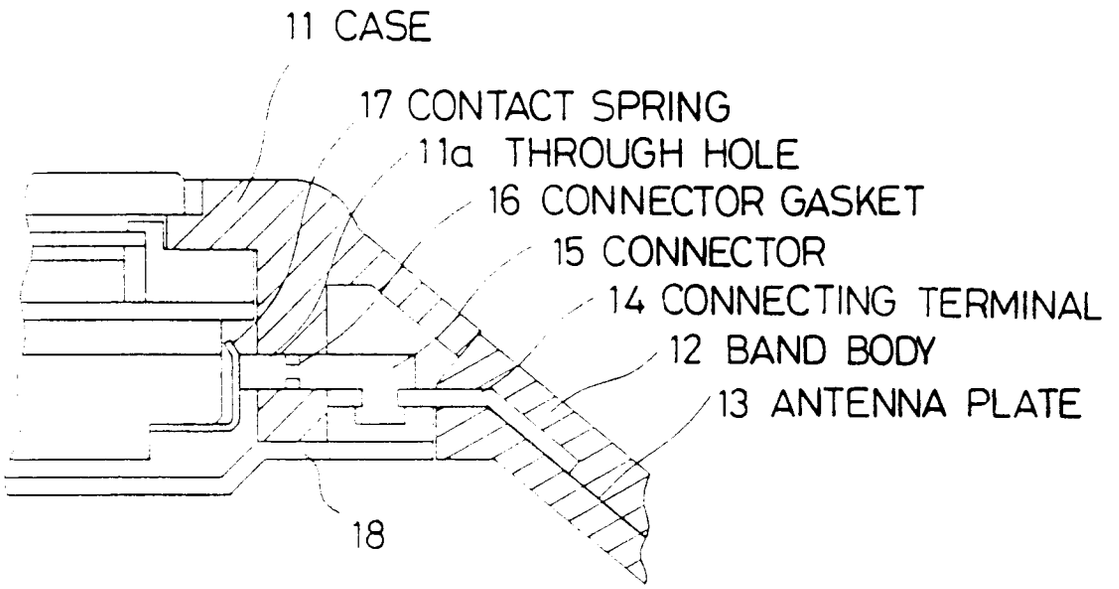
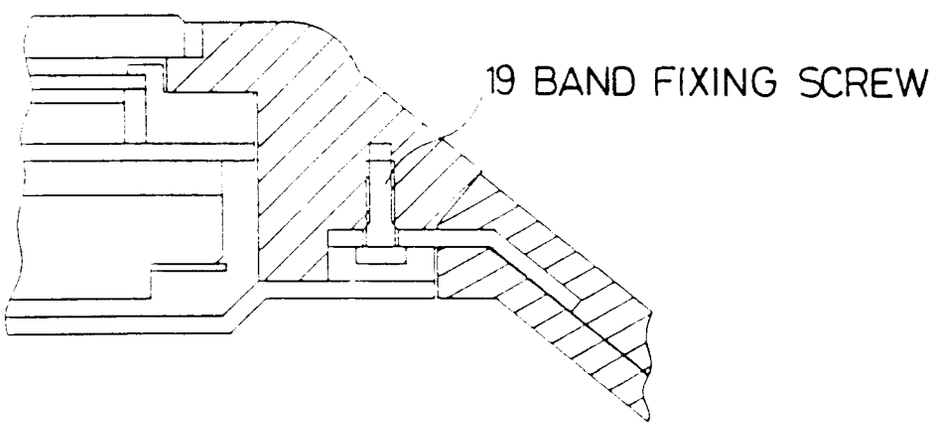


FIG. 5 PRIOR ART



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EUROPEAN SEARCH REPORT

Application Number
EP 94 30 4621

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
A	GB-A-2 201 266 (UPPERPACE) * page 4, line 34 - page 5, line 6; figures 1,2 * * page 6, line 5 - page 7, line 3; figures 4-5B *	1-4	H01Q1/27
A D	US-A-5 168 281 (TOKUNAGA) & JP-A-4 025 224 (SEIKO EPSON) * column 3, line 34 - column 6, line 17; figures 1-5 *	1	
A	PATENT ABSTRACTS OF JAPAN vol. 17, no. 188 (E-1349) 13 April 1993 & JP-A-04 336 804 (SEIKO EPSON) * abstract *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.5) H01Q G04G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	5 October 1994	Angrabeit, F

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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