ORGANISATION AFRICAINE DE LA PROPRIETE INTELLECTUELLE (O.A.P.I.)

(19) (11) N° 11259 (51) Inter. Cl.[7] H01Q 1/06 H01Q 1/24 H01Q 1/10

(12) BREVET D'INVENTION

(21) Numéro de dépôt: 9900190

(22) Date de dépôt: 20.08.1999

(30) Priorité(s): JP
22.12.1997 N° 9/365627
16.11.1998 N° 10/9048

(24) Délivré le: 03.07.2000

(45) Publié le: 20 NOV 2002

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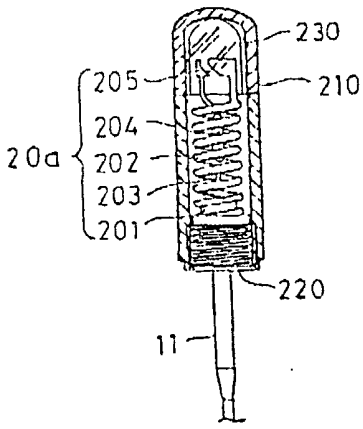
(54) Titre: Device for detecting electromagnetic waves.

(57) Abrégé: The present invention provides a device for detecting electromagnetic waves or an antenna comprising an antenna body, a head member detachably attached to the upper portion of the antenna body and a supporting member inserted into the antenna body to support it. The head member is provided with a resonance circuit comprising a coil, a rectifying diode and a light emitting diode, or with a discriminating member for discriminating itself from others, so that it is possible to improve the receiving sensitivity, to sense the direction of the wave emitting source, and to discriminate the device being attached.



SPECIFICATION

DEVICE FOR DETECTING ELECTROMAGNETIC WAVES

Field of Art

The present invention relates to an antenna or a device for detecting electromagnetic waves used to be installed with equipment such as a portable telephone, a telecommunication apparatus and the like.

Background

Signal transmitting-receiving apparatus has now been widely used in various applications such as portable telephone, but entrains a drawback that it is not always to communicate with high accuracy in the case of bad receiving condition or low sensitivity, due to the geographical conditions of a location. In particular, due to the structure that the antenna is retracted in a body of the receiver upon non-use, the receiving condition will become worse.

Japanese non-examined patent publication No. Hei 10-197581, which is known as to improve the receiving sensitivity and to visualize the detected wave, discloses a device which senses a high frequency alternating current generated by an LC resonance circuit from an electromagnetic wave, energize a light emitting diode by a direct current rectified by a rectifying circuit to indicate a stronger wave intensity direction of the wave to a user, thereby to make possible to direct the antenna to a suitable direction.

However, such a prior art antenna causes the device to have a complicated circuit structure and high costs. Also, the prior art antenna does not have a function to discriminate a device himself from the other.

It is an object of the present invention to provide a device for detecting electromagnetic waves to solve the above-mentioned problems, having a high sensitivity, detecting the direction of the emitting source of the wave, and discriminating the device being installed.

Description of the Invention

The device for detecting electromagnetic waves comprises an antenna body in the form of a rod of electrically conductive material, a head member removably attached a top end of the antenna body, and a supporting member inserted therein and expansibly and contractibly supporting the antenna body.

The head member encloses therein a serial resonance circuit, thereby enabling to increase the receiving sensitivity.

The serial resonance circuit comprises a capacitive resistor and a coil, or a serial resonance circuit comprising a capacitive resistor and metal washer fitted to the upper portion of the resistor to select the wave having a desired frequency, thereby achieving reduction in costs.

Alternatively, the resonance circuit comprises a rod element extending from the capacitive resistor and the coil covering the rod element to form a parallel resonance circuit, or a rod element and a metal pipe selecting the objective frequency to form a parallel resonance circuit, thereby achieving reduction in costs and a high sensitivity.

In order to select a wave having desired frequency, one or two smoothing capacitors are connected at the middle portion of the element and to the upper end of the coil to form a serial resonance circuit, thereby to achieving a high sensitivity.

Furthermore, the resonance circuit may comprise a light emitting serial resonance circuit to form an indicating member which comprises the resonance circuit may comprise a detector diode positioned at the central portion of the element extending from the capacitive resistor in series, a light emitting diode connected between the upper end portion of the coil and the upper portion of the element, thereby to form a an indicating member consisting of a light emitting series resonance circuit. In such construction, it is possible to indicate receiving a wave by light emission of the indicating member.

The head member, which include a built-in resonance circuit, may comprise a connecting member formed of a conductor and a cap portion.

In addition, the upper portion or whole portion of the cap member may be formed of a transparent or translucent insulator material, thereby enabling the indicating member or the discrimination member to be visible from the outside. Alternatively, when at least part of the cap member is formed by a opaque insulating material having any desired color or pattern, it provide a capability of discrimination between itself and others.

The connecting member of the antenna may have a screw at the outer periphery, to which the cap member is screwed for fitting together, and a screwed penetrating hole at the center of the connecting member in the axial direction, by which the connecting member can be connected to the connecting member of the antenna member. Such construction makes possible to select one of various combinations of the cap members and the antenna members.

The antenna member may comprise a connecting member to be connected to thee head member at the upper end portion in its longitudinal direction, and a restricting member for preventing removal from the supporting member.

Furthermore, in order to improve the receiving sensitivity, the antenna body may be formed from telescopically expansible and contractible multiple pipes having the maximum length longer than its minimum length.

The antenna having the above-mentioned construction can be attached by removing the already attached antenna from a portable telephone, for example, and by attaching in a manner that the supporting member of the antenna of the present invention is fitted to the portable telephone in place, thereby exhibiting functions of improvement of receiving sensitivity, sensing the direction of the emitting waves, indication of the receiving and discrimination between itself and others.

Brief Description of the Drawings

Fig. 1 is a front view of a first embodiment of the present invention;

Fig. 2 is a sectional view of a head member of the first embodiment of the present invention;

Fig. 3 shows an exploded front view of the first embodiment of the present invention;

Fig. 4 is a circuit diagram of the first embodiment of the present invention;

Fig. 5 shows an exploded front view and a circuit diagram of a second embodiment of the present invention;

Fig. 6 shows an exploded front view of a third embodiment of the present invention;

Fig. 7 shows an exploded front view of a fourth embodiment of the present invention;

Fig. 8 shows an exploded front view of a fifth embodiment of the present invention;

Fig. 9 shows an exploded front view and a circuit diagram of a sixth embodiment of the present invention;

Fig. 10 shows an exploded front view of a seventh embodiment of the present invention;

Fig. 11 is a sectional view of a head member of the seventh embodiment of the present invention;

Fig. 12 is a front view of the applied embodiment of the antenna of the present invention;

Fig. 13 shows an exploded front view of a eighth embodiment of the present invention;

Fig. 14 shows a front view of a supporting member of the eighth embodiment of the present invention;

Fig. 15 shows a front view of a ninth embodiment of the present invention;

Fig. 16 shows a front view of a tenth embodiment of the present invention;

Fig. 17 is a sectional view of a connecting member of the antenna of the applied embodiment of the present invention; and

Fig. 18 is a view showing a form of use of a first embodiment of the present invention.

The Best Mode for Embodying the Present Invention

(First Embodiment)

An antenna A embodying the present invention of the present invention comprises, as shown in Fig. 1, an antenna body 1 in the form of a rod made of a conductive material, a head member 2 detachably fitted to the upper end portion of the antenna body 1, and a supporting member 3 inserted through the antenna body 1 for supporting it.

The head member 2 comprises, as illustrated in Fig. 2, a built-in resonance circuit 20a which receives a wave to generate a high frequency alternating current for indication. The upper part of the head member 2 is covered with a transparent or translucent cap member 210. At the lower part of the cap member 210 is provided a connecting member 220 fitted by screwing.

As shown in Fig. 3, the resonance circuit 20a comprises a capacitive resistor 201 press fitted to the antenna connecting member 220, a coil 202 snap fitted to a projection formed at the upper portion of the capacitive resistor 201, an element 203 disposed inside of the coil 202 at the central portion thereof, a detecting diode 204 disposed in the coil 202 and connected in series with the coil 202, and a light emitting diode 205 connected between an end of the coil 202 and an end of the element 203 in series with the detecting diode 204 (see Fig. 3).

Fig. 4 illustrates a circuit diagram showing the light emitting series resonance circuit, wherein a high frequency alternating current generated in the coil 202 is rectified by the detecting diode 204, and then supplied to the light emitting diode 205 to light it, thereby performing a function of indication at the indicating member 230.

As shown in Fig. 12, the antenna body 1 is provided with a connecting member 11 having threads 11m for connecting it to the upper end portion of the head member 2 by screwing. At the lower end portion of the antenna body 1 has a restricting member 12 for preventing removal of the antenna body 1 from the supporting member 3.

The antenna having the above-mentioned construction can be attached to a portable telephone as shown in Fig. 18, for example, by removing the existing antenna and attaching in place thereof by screwing the supporting member 3 to an antenna fitting portion, thereby enabling increase in its receiving sensitivity and adjustment of the direction for a better receiving condition corresponding to the directivity of the electromagnetic waves by the aid of the intensity of the light emitted from the indicating member 230.

Referring now to a different embodiments with reference to Figs. 5 to 10 in which different head members 2 are used, and to Figs. 13 to 16 in which different antenna bodies 1 are used. These different head members 2 and different antenna bodies 1 can be used in any desired combination by attaching them by screwing the connecting member 11 of the antenna body 1 with the antenna connecting member 220 of the head member 2.

(Second Embodiment)

As illustrated in Fig. 5, the antenna of this embodiment comprises a series resonance circuit 20b press fitted to an antenna connecting member 220 and an discrimination member 207 made of insulating material having a desired color or pattern are enclosed within a transparent or translucent cap member 210.

The series resonance circuit 20b has a simple construction consisting of the capacitive resistor 201 and the coil 202 secured to the projection of the upper portion of the resistor 202, but the same function and effect as in the first embodiment can be obtained, and it is possible to discriminate itself from the other antenna or the device having other antenna by means of the indicating member 207.

(Third Embodiment)

In the third embodiment shown in Fig. 6, different from the second embodiment, a metal washer 206 is fitted to the projection of the capacitive resistor 201. By this, a series resonance circuit 20c is formed which can perform adjustment to a desired wave, and it is possible to obtain the same function and effect as in the second embodiment.

(Fourth Embodiment)

In the fourth embodiment shown in Fig. 7, there are provided a rod-shaped element extending from the capacitive resistor 201, and a coil 202 covering the outer periphery of the element 203 and fitted to the capacitive resistor 201 to form a parallel resonance circuit 20d, thereby and it is possible to obtain the same function and effect as in the second and third embodiments.

(Fifth Embodiment)

The fifth embodiment illustrated in Fig. 8 is different from the above fourth embodiment in that there is provided a metal pipe 208 which penetrates through the element 203 for selecting a wave having a desired frequency. The metal pipe 208, within which the element 203 is inserted, is positioned within the coil 202. In this embodiment, a parallel resonance circuit 20e is formed by using such construction as above, and the antenna presents same function and effect as in the second, third and fourth embodiments.

(Sixth Embodiment)

The sixth embodiment illustrated in Fig. 9(a) comprises a capacitor 209 serially connected to the rod-shaped element 203 which is extending from the capacitive resistor 201. The capacitor 209 is so provided as to cover the outer periphery of the element 203, and constitute a series resonance circuit 20f together with a coil 202 attached to the projection of the capacitive resistor 201. The circuit diagram is shown in Fig. 9(b).

In this embodiment, it is possible not only to adjust to a desired frequency by the function of the capacitor 209, but also to obtain same function and effect as in the second to fifth embodiments.

(Seventh Embodiment)

The sixth embodiment illustrated in Figs. 10 and 11 comprises an opaque cap 210a, having any desired color or pattern, at the head portion for enabling the antenna to be discriminated from others by applying. In Fig. 11 is illustrated an example in which the resonance circuit 20b is built-in as described in the second embodiment, but it is possible to enclose any one of the resonance

circuit 20c, 20d, 20e and 20f as described in the third, fourth, fifth and sixth embodiments, respectively.

(Eighth Embodiment)

Referring now to an antenna body 1 embodying another embodiment of the present invention with reference to the drawings, in the eighth embodiment shown in Fig. 13, an antenna body 1b is formed of multiple pipes 13a, 13b, 13c and 13d having different diameters from each other and arranged coaxially in a manner to be expansible and contractible, thereby improving receiving sensitivity by expanding upon use. A supporting member 31 is fitted at the lower end portion of the antenna body 1b. As shown in Fig. 14, the supporting member 31 is attached to the antenna body 1b by screwing the lowest pipe 13a having the largest diameter.

(Ninth Embodiment)

In the ninth embodiment illustrated in Fig. 15, the antenna body 1b in the above eighth embodiment is so modified that a shaft 33 is provided on the upper portion of a supporting member 32, and a pipe 14e positioned at the lowest and having largest diameter is connected to the shaft 33. In this embodiment, it is possible to fold the antenna 1c.

(Tenth Embodiment)

The tenth embodiment shown in Fig. 16 comprises two antenna bodies 1 at upper and lower portions, respectively, with the upper antenna body and the lower antenna body being mutually connect through an intermediate connecting member 14. Therefore, the entire length of the antenna body 1d is extended, thereby to improve its receiving sensitivity more easily.

In addition, the present invention is also possible to provide a sufficient sensitivity and discrimination ability as desired by a user, by using any desired combination of one of the antennas 1b, 1c and 1d of the eighth, ninth and tenth embodiments and one of head members 2 mentioned in the first through seventh embodiments.

Furthermore, as shown in Fig. 17(a), it is also preferable to connect by screwing the connecting member 11 of the antenna body 1 to an antenna connecting member 220 provided at the lower portion of the

head member 2, or to form integrally an antenna connecting member 220a and the antenna 1.

Possibility of Utilization in Industry

As has been described above, the antenna of the present invention has a high receiving sensitivity, so that it is possible to prevent occurrence of inconvenient condition such as impossible state for receiving. In addition, due to the ability of sensing the direction of a wave emitting source, it is possible to receive a wave at a best condition even at the bad geographic location or in the shade of a building.

Furthermore, the head member is formed to be replaceable, the user can select a suitable combination according to a desired sensitivity or a performance. In addition, the antenna of the present invention can be attached in replace of the already existing antenna, thereby easily confirming whether the telephone belongs to the user or not.

CLAIMS

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1. A device for detecting electromagnetic waves characterized by comprising: comprises an antenna body in the form of a rod of electrically conductive material, a head member removably attached to a top end of said antenna body, and a supporting member inserted in said antenna body to support said supporting body.

2. The device for detecting electromagnetic waves of claim 1, characterized in that said head member encloses therein a resonance circuit for receiving an electromagnetic wave to generate a high frequency alternating current.

3. The device for detecting electromagnetic waves of claim 1 or 2, characterized in that said resonance circuit comprises a detecting diode for converting a generated high frequency alternating current into a direct current, and an indicating member having a light emitting diode.

4. The device for detecting electromagnetic waves of claim 1 or 2, characterized in that said head member has a discrimination member for discriminating itself and others.

5. The device for detecting electromagnetic waves of any one of claims 1 to 4, characterized in that said head member is formed of a transparent or translucent insulating material.

6. The device for detecting electromagnetic waves of any one of claims 1 to 5, characterized in that said indicating member or said discrimination member is accommodated in a manner to be visible from the outside.

7. The device for detecting electromagnetic waves of claim 1, characterized in that said antenna body has a connecting member connected to said head member and a restricting member at the lower portion thereof for preventing removal from said supporting member.

8. The device for detecting electromagnetic waves of claim 1, characterized in that said antenna body is formed of a expansible and contractible multiple pipes.

Description of the Numerals

A antenna

1 antenna body

2 head member

3 supporting member

11 connecting member

12 restricting member

13a, 13b, 13c, 13d, 13e pipe

14 intermediate connecting member

20a resonance circuit

20b, 20c, 20f series resonance circuit

20d, 20e parallel resonance circuit

31, 32 supporting member

33 shaft

201 resistor

202 coil

203 element

204 detecting diode

205 light emitting diode

206 washer

207 discriminating member

208 pipe

209 capacitor

210, 210a cap member

220, 220a, antenna connecting member

230 indicating member

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FIG. 1

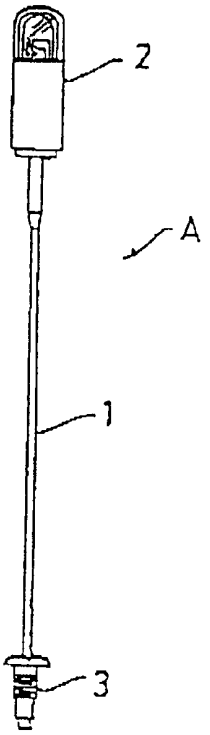

FIG. 2

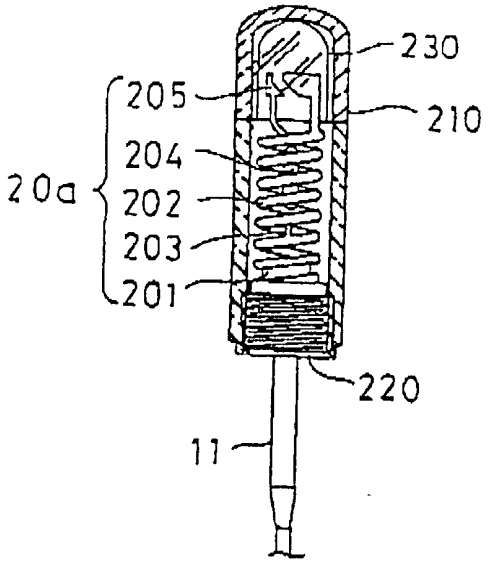

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FIG. 3

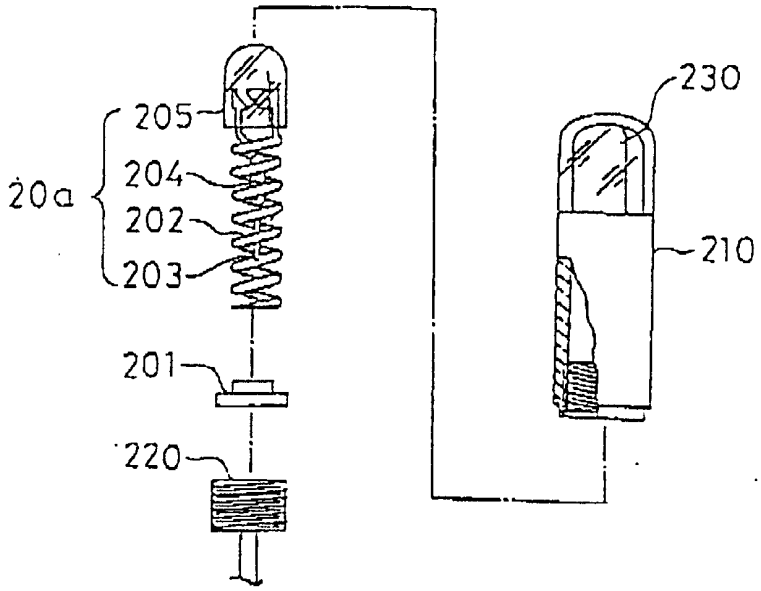

FIG. 4

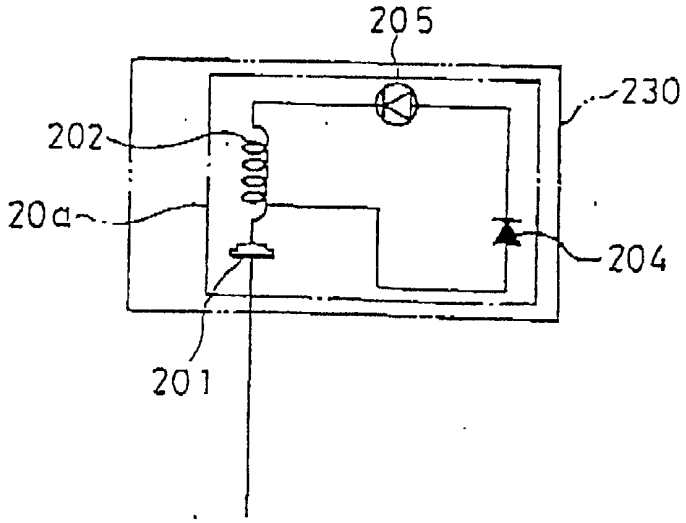

FIG. 5 (a)

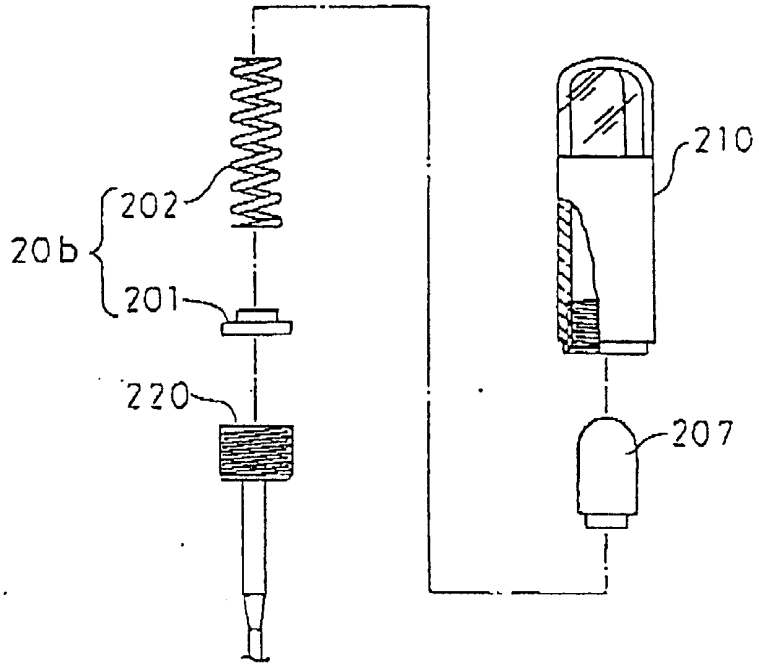

FIG. 5 (b)

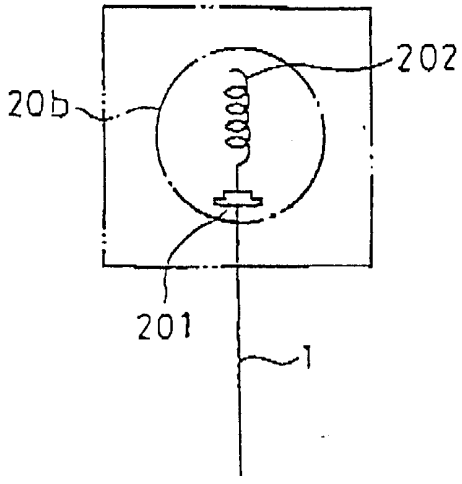

FIG. 6

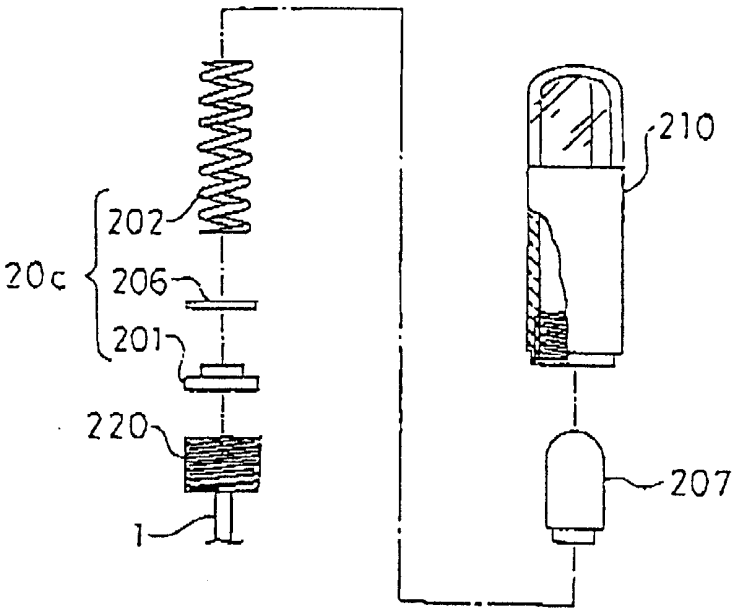

FIG. 7

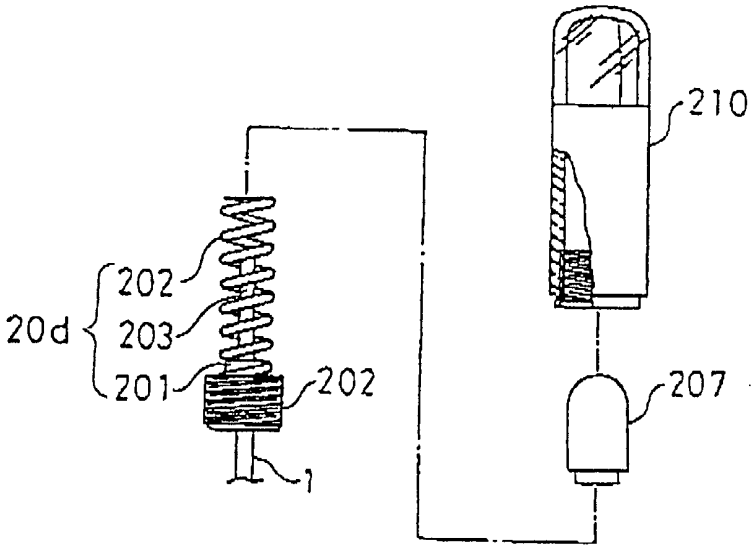

FIG. 8

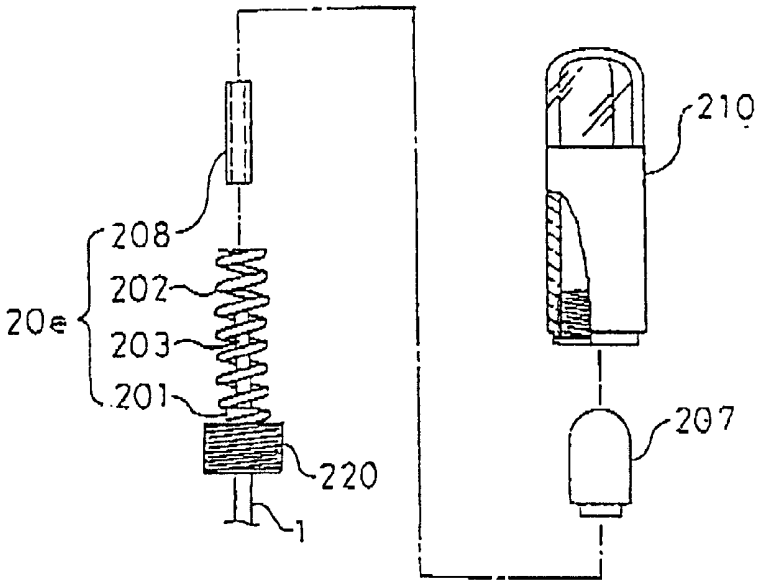

FIG. 9 (a)

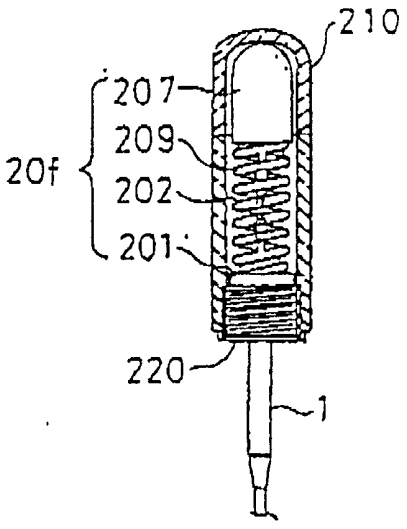

FIG. 9 (b)

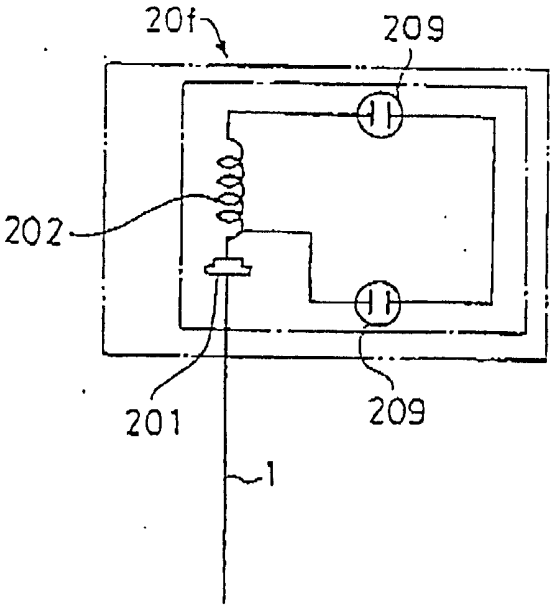

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FIG. 10

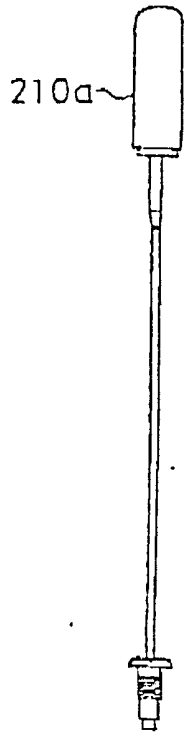

FIG. 11

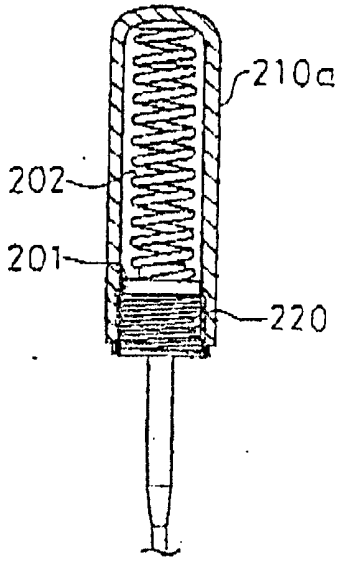

FIG. 12

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FIG. 13

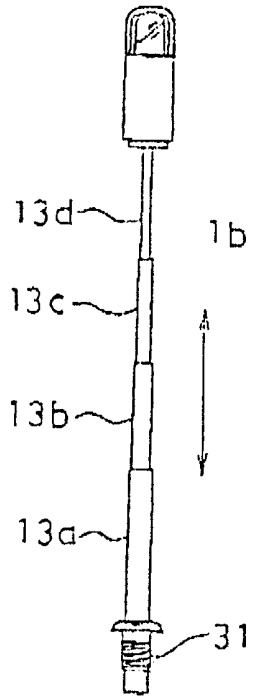

FIG. 14

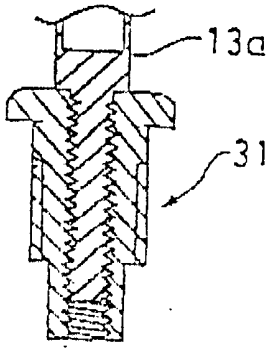

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FIG. 15

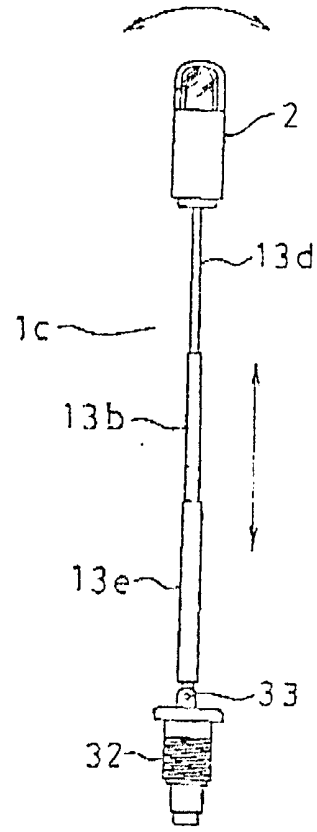

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FIG. 16

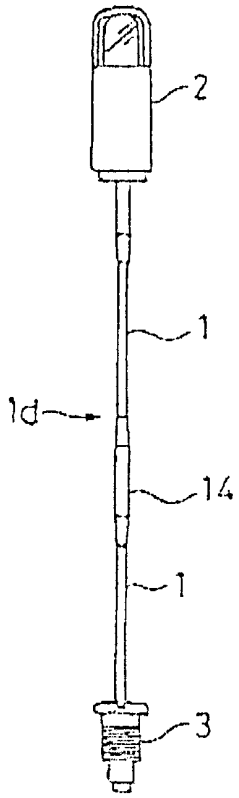

FIG. 17 (a)

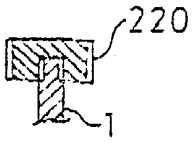

FIG. 17 (b)

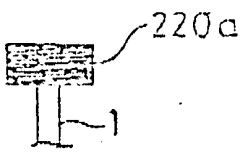

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FIG. 18