[0032] One end of the AC voltage generator **11** is connected to specific electrical potential (a ground in this example), and other end (an output terminal) of that generates specific AC voltage (voltage V in, angular frequency ω). The resistance (R1) **12** is connected between the output terminal of the AC voltage generator **11** and an inverting input terminal of the operational amplifier **14**.

[0033] The operational amplifier **14** is a voltage amplifier with a high level of input impedance and an open loop gain, a non-inverting input terminal here is connected to specific potential (the ground in this example), and the non-inverting input terminal and the inverting input terminal are in an imaginary short status. In a negative feedback loop of the operational amplifier **14**, which is from an output terminal to the inverting input terminal of the operational amplifier **14**, the capacitor **15**, the impedance converter **16** and the resistance (R2) **13** are connected in series in this order.

[0034] The impedance converter **16** is a voltage amplifier of which input impedance is extremely high, output impedance is extremely low, and voltage gain is A times. An input terminal **21** of this impedance converter **16** is connected to one end of the capacitor **17** via a signal line or an electric conductor such as a wiring patter on a printed circuit board, and other end of the capacitor **17** is connected to specific potential (the ground in this example). An output terminal of the operational amplifier **14** is connected to an output signal of this electrostatic capacitance detection circuit **10**, i.e. the signal output terminal **20** for outputting a detection signal corresponding to the capacitance of the capacitor **17**. In this patent document, a variable A indicated for the A times or the like shows any real number other than zero.

[0035] As for the connection between the capacitor **17** and the electrostatic capacitance detection circuit **10**, it is preferable that an electric conductor, which is as short as possible, (such as a cable, a copper foil wiring pattern, a connection terminal) is used, so that it is possible to prevent any unnecessary stray capacitance from being added as a detection error, or a disturbance noise from being mixed. Moreover, to enhance a shield against the disturbance noise, it is preferable that a whole part of the capacitor **17** and the electrostatic capacitance detection circuit **10** is covered with a grounded shield material or put in a shield box if possible.

[0036] Actions of the electrostatic capacitance detection circuit **10** structured above are as follows.

[0037] Regarding an inverting amplification circuit comprising the resistance (R1) **12**, the resistance (R2) **13** and the operational amplifier **14** and the like, both of the input terminals of the operational amplifier **14** are in the imaginary short status and in the same potential (e.g. 0 V), their impedance is extremely high, and no electric current flows through, so that the electric current passed through the resistance (R1) **12** becomes Vin/R1. Because all of the electric current is passed through the resistance (R2) **13**, the following expression becomes effective when the output voltage of the impedance converter **16** is V2.

$$Vin/R1=-V2/R2$$

[0038] When summarizing this, the output voltage V2 of the impedance converter **16** can be expressed by the following expression.

$$V2=-(R2/R1)\cdot Vin \qquad \text{(Expression 1)}$$

[0039] Also, because the voltage gain of the impedance converter **16** is A, the input voltage **V1** is expressed as follows from a relationship between the input voltage (voltage of the input terminal **21**) **V1** and the output voltage (voltage of the output terminal **22**) **V2**.

$$V1=(1/A)\cdot V2 \qquad \text{(Expression 2)}$$

[0040] When the electric current flows through the capacitor **15** towards the capacitor **17** is i, all of the electric current i is sent to the capacitor **17** because the input impedance of the impedance converter **16** is extremely high. Therefore, the electric current i becomes jωC·**V1**. The voltage Vout of the detection signal output from the signal output terminal **20** is expressed as follows:

$$\begin{aligned} Vout &= i\cdot(1/j\omega Cf)+V1 \qquad \text{(Expression 3)} \\ &= (1+Cs/Cf)\cdot V1 \end{aligned}$$

[0041] When **V2** is deleted from the above expressions 1 and 2, the following expression is obtained.

$$V1=-(R2/R1)\cdot(Vin/A) \qquad \text{(Expression 4)}$$

[0042] When this **V1** is assigned to the above expression 3, the following expression is obtained.

$$Vout=-(1+Cs/Cf)\cdot(R2/R1)\cdot(Vin/A) \qquad \text{(Expression 5)}$$

[0043] As clarified from this expression 5, the voltage Vout of the detection signal output from the signal output terminal **20** of the electrostatic capacitance detection circuit **10** becomes a value that depends on the capacitance Cs of the capacitor **17**. Therefore, the capacitance Cs can be determined by executing various signal processing to this voltage Vout. Also, as seen in this expression 5 where the angular frequency ω is not included, the voltage Vout of this detection signal does not depend on a fluctuation in a frequency of the AC signal Vin from the AC voltage generator **11** and in a frequency of the capacitor to be detected. So, the electrostatic capacitance detection circuit (that does not have a frequency-dependent characteristic in the circuit) capable of detecting the capacitance of the capacitor **17** is realized without depending on the frequency of the AC voltage applied to the capacitor **17**. Therefore, for the capacitor **17**, of which capacitance value is changed at a certain frequency (sound band), such as a capacitor microphone, it is possible to specify a capacitance value directly from the voltage value thereof in stead of correcting the frequency for the detected signal.

[0044] Also, in the electrostatic capacitance detection circuit **10** according to this embodiment, the operational amplifier **14**, which supplies the electric current to the capacitor **15** and the capacitor **17**, has the non-inverting input terminal connected to specific potential and fixed. Therefore, unlike the operational amplifier **95** in the conventional circuit shown in **FIG. 1**, the operational amplifier **14** supplies stable electric current with less noises to the capacitor **15** and the capacitor **17** without depending on the frequency of the input AC signal or the like, and very small capacitance of the capacitor **17** can be detected.

[0045] According to an experiment related to the present invention, in the electrostatic capacitance detection circuit shown in **FIG. 2**, for example, if the stray capacitance of the