

ABSTRACT

To provide a communication sheet structure that is used in combination with an IC tag, has stable read rate and can be easily introduced and installed on an existing shelf, and also an information management system using the same.

A communication sheet structure comprises at least three layers of a conductor layer A, a base member layer and a conductor layer B described below, which are laminated in order, wherein the size of the communication sheet structure in the direction of width thereof at right angles with the direction in which the transmitted electromagnetic waves travel in a plane thereof is nearly equal to a natural number of times of one-half the wavelength of the transmitted electromagnetic waves so as to establish a resonating state in the direction of width:

conductor layer A: a layer in which continuous, conducting portions A and nonconducting portions A are present, the conducting portions A having an electric resistance of not larger than $1 \Omega/\square$;

base member layer: a layer of a resin molded body or a fiber structure having a relative dielectric constant of 1.0 to 5.0 at a frequency of 800 MHz to 10 GHz;

conductor layer B: a layer in which a conducting portion B is present over not less than 90% of the area thereof, the conducting portion B having an electric resistance of not larger than $1 \Omega/\square$.

CLAIMS

[Claim 1] A communication sheet structure comprising at least three layers of a conductor layer A, a base member layer and a conductor layer B described below, which are laminated in order, wherein the size of said communication sheet structure in the direction of width thereof at right angles with the direction in which the transmitted electromagnetic waves travel in a plane thereof is nearly equal to a natural number of times of one-half the wavelength of said transmitted electromagnetic waves so as to establish a resonating state in said direction of width:

conductor layer A: a layer in which continuous, conducting portions A and nonconducting portions A are present, said conducting portions A having an electric resistance of not larger than $1 \Omega/\square$;

base member layer: a layer of a resin molded body or a fiber structure having a relative dielectric constant of 1.0 to 5.0 at a frequency of 800 MHz to 10 GHz;

conductor layer B: a layer in which a conducting portion B is present over not less than 90% of the area thereof, said conducting portion B having an electric resistance of not larger than $1 \Omega/\square$.

[Claim 2] The communication sheet structure according to claim 1, wherein said communication sheet structure is of the shape of a strip having a long side in the direction in which the transmitted electromagnetic waves travel and a short side in said direction of width.

[Claim 3] The communication sheet structure according to claim 1 or 2, wherein the size in said direction of width is nearly equal to one-half the wavelength of said transmitted electromagnetic waves so that said transmitted electromagnetic waves become plane waves.

[Claim 4] The communication sheet structure according to any one of claims 1 to 3, wherein the conducting portions A in said conductor layer A are of the shape of a lattice having a wire width of 0.5 mm to 1.5 mm and a gap among

the wires of 5 mm to 10 mm.

[Claim 5] The communication sheet structure according to any one of claims 1 to 4, wherein said base member layer comprises a foamed polypropylene resin or foamed polyethylene resin having a voidage of 50 to 85%.

[Claim 6] The communication sheet structure according to any one of claims 1 to 5, further comprising an input/output interface for inputting and outputting said transmitted electromagnetic waves in a predetermined direction of travel.

[Claim 7] The communication sheet structure according to any one of claims 1 to 6, wherein a high dielectric constant layer is laminated on said conductor layer A, said high dielectric constant layer having a relative dielectric constant larger than that of the base member layer and having a dielectric loss tangent of not more than 0.001.

[Claim 8] The communication sheet structure according to claim 7, wherein said high dielectric constant layer has a relative dielectric constant of from 2.0 to 10.0.

[Claim 9] The communication sheet structure according to claim 8, further comprising a protection layer A of a thickness of 0.02 to 0.3 mm between said conductor layer A and said high dielectric constant layer.

[Claim 10] An information management system comprising an IC tag for storing information related to an article which is to be managed, the communication sheet structure described in claim 1, and a transmission/reception unit which transmits electromagnetic waves toward said communication sheet structure and receives signals from said IC tag through said communication sheet structure.

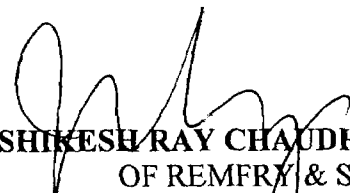
[Claim 11] The information management system according to claim 10, further comprising a management device which reads information related to said article based on said signals received by said transmission/reception unit, and manages the state of said article by the database based on the management information that has been registered in

advance and the information that is read concerning the article.

[Claim 12] The information management system according to claim 11, wherein said communication sheet structure includes an input/output interface connected to said transmission/reception unit or to another communication sheet structure to input and output signals.

[Claim 13] The information management system according to claim 10, wherein said communication sheet structure is placed on a surface on where said article to which said IC tag is attached is to be arranged.

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Fig.1

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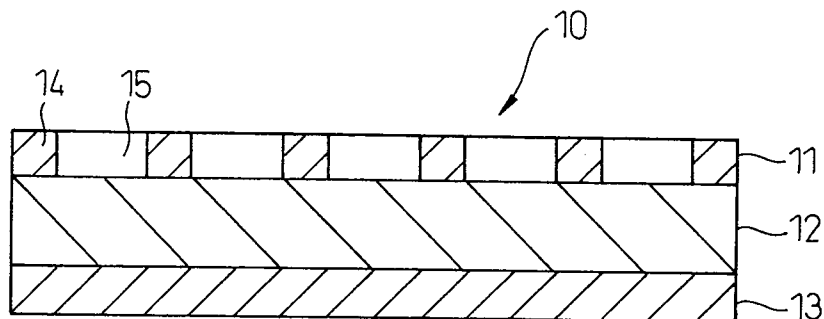


Fig.2

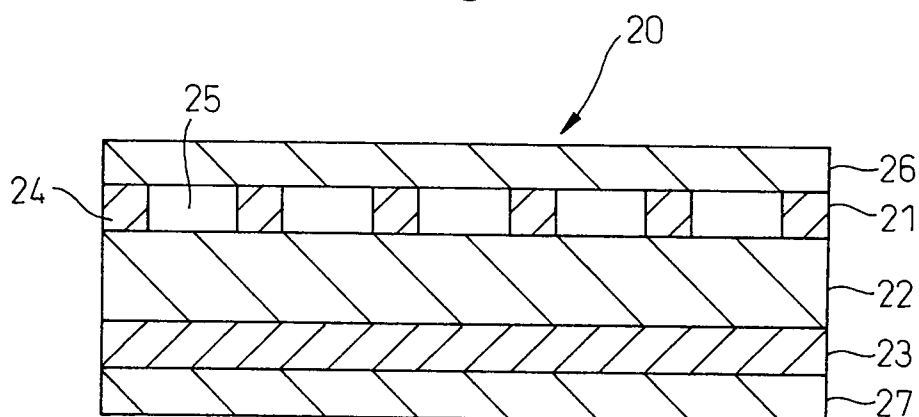
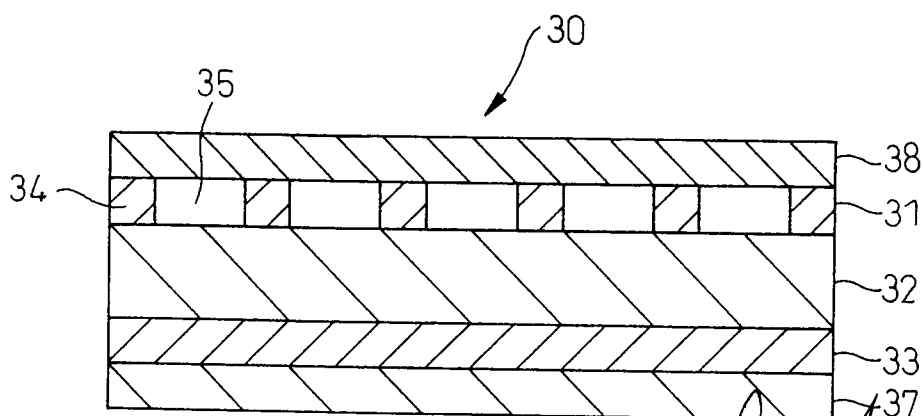


Fig.3



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Fig.4

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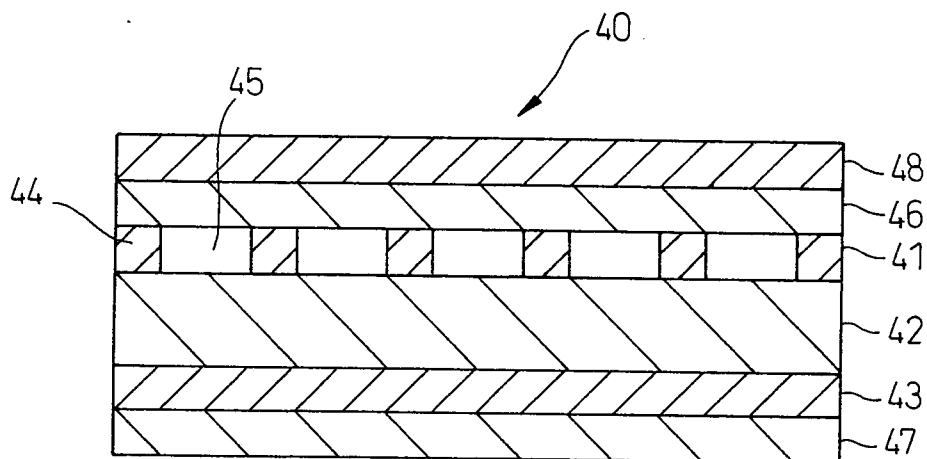
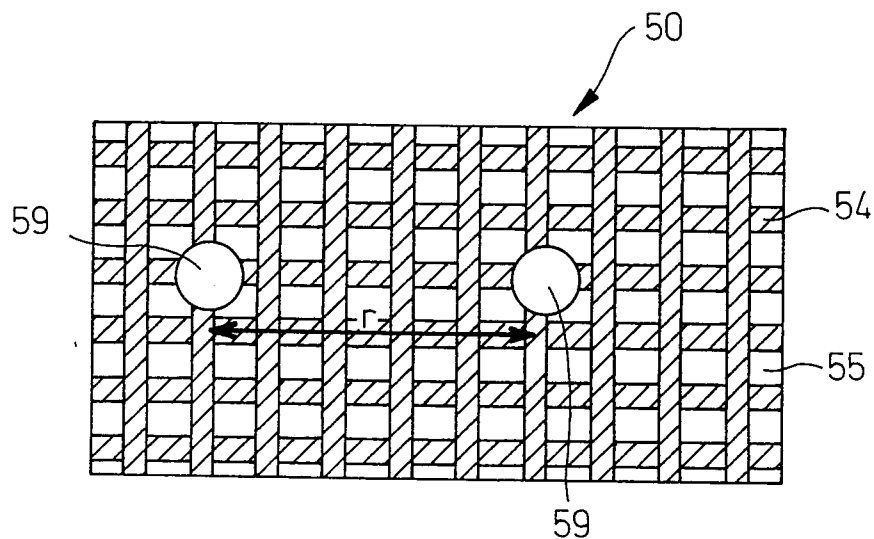



Fig.5




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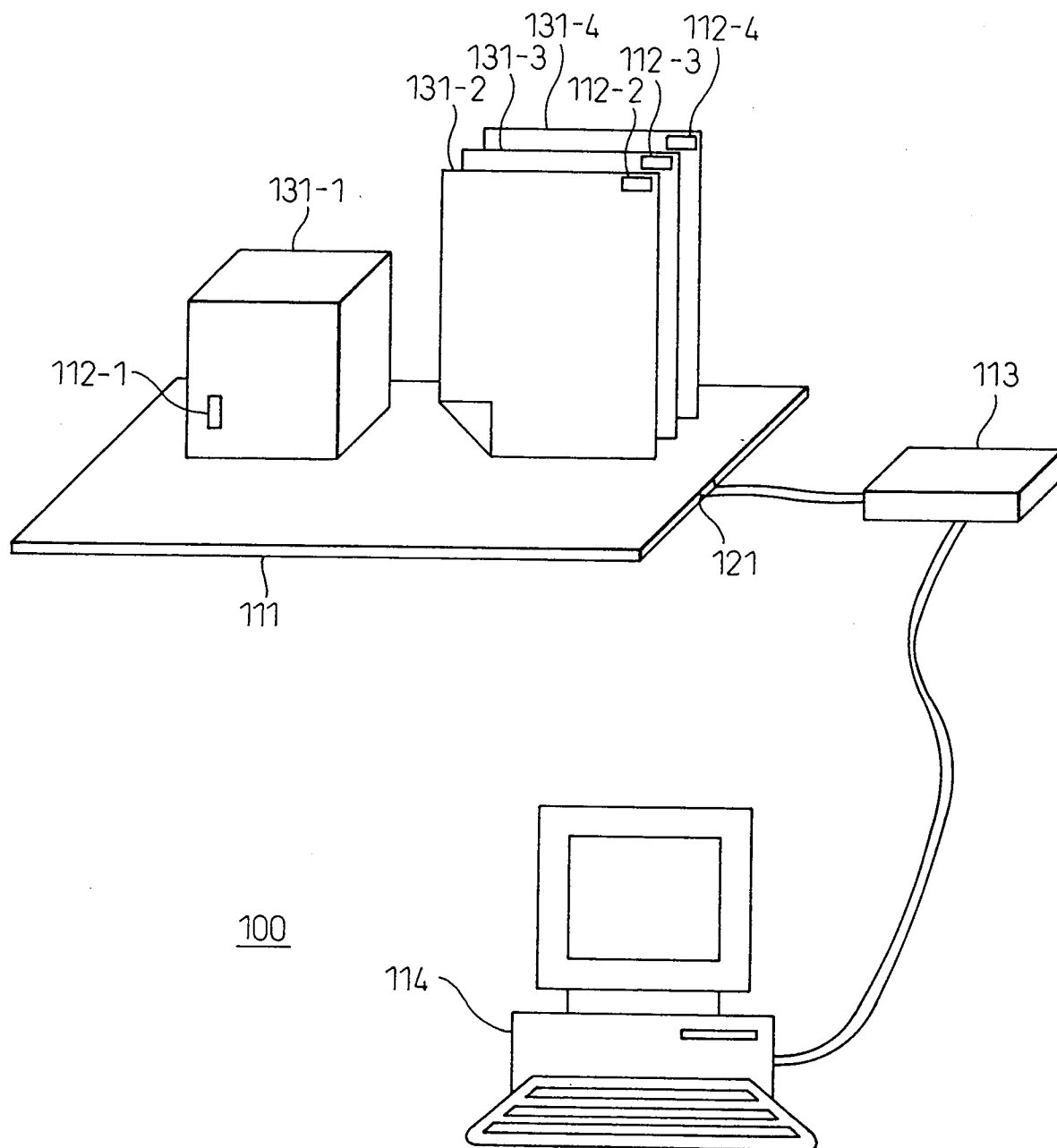
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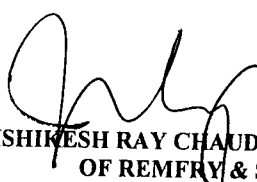
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Fig.6




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Fig.7

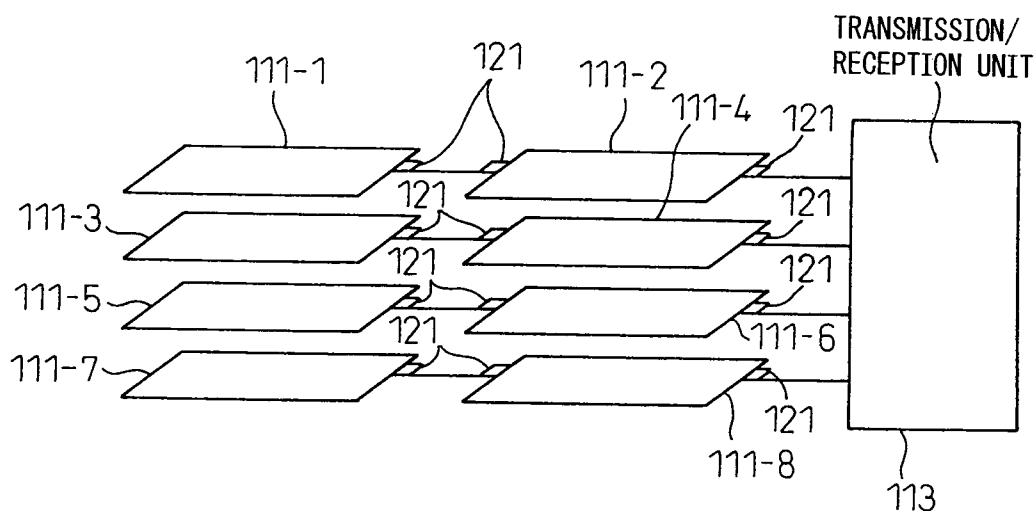
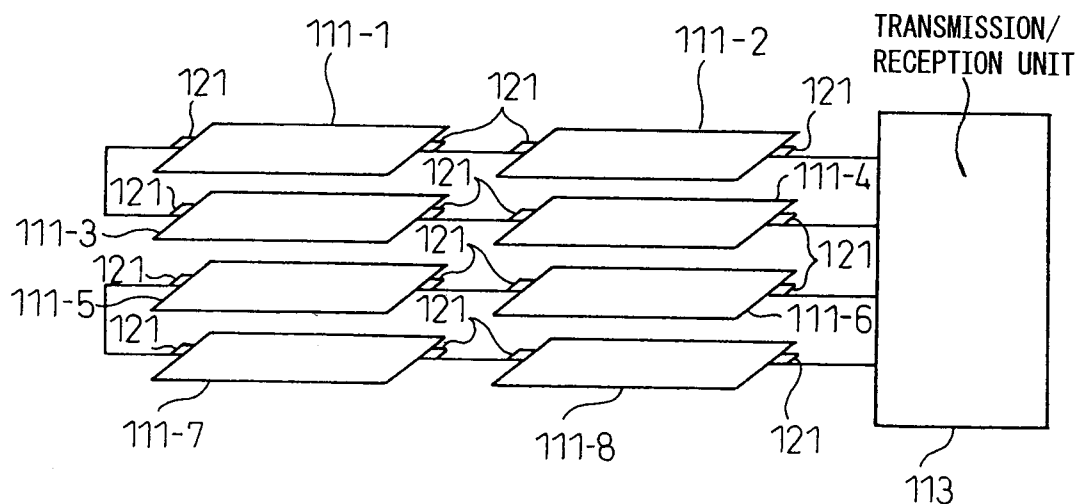


Fig.8



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Fig.9

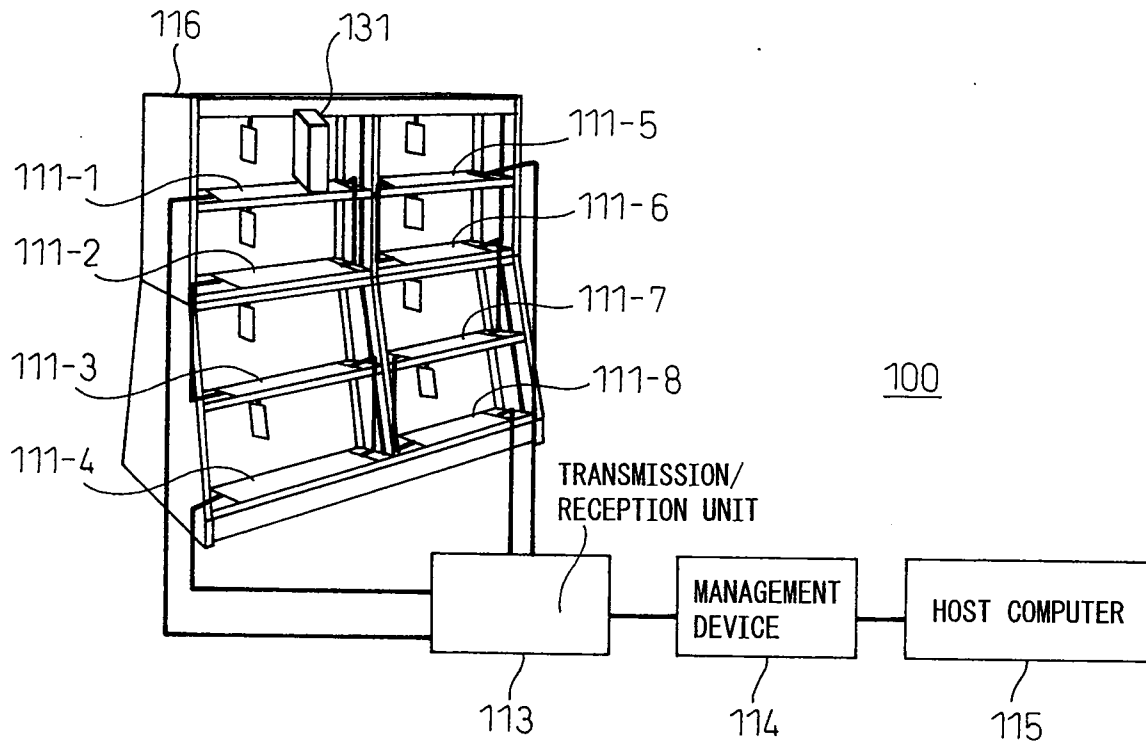
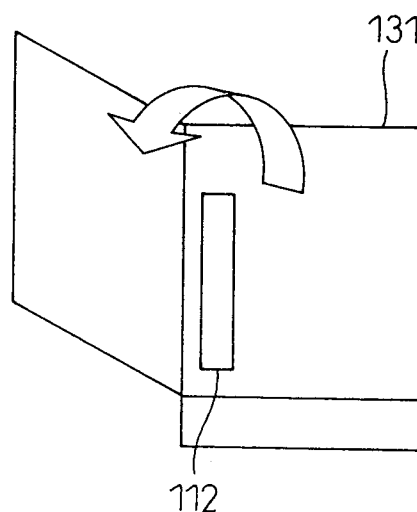


Fig.10



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Fig.11

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