CLAIMS

1. A magnetic marker installation method for laying, in or on a road, a magnetic marker having ~~retained therein~~ a wireless tag retained by a main body forming a magnetism generation source, the wireless tag including an antenna for transmitting or receiving electric waves for wireless communication, the installation method comprising:

an arrangement step of arranging the magnetic marker in or on the road; and

a formation step of providing the magnetic marker with a protecting part for isolating the antenna from water, wherein

the antenna includes waveguide parts made of a conductive material and a gap which is formed by any two of the waveguide parts arranged so as to be opposed to each other, and

the formation step is a step of providing the magnetic marker with the protecting part so that a distance for isolating the antenna from water is longer than a distance of the gap.

~~2. The magnetic marker installation method according to claim 1, wherein the antenna includes waveguide parts made of a conductive material and a gap formed by any two of the waveguide parts arranged to face each other, and~~

~~the formation step is a step of providing the magnetic marker with the protecting part so that a distance for isolating the antenna from water is longer than the gap.~~

~~3~~2. The magnetic marker installation method according to claim ~~2~~1, wherein the wireless tag has an electronic component including a processing part for processing

information to be superposed on the electric waves and a primary antenna provided to electrically extend from the processing part, and

the electronic component is arranged in the gap.

3. A magnetic marker installation method for laying, in or on a road, a magnetic marker having retained therein a wireless tag including an antenna for transmitting or receiving electric waves for wireless communication, the installation method comprising:

an arrangement step of arranging the magnetic marker in or on the road; and

a formation step of providing the magnetic marker with a protecting part for isolating the antenna from water, wherein

in the magnetic marker, the wireless tag is retained on an outer surface of the main body forming a magnetism generation source, and

the protecting part is formed so as to cover the wireless tag and fluid-tightly make contact with the outer surface of the main body on an outer peripheral side of the wireless tag.

4. The magnetic marker installation method according to claim 3, wherein the main body forms a columnar shape and the wireless tag is arranged and retained on an end face of the main body in the columnar shape,

the arrangement step is a step of accommodating the magnetic marker with the end face where the wireless tag is arranged upward in an accommodation hole provided to be bored in a road surface so as to be deeper than a height of the magnetic marker, and

the formation step is a step of forming the protecting part by supplying a polymer material in a molten state to the accommodation hole after the arrangement step is performed.

5. The magnetic marker installation method according to claim 3, wherein the main body forms a columnar shape and the wireless tag is arranged and retained on an end face of the main body in the columnar shape,

the arrangement step is a step of accommodating the magnetic marker with the end face where the wireless tag is arranged upward in an accommodation hole provided to be bored in a road surface so as to be deeper than a height of the magnetic marker, and

the formation step is a step of accommodating a protective member in the accommodation hole and bonding the protective member to the end face of the main body, the protective member which can be accommodated in an upper recess of the magnetic marker in the accommodation hole after the arrangement step is performed and is also prepared in advance so as to be able to be in contact with the outer surface of the main body on the outer peripheral side of the wireless tag as covering the wireless tag.

6. The magnetic marker installation method according to claim 4 or 5, wherein the antenna includes waveguide parts made of a conductive material and a gap which is formed between any two of the waveguide parts arranged so as to be opposed to each other,

the accommodation hole has a depth deeper than a dimension obtained by adding the distance of the gap formed in the antenna to the height of the magnetic marker, and

in the formation step, the protecting part is formed so as to be substantially flush with the road surface.

7. The magnetic marker installation method according to claim 3, wherein the main body forms a columnar shape and the wireless tag is arranged and retained on an outer side surface of the main body in the columnar shape,

the arrangement step is a step of accommodating the magnetic marker in an accommodation hole provided to be bored in the road surface so as to exhibit a section that is one size larger than a section of the magnetic marker, and

the formation step is a step of forming the protecting part by supplying a polymer material in a molten state to a gap between an inner side surface of the accommodation hole and an outer side surface of the magnetic marker after the arrangement step is performed.

8. The magnetic marker installation method according to claim 3, wherein the main body forms a columnar shape and the wireless tag is arranged and retained on an outer side surface of the main body in the columnar shape,

the arrangement step is a step of accommodating the magnetic marker in an accommodation hole provided to be bored in the road surface so as to exhibit a section that is one size larger than a section of the magnetic marker, and

the formation step is a step of accommodating a protective member in the accommodation hole, the protective member being prepared in advance so as to be able to be mounted to an outside of the magnetic marker, thereby mounting and arranging the protective member to the outside of the magnetic marker for attachment in a fluid-tight state.

9. The magnetic marker installation method according to claim 7 or 8, wherein the antenna includes waveguide parts made of a conductive material and a gap which is formed by any two of the waveguide parts arranged to face each other, and

the accommodation hole is a hole provided so that a thickness of the cylindrical gap between the inner side surface of the accommodation hole and the outer side surface of the magnetic marker is equal to or larger than a dimension of the gap formed in the antenna.

10. The magnetic marker installation method according to claim 7 or 8, wherein the arrangement step is a step of accommodating the magnetic marker in the accommodation hole by performing centering for adjusting the magnetic marker at a center of the accommodation hole, and

the centering is

a step of accommodating the magnetic marker in an accommodation hole having a bottom surface in a two-stage structure formed of an deep inner-periphery bottom surface and a shallow outer-peripheral bottom surface or an accommodation hole having a mortar-shaped bottom surface gradually deeper from an outer peripheral side toward the deep inner-periphery bottom surface so that the main body in the columnar shape is in contact with the deep inner-periphery bottom surface, or

a step of accommodating a magnetic marker having a flange shape projecting from the outer perimeter in an accommodation hole exhibiting a constant sectional shape in a depth direction.

11. The magnetic marker installation method according to

claim 3, wherein the main body forms a sheet shape and the wireless tag is arranged and retained on a surface of the main body in the sheet shape, and

the formation step is a step of forming the protecting part by, to a surface of the magnetic marker arranged on a road surface by the arrangement step, supplying a polymer material in a molten state so as to cover the wireless tag or bonding a protective seal made of a polymer material so as to cover the wireless tag.

~~4~~12. The magnetic marker installation method according to any one of claims 1 to ~~3~~11, wherein the protecting part to be provided to the magnetic marker in the formation step is made of a polymer material.

~~5~~13. The magnetic marker installation method according to any one of claims 1 to ~~4~~12, wherein the arrangement step is a step of accommodating the magnetic marker in an accommodation hole provided to be bored in a road surface of the road, and

the formation step is performed after the arrangement step is performed.

14. The magnetic marker installation method according to any one of claims 1 to 13, wherein the main body is a ferrite magnet having magnetic powder of iron oxide as a magnetic material dispersed into a polymer material as a base material, and

the protecting part is formed so as to cover part of an outer surface of the main body.