CLAIMS

1. A diffraction device for fitting to the facade (11) of a building, or any other reflecting wall, exposed to an electromagnetic radiation transmitted by a source located at a distance from the building, the device having a plurality of tubular resonant elements (12) positioned on the facade of said building, characterized in that, these resonant elements being positioned in a substantially parallel way on the facade (11) of said building, so as to form a diffraction grating, and being oriented in a direction substantially perpendicular to the plane defined by the propagation vectors of the incident and reflected electromagnetic waves, each resonant element (12) is configured to form a resonator of the "LC" type adapted to re-radiate a wave corresponding to the incident wave subjected to a phase shift; the assembly of the resonant elements being arranged in such a way that the incident wave is diffracted in a preferred direction.

2. The device as claimed in claim 1, characterized in that the spacing pitch d of the different conductive elements (12) is determined as a function of the wavelength λ and the angle of incidence θ so as to create a Bragg grating producing a phase shift of the incident wave such that the latter is diffracted in a preferred direction.

3. The device as claimed in either of claims 1 and 2, characterized in that, if the electromagnetic transmission source is distant, the spacing d between the different conductive elements (12) is constant.

4. The device as claimed in either of claims 1 and 2, characterized in that if the electromagnetic transmission source is nearby, the spacing d between the different conductive elements is a function of the local angle of incidence of the electromagnetic wave.

5. The device as claimed in any of claims 1 to 4, characterized in that each resonant element (12) is formed by a tube of conductive material whose wall, which defines an inner cavity (17), has a

longitudinal opening (14), the dimensions and geometry of the cavity (17) defined by the wall, as well as the width of the longitudinal opening (14) formed in this wall, being defined so that the element (12) acts, in electromagnetic terms, as an LC resonator with a resonance frequency F_0 and a bandwidth ΔF_0.

6. The device as claimed in any of claims 1 to 5, characterized in that each resonant element (12) is configured so as to have overall dimensions which can be inscribed within a parallelepipedal volume of given dimensions taking mechanical stresses into account.

7. The device as claimed in claim 6, characterized in that the wall of a resonant element (12) has, in cross section, the shape of a rectangle, one of the lengths of which has a discontinuity (24) corresponding to the longitudinal slit (14) formed along the wall.

8. The device as claimed in claim 7, characterized in that the cavity (17) defined by the wall of the resonant element (12) accommodates an inner extension (51) fixed to the inner face of said wall and forming a rib having a "T" shape in cross section, the bar of which is parallel to the lengths of the rectangle, the rib (51) being configured and arranged within the cavity (17) in such a way that the bar of the "T" is placed facing the opening (24) present in one of the lengths of the rectangle, at a distance defined as a function of the frequency F_0 and the bandwidth ΔF_0.

9. The device as claimed in claim 6, characterized in that the wall of a resonant element (12) has the shape, in cross section, of a rectangle, one length of which has a discontinuity limited by two segments (31, 32) substantially perpendicular to said length, whose ends are directed toward the inside of the perimeter.

10.The device according to any of the preceding claims, characterized in that the cavities (17) defined by the walls of the

resonant elements are filled with a dielectric material (51) chosen so as to reinforce the rigidity of the elements.

11.The device according to any of the preceding claims, characterized in that the cavities (17) defined by the walls of the resonant elements (12) are filled with two superimposed layers of a dielectric material chosen so as to reinforce the rigidity of the elements, a conductive strip (52) being placed in each cavity (17) at the interface between the two layers, facing the longitudinal slit (14) formed along the wall.

12.The device according to any of the preceding claims, characterized in that the cavities (17) defined by the walls of the resonant elements (12) are filled with a nonconducting ferromagnetic material chosen so as to increase the bandwidth ΔF_0 and reduce the frequency F_0 of these elements.

13.The device according to any of the preceding claims, characterized in that the cavities (17) defined by the walls of the resonant elements (12) are filled with a dielectric material having a high permittivity ϵ, chosen so as to reduce the resonance frequency F_0 of the elements.

14.A diffraction device for fitting to a facade (11) of a building, or any other partition, exposed to the electromagnetic radiation transmitted by a distant source, characterized in that it includes a plurality of tubular resonant elements (12) positioned in a periodic manner in a substantially parallel way on the facade (11) of said building so as to form a diffraction grating, each resonant element (12) being itself formed by a plurality of juxtaposed resonant elements as claimed in any of claims 1 to 13, the lateral walls of which are in electrical contact.

CLAIMS

1 - A diffraction device for fitting to a facade (11) of a building, exposed to an electromagnetic radiation transmitted by a source located at a distance from said building, said diffraction device having a plurality of tubular resonant elements (12) positioned on said facade of said building, characterized in that :

- the resonant elements (12) of said plurality of resonant elements are positioned vertically (page 6 lines 17-19) in a substantially parallel way on the facade (11) of said building, so as to form a diffraction grating,
- each resonant element (12) has a form of a hollow cylinder of a conductive material, and a wall of said hollow cylinder, defining an inner cavity (17), has a longitudinal slit (14) having a given width **e** *(page 6 lines 21-25)*,
- the dimensions and geometry of the cavity (17) defined by the wall, as well as the width of the longitudinal slit (14) formed in this wall, form an inductance-capacitance (**LC**) circuit having a resonance frequency (**F0**) and a bandwidth (**ΔF0**) *(page 6 lines 30_33, claim 5)* to re-radiate a wave corresponding to an incident wave.

2 - The device as claimed in claim 1, characterized in that a spacing pitch **d** of the conductive elements (12) of the diffraction grading is determined as a function of the wavelength **λ** and the angle of incidence **θ** to diffract the incident wave in a preferred direction.

3 - The device as claimed in either of claims 1 and 2, characterized in that, if the electromagnetic transmission source is distant, the spacing **d** between the different conductive elements (12) is constant.

4 - The device as claimed in either of claims 1 and 2, characterized in that, if the electromagnetic transmission source is nearby, the spacing **d** between the different conductive elements is a function of the local angle of incidence of the electromagnetic wave.

5 - The device as claimed in one of preceding claims, characterized in that the wall of a resonant element (12) has, in cross section, a rectangular shape.

6 - The device as claimed in claim 5, characterized in that the cavity (17) defined by the wall of a resonant element (12) accommodates an inner extension (51) fixed to the inner face of said wall and forming a rib having a "T" shape in cross section, the bar of which is parallel to the lengths of the rectangle, the rib (51) being configured and arranged within the cavity (17) in such a way that the bar of the "T" is placed facing the opening (24) present in one of the lengths of the rectangle, at a distance defined as a function of the frequency F_0 and the bandwidth ΔF_0.

7 - The device as claimed in claim 5, characterized in that the slit (24) of a resonant element (12) is limited by two segments (31, 32) substantially perpendicular to the wall, ends of said two segments being directed toward the inside of the rectangle.

8 - The device as claimed in claim 5, characterized in that a resonant element (12) comprises a slit (61) on a lateral face (16) of the wall of the resonator element and comprises at least one self-inductance element (62) inside the cavity (17), ends (63, 64) of said self-inductance element being respectively connected electrically to edges (65, 66) of said slit (61).

9 - The device as claimed in claim 5, characterized in that a resonant element (12) comprises a slit (61) on a lateral face (16) of the wall of the resonator element and comprises inductances (71), distributed over a length of said slit (61), terminals of each inductance being connected to edges (65, 66) of the slit (61).

10 - The device as claimed in claim 9, characterized in that a resonant element (12) comprises capacitive elements (72) fitted along the slit (14) with their terminals connected to edges of said slit (14).

11 - The device as claimed in claim 5, characterized in that at least two resonant elements (12) are adjacent.

12 - The device according to any of the preceding claims, characterized in that the cavities (17) defined by the walls of the resonant elements are filled with a dielectric material (51) chosen so as to reinforce the rigidity of the elements.

13 - The device according to any of the preceding claims, characterized in that the cavities (17) defined by the walls of the resonant elements (12) are filled with two superimposed layers of a dielectric material chosen so as to reinforce the rigidity of the elements, a conductive strip (52) being placed in each cavity (17) at the interface between the two layers, facing the longitudinal slit (14) formed along the wall.

14 - The device according to any of the preceding claims, characterized in that the cavities (17) defined by the walls of the resonant elements (12) are filled with a nonconducting ferromagnetic material chosen so as to increase the bandwidth ΔF_0 and reduce the resonance frequency F_0 of said resonant elements.

15 - The device according to any of the preceding claims, characterized in that the cavities (17) defined by the walls of the resonant elements (12) are filled with a dielectric material having a high permittivity ϵ, chosen so as to reduce the resonance frequency F_0 of said rersonant elements.

16 - A facade (11) of a building comprising a diffraction device in accordance with one of the preceding claims.