CLAIMS

1. Device (1) for measuring moisture of materials flowing in the shape of dried, liquid or gaseous granulates, or in the shape of powders in at least one duct disposed at least partially along the axis (X - X) through which the material of which the moisture has to be measured flows, comprising:

- at least one capacitor (Cx) wherein the material of which the moisture has to be measured flows, characterized in that the capacitor (CX) comprises:

- at least two metallic rings (3) coaxially mounted to said axis (X – X) and adjacent to an inner wall of the duct through which the material of which the moisture has to be measured flows;

- at least one dielectric element (5) having:

dielectric constant substantially linear with the temperature changing, and

thermal expansion lower than $\alpha = 27 \times 10^{-6}/°C$.

2. Device (1) for measuring moisture according to claim 1, characterized in that said at least one dielectric element (5) comprises at least one ring of dielectric material (6).

3. Device (1) for measuring moisture according to claim 2, characterized in that a radially inner surface of said electrodes is disposed substantially aligned with said inner wall of said at least one duct.

4. Device (1) for measuring moisture according to any one of the preceding claims, characterized by having a modular structure.

5. Device (1) for measuring moisture according to any one of the preceding claims, characterized in that said dielectric element (5) has low hygroscopic characteristics.

6. Device (1) for measuring moisture according to any one of the preceding claims, characterized in that said capacitor (Cx) comprises four rings of dielectric material (6) and three metallic rings (3) interposed between the four rings of dielectric material (6).

7. Device (1) for measuring moisture according to any one of the preceding claims, characterized by comprising at least one unit (15) for compensating the thermal expansion of the dielectric material.

8. Device (1) for measuring moisture according to claim 7,

characterized in that said compensating unit (15) comprises at least one elastic means (16) and at least one sensor (17) disposed between at least one ring of dielectric material (6) and a flange for supporting the capacitor (Cx).

9. Device (100) for measuring moisture according to any one of the preceding claims, characterized by comprising at least one temperature probe.

10. Device (100) for measuring moisture according to any one of the preceding claims, characterized in that said capacitor (Cx) is inserted in a bridge circuit (29).

11. Device (100) for measuring moisture according to claim 10, characterized in that said bridge circuit (29) comprises at least a first (20) and a second (21) electric power line parallel connected, the first line (20) comprising at least two resistances (R1; R2) and said second line (21) comprising at least one reference resistance (RX) and at least said capacitor (Cx).

12. Device (100) for measuring moisture according to claim 10 or 11, characterized in that said bridge circuit (29) is connected to an oscillator (19) adapted for applying a variable sinusoidal signal to said bridge circuit (29) for measuring changes of capacitance of said capacitor (Cx).

13. Device (100) for measuring moisture according to claim 1, characterized in that said at least one dielectric element is substantially composed of PTFE.

14. Device (100) for measuring moisture according to claim 1, characterized in that said dielectric element (5) is substantially composed of ceramic material.

15. Device (100) for measuring moisture according to claim 1, characterized in that the inner walls of said capacitor (Cx) are hermetically sealed.

Claims

1. Device (1) for measuring moisture of materials flowing in the shape of dried, liquid or gaseous granulates, or in the shape of powders in at least one duct disposed at least partially along the axis (X - X) through which the material of which the moisture has to be measured flows, comprising:

    - at least one capacitor (Cx) wherein the material of which the moisture has to be measured flows, characterized in that the capacitor (CX) comprises:

    - at least three metallic rings (3) coaxially mounted to said axis (X - X) and adjacent to an inner wall of the duct through which the material of which the moisture has to be measured flows;

    - at least one dielectric element (5) having dielectric constant substantially linear with the temperature changing, and thermal expansion lower than a = 27 x 10^{-6}/°C;

    - at least one unit (15) for compensating the thermal expansion of the dielectric material.

2. Device (1) for measuring moisture according to claim 1, characterized in that said at least one dielectric element (5) comprises at least one ring of dielectric material (6).

3. Device (1) for measuring moisture according to claim 2, characterized in that a radially inner surface of said electrodes is disposed substantially aligned with said inner wall of said at least one duct.

4. Device (1) for measuring moisture according to any one of the preceding claims, characterized by having a modular structure.

5. Device (1) for measuring moisture according to any one of the preceding claims, characterized in that said dielectric element (5) has low hygroscopic characteristics.

6. Device (1) for measuring moisture according to any one of the preceding claims, characterized in that said capacitor (Cx) comprises four rings of dielectric material (6) and three metallic rings (3) interposed between the four rings of dielectric material (6).

7. Device (1) for measuring moisture according to claim 6, characterized in that said compensating unit (15) comprises at least one elastic means (16) and at least one sensor (17) disposed between at least one ring of dielectric material (6) and a flange for supporting the capacitor (Cx).

8. Device (100) for measuring moisture according to any one of the preceding claims, characterized by comprising at least one temperature probe.

9. Device (100) for measuring moisture according to any one of the preceding claims, characterized in that said capacitor (Cx) is inserted in a bridge circuit (29).

10. Device (100) for measuring moisture according to claim 9, characterized in that said bridge circuit (29) comprises at least a first (20) and a second (21) electric power line parallel connected, the first line (20) comprising at least two resistances (R1; R2) and said second line (21) comprising at least one reference resistance (RX) and at least said capacitor (Cx).

11. Device (100) for measuring moisture according to claim 9 or 10, characterized in that said bridge circuit (29) is connected to an oscillator (19) adapted for applying a variable sinusoidal signal to said bridge circuit (29) for measuring changes of capacitance of said capacitor (Cx).

12. Device (100) for measuring moisture according to claim 1, characterized in that said at least one dielectric element is substantially composed of PTFE.

13. Device (100) for measuring moisture according to claim 1, characterized in that said dielectric element (5) is substantially composed of ceramic material.

14. Device (100) for measuring moisture according to claim 1, characterized in that inner walls of said capacitor (Cx) are hermetically sealed.