Claims

[Claim 1] A carbonated cement slurry production system for producing a carbonated cement slurry formed by carbonation of a cement slurry containing cement and water by a carbon dioxide-containing gas, the carbonated cement slurry production system comprising:

a carbonation apparatus for bringing the cement slurry into contact with the carbon dioxide-containing gas;

a carbon dioxide-containing gas supply apparatus for supplying the carbon dioxide-containing gas to the carbonation apparatus at a pressure larger than an atmospheric pressure; and

a mixing tank for mixing the cement with the water to obtain the cement slurry on an upstream side of the carbonation apparatus,

wherein the carbonation apparatus, which is a sealed and pressurizable, includes an inflow port of the cement slurry and an inflow port of the carbon dioxide-containing gas, and a carbonation tank for storing the cement slurry and the carbon dioxide-containing gas so that a gas phase formed of the carbon dioxide-containing gas is positioned above a liquid phase of the cement slurry.

[Claim 2] The carbonated cement slurry production system according to claim 1, wherein

the carbonation cement slurry production system includes

an inflow port for the cement for charging the cement into the mixing tank, and an inflow port for the water for charging the water into the mixing tank.

[Claim 3] The carbonated cement slurry production system according to claim 1 wherein

the carbonated cement slurry production system includes a slurry circulation path for circulating the carbonated cement slurry between the carbonation apparatus and the mixing tank.

[Claim 4] The carbonated cement slurry production system according to claim 1, wherein

the carbonated cement slurry production system includes a storage tank for storing the cement slurry on a downstream side of the mixing tank and on an upstream side of the carbonation apparatus, and a slurry circulation path for circulating the carbonated cement slurry between the carbonation apparatus and the storage tank.

[Claim 5] The carbonated cement slurry production system of any one of claims 1 to 4, wherein

the carbonated cement slurry production system includes a storage tank for storing the carbonated cement slurry formed by the carbonation apparatus.

[Claim 6] The carbonated cement slurry production system according to any one of claims 1 to 4, wherein

the carbonated cement slurry production system includes a solid/liquid separation means for recovering a part of the water in the carbonated cement slurry formed by the carbonation apparatus.

[Claim 7] The carbonated cement slurry production system according to claim 6, wherein

the carbonated cement slurry production system includes a water return means for using the water recovered by the solid/liquid separation means as a part of the water for preparing the cement slurry.

[Claim 8] The carbonated cement slurry production system according to any one of claims 1 to 4, wherein

the carbonated cement slurry production system includes a liquid temperature adjustment means for adjusting a liquid temperature of at least one of the cement slurry and the carbonated cement slurry.

[Claim 9] The carbonated cement slurry production system according to any one of claims 1 to 4, wherein

the carbonated cement slurry production system includes a pH measurement means for measuring a pH of at least one of the

cement slurry and the carbonated cement slurry.

[Claim 10] A method for producing a carbonated cement slurry formed by carbonation of a cement slurry containing cement and water by a carbon dioxide-containing gas using the carbonated cement slurry production system according to any one of claims 1 to 4, the method comprising:

a cement slurry preparation step for mixing the cement with the water in the mixing tank to form the cement slurry;

a cement slurry storage step for supplying the cement slurry from the mixing tank to the carbonation tank through an inflow port for the cement slurry, and for storing the cement slurry and the carbon dioxide-containing gas in a carbonation tank so that a gas phase formed of the carbon dioxide-containing gas is positioned above a liquid phase of the cement slurry; and

a carbonated cement slurry preparation step for supplying the carbon dioxide-containing gas to the gas phase at a pressure larger than an atmospheric pressure and bringing the liquid phase into contact with the gas phase to carbonate the cement slurry and to form a carbonated cement slurry.