In view of this, for preserving freshness of produced plants/animals or portions thereof to be frozen, Patent Document 3 discloses a production method of ice having a solute concentration of approximately 0.5% to 2.5% acquired by freezing a salt-containing water so as to form the state of a slurry, wherein a raw water such as filtered and sterilized seawater is adjusted in salinity, and the resultant salt-containing water having about 1.0% to 1.5% solute concentration is rapidly frozen, thereby producing a slurry-state salt-containing ice having the above described solute concentration and an ice point temperature of -5℃ to -1℃.

In addition, Patent Document 4 discloses a method for immersing fresh fish in a liquid in which bittern is added to 0.2% to 5.0% (w/v) saline solution and the water temperature is kept at from -3℃ to 10℃ for a certain period of time.

Patent Document 1: Japanese Unexamined Patent Application, Publication No. 2002-115945

Patent Document 2: Japanese Unexamined Patent Application, Publication No. 2000-3544542

Patent Document 3: Japanese Unexamined Patent Application, Publication No. 2002-115945

Patent Document 4: Japanese Unexamined Patent Application, Publication No. 2006-158301

DISCLOSURE

production method of flake ice having excellent cooling capacity, and a production method of flake ice capable of maintaining a non-separating state for a long period of time.

In accordance with an aspect of the present disclosure, there is provided a flake ice production device that produces flake ice by freezing brine, including: a drum including an inner cylinder, an outer cylinder that surrounds the inner cylinder, and a clearance formed between the inner cylinder and the outer cylinder, a refrigerant supply unit that supplies a refrigerant to the clearance, a rotary shaft that rotates by taking a central axis of the drum as an axis, an injection unit that rotates together with the rotary shaft and injects brine toward an inner peripheral surface of the inner cylinder, and a scraping unit that scrapes off flake ice that is generated as a result of the brine injected from the injection unit being adhered to the inner peripheral surface of the inner cylinder, which has been cooled by the refrigerant supplied to the clearance.

In addition, the brine can include, an aqueous solution that contains a solute satisfying a predetermined condition, and a solid (such as metal) having a thermal conductivity higher than that of an ice formed from a liquid including the aqueous solution.

In addition, the liquid can further include, oil.

In addition, the solute can include, two or more types of solutes each having a different degree of solidifying point depression.

In addition, the flake ice production device according to an embodiment can further include a speed control unit that variably controls a rotation rate of the rotary shaft.

In addition, the refrigerant supply unit can supply a liquefied natural gas as the refrigerant to the clearance.

In addition, the flake ice production device according to an embodiment can be installed on a moving body.

According to an aspect, there is a flake ice production system for producing a flake ice by freezing a brine, comprising:

a spray unit for spraying the brine,

a member for producing the flake ice, in a state in which the member is cooled at a temperature equal to or lower than the solidifying point of the brine by a predetermined refrigerant, by having the sprayed brine attached to the member so as to freeze, and

a refrigerant supply unit that supplies to the member a liquefied gas that can cool the member to a temperature equal to or lower than the solidifying point of the brine as the predetermined refrigerant.

EFFECT OF THE INVENTION

According to the present invention, it is possible to easily produce flake ice having approximately uniform solute concentration. Further, it is possible to provide a production method of flake ice having superior cooling capacity, and a production method of flake ice that is possible to maintain an unseparated state for a long time.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an image view including a partial cross-sectional perspective view showing an outline of a flake ice production device according to an embodiment of the present invention;