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(54) PROCESS AND INSTALLATION FOR USE IN THE FOOD PRODUCT INDUSTRY FOR FREEZING OR DEEP-FREEZING LIQUIDS, SEMI-FLUIDS OR PASTES

(71) We, MAISON D. BOIRON, a Societe anonyme organised under the laws of France, of 07200 Vesseaux, France, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

The present invention relates to a process and installation for use in the food product industry for freezing or deep-freezing liquids, semi-fluids or pastes.

Installations and processes of this type have already been proposed, in which the product to be treated is poured into moulds which are made of synthetic material and which have a large number of cells or chambers, the bottom of which is provided with a central boss projecting on the side opposite to the internal volume of the cell in question. After each mould has been filled, it is introduced into a freezing or deep-freezing tunnel so as to obtain solidification of the contents of the cells and it is then necessary to initiate the removal from the cells of the solid blocks which are formed therein. For this purpose, each mould, disposed so that the bottom of each of its cells faces upwardly, is caused to pass in front of a rotating drum, which exerts a vertical pressure on each of the said bosses, in order to deform the wall of the cells and thus to eject the deep-frozen block which the said wall retains by adherence.

Tests have shown that although the process was satisfactory for the formation of blocks or cubes of reduced volume corresponding to particularly advantageous unit "doses", difficulties arose at that station of the installation where the blocks were removed from the mould. Even by multiplying the number of present drums, the ejection of the blocks or cubes from the cells was effected in an erratic manner, in the sense that a certain number of "doses" were not removed from the mould, resulting in an unacceptable loss.

The general object of the present invention is to overcome this inconvenience and to permit the removal from the mould of deep-frozen, or frozen products under efficient and simple conditions appropriate for satisfying the requirements of industrial production.

According to one aspect of the present invention there is provided a process for freezing or deep-freezing liquid or pasty products, of the type in which the product to be treated is introduced into cells or chambers of a mould made of deformable synthetic material, the mould being then passed through a freezing or deep-freezing apparatus, the solid blocks being thereafter extracted from the cells, characterised in that hot liquid is sprayed on to the bottom of a mould after leaving the freezing apparatus, the temperature and amount of liquid being such as to soften the wall of the mould without causing defreezing of the frozen or deep-frozen product, the bottom of the mould being then hammered so as to eject the block.

According to another aspect of the present invention there is provided an installation for freezing or deep-freezing liquid or pasty products of the type comprising a station for filling moulds of deformable synthetic material having a series of cells, a freezing or deep-freezing apparatus and a mould-emptying station, characterised in that the mould-emptying station comprises, in combination, means for spraying hot water onto the bottom of each mould, and means for thereafter hammering the bottom of each mould so as to ensure the ejection of the blocks frozen in the cells.

Tests have demonstrated that the combination of the two steps consisting of heating ahd hammering achieves a perfectly regular emptying of all the cells.

The invention will now be further

described by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a diagrammatic plan view showing the general arrangement of one embodiment of an installation in accordance with the invention;

Figure 2 is a side elevation corresponding to Figure 1;

Figure 3 is a partial underneath plan view of one of the moulds used for the operation of the installation according to Figures 1 and 2; and

Figure 4 is a transverse section on a larger scale in the plane indicated at IV-IV in Figure 2.

Only one mould-emptying station A of the installation according to the invention is shown in Figures 1 and 2, since it is this station which is modified in accordance with the invention, the other stations being substantially identical with the prior art.

The moulds, having chambers or cells containing the product in the frozen or deep-frozen state leave the freezing or deep-freezing tunnel on a chain conveyor 1, the moulds 2 being in the inverted position with the cells open downwardly. The moulds 2 can be conveyed in any suitable manner, for example by means of spaced lugs la provided along the conveyor chains 1.

On leaving the tunnel, each of the moulds 2 is caused to pass through a sprinkling chamber 3, inside which are fixed transverse spraying pipes 4 which are supplied through duct 5. The water which is sprayed by the distributing pipes 4 onto the moulds 2 is at a temperature of about 80°C, so that the walls of the moulds are softened and therefore re-assume the natural pliability which they have at ambient temperature; it will be noted that the hot water sprayed onto the bottom of the moulds 2 is collected in a trough 6 located in the lower part of the chamber 3, so as to be recycled through a conduit 7.

Each mould 2 is then subjected to a drying operation. To this end, a blowing distributor pipe 8 is provided, this pipe being arranged transversely above the conveyor 1 beyond the chamber 3. The air blown through the distributing pipe 8 ensures the drying of the bottom of each mould 2, thereby avoiding any drips occurring during the following operation.

It will be observed that after the moulds 2 have been dried, they leave the lower conveyor 1 to be engaged by the driving lugs or dogs 9a fixed on the chains of a conveyor 9 situated above the plane of the conveyor 1. In order to be able better to understand the arrangement, it is necessary first of all to consider the arrangement of the shaping moulds 2.

One of these moulds 2 has been partially shown in underneath plan view in Figure 3 and it can be seen that each mould comprises a series of chambers of cells 2a, arranged in groups. The groups of cells are separated from one another by longitudinal and transverse grooves 2b; furthermore the margins 2c of the mould are themselves recessed, at the same level as the aforesaid grooves. Finally, it will be noted that, as usual, the wall of the bottom of the cell has a boss 2d which projects towards the exterior of the mould.

On leaving the conveyor 1, each mould 2 is engaged and supported by spaced bars 10 (Figure 4), which are so arranged as to engage in the longitudinal grooves 2b and underneath the margins or rims 2c. The bars 10 are disposed immediately above the upper opening of a hopper 11 (Figures 1 and 2), the outlet of which is open above a discharge conveyor shown diagrammatically at 12.

The hopper 11 supports a hammer device comprising a driving motor 13, the output shaft of which is fitted with an eccentric 14 associated with a connecting rod 14a for controlling a transverse shaft 15 positioned above the hopper. Arms 16 are fixed on the said shaft 15, the number of arms being equal to that of the transverse groups of cells 2a. As may be seen in Figure 4, the free ends of each arm 16 are provided with a hammer 17, the length of which corresponds substantially to the total width of one groups of cells 2a.

It will be understood that the eccentric 14 imparts an oscillating movement to the shaft 15, in such a way that the hammers 17 are applied to the bosses 2d of the cells 2a with the passage of each mould 2 above the hopper 11. Tests have shown that this hammer action, exerted on the wall of the mould which has been softened by being heated in the chamber 3, ensures that the blocks or doses 18 which have been formed inside the cells 2a are regularly ejected. These blocks are taken up by the conveyor 12 and transmitted to a conventional packaging station, while the conveyor 9 carries the empty moulds 2 into a cleaning tunnel 19 (Figures 1 and 2). On leaving the tunnel 19, the moulds, suitably inverted, can be once again filled for a subsequent freezing cycle.

WHAT WE CLAIM IS:-

1. A process for freezing or deep-freezing liquid or pasty products of the type in which the product to be treated is introduced into cells or chambers of a mould made of deformable synthetic material, the mould being then passed through a freezing or deep-freezing apparatus, the solid blocks being thereafter extracted from the cells, characterised in that hot liquid is sprayed onto the bottom of a mould after leaving the freezing apparatus, the temperature and amount of liquid being such as to soften the wall and the mould without causing defreezing of the frozen or deep-frozen product, the bottom of the mould being then hammered

so as to eject the block.

2. A process as claimed in claim 1, characterised in that the mould is at least partially dryed after it has been heated by the spraying and before it has been hammered.

3. An installation for freezing or deep-freezing liquid or pasty products of the type comprising a station for filling moulds of deformable synthetic material having a series of cells, a freezing or deep-freezing apparatus and a mould-emptying station, characterised in that the mould-emptying station comprises, in combination, means for spraying hot water onto the bottom of each mould, and means for thereafter hammering the bottom of each mould so as to ensure the ejection of the blocks frozen in the cells.

4. An installation according to claim 3, characterised in that the spraying means comprise at least one spraying pipe or distributor arranged transversely above a conveyor for the moulds leaving the freezing apparatus, the arrangement being such that the moulds are disposed on the conveyor with their bottoms uppermost.

5. An installation according to either claim 3 or 4, characterised in that the hammer means comprises a series of striking hammers provided at the ends of arms fixed radially on a common oscillating transverse shaft.

6. An installation according to claim 5, including a motor to drive the reciprocal drive of the common transverse shaft through a connecting rod and eccentric mechanism.

7. An installation according to any of claims 3 to 6, including means for drying the bottom of the moulds positioned between the spraying means and the hammer means.

8. A process for producing frozen or deep-frozen products substantially as hereinbefore described.

9. An installation for producing frozen or deep-frozen products substantially as hereinbefore described with reference to the accompanying drawings.

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1580013 COMPLETE SPECIFICATION

3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 1

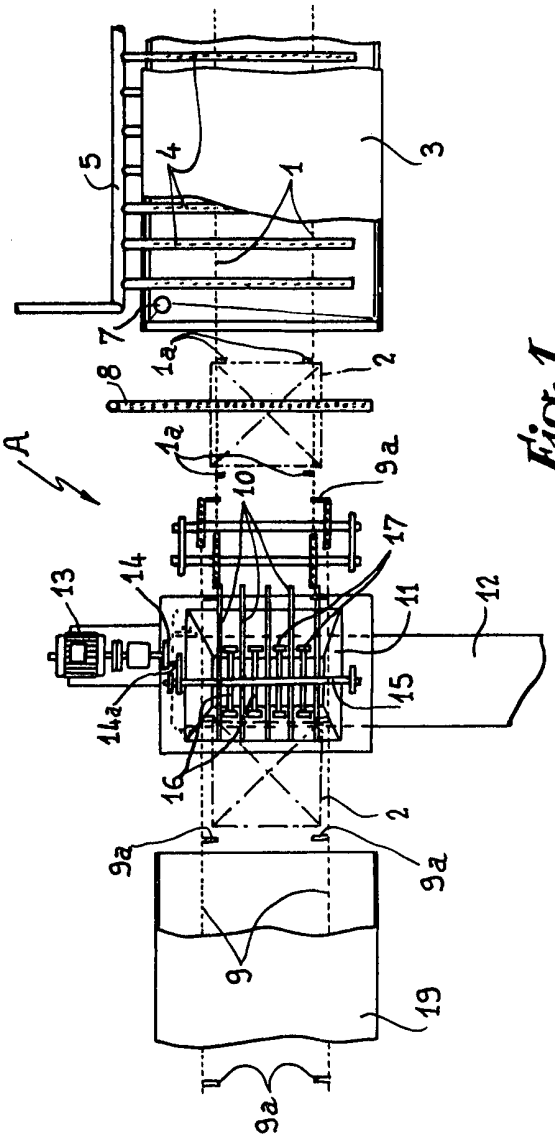

Fig. 1

1580013 COMPLETE SPECIFICATION

3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 2

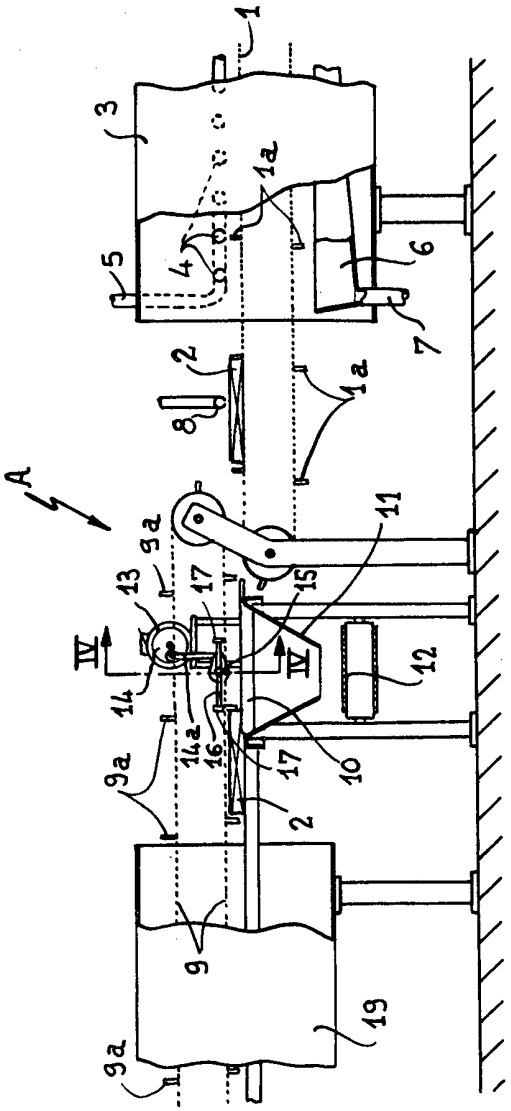

Fig. 2

1580013 COMPLETE SPECIFICATION

3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 3

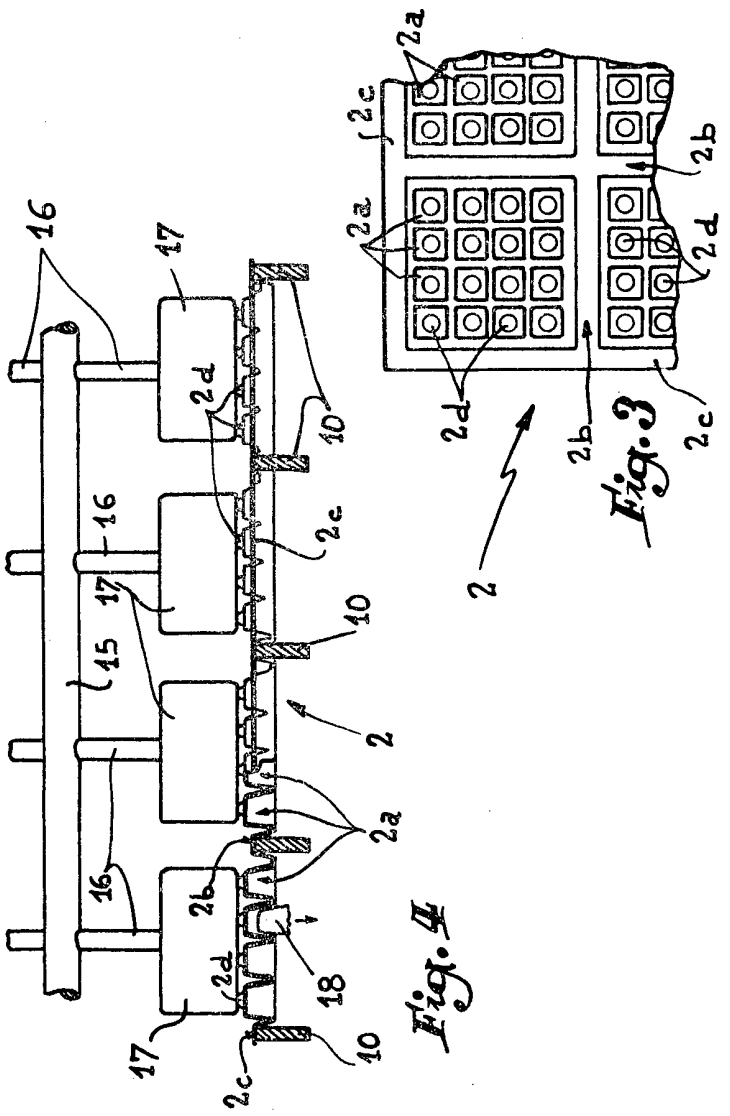

Fig. 4

Fig. 3