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— *with amended claims*

(54) Title: FREEZING MACHINE FOR MINCED MEAT

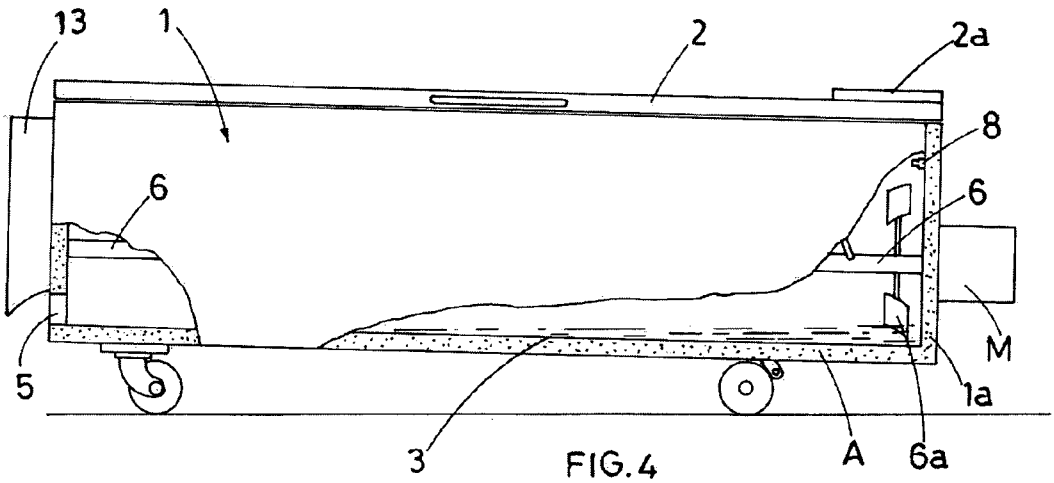

FIG. 4

(57) Abstract: This invention regards a freezing machine for minced meat. It is composed of an insulation vat (1) closed by a drop-leaf lid (2) where the inlet case (2a) is placed. Below it and inside the vat, there is a spraying nozzle (8) which sprays the meat with liquid nitrogen before it reaches the bottom of the vat (1). There, the meat is propelled forward by a rotating bladed shaft (6a) through all its journey to the outlet case (5).

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Description

Freezing machine for minced meat

This application is for a patent related to the invention of a freezing machine for minced meat.

The machines which are known and commonly used for this kind of process are a few, but everyone has its disadvantages.

In the so-called "Autoclave" machine, for example, fixed quantities of meat have to be loaded and sealed in a low motion rotating vat for a pre-determined length of time in order for the meat to be constantly stirred.

The freezing process is obtained by injecting carbon dioxide inside the autoclave. Every time the lid of the vat is opened and the frozen meat unloaded, carbon dioxide is lost in the environment. It is, therefore, a discontinuous and cyclic process which requires high consumption of carbon dioxide and gives poor final results. The meat tends, in fact, to form big frozen blocks, which maintain their solid structure inside the packaging until final use.

This peculiarity is not appreciated by the final consumer, especially when the blocks of meat are big and small portions are to be used. As a result, there is no choice but to break those blocks of frozen meat in small pieces in order to use the number of fragments whose weigh is similar to that the consumer needs.

On the contrary, the ideal result would be freezing minced meat in a way that preserves its natural "vermicelli-shape" and avoids the formation of lumps and blocks.

To solve this problem, "vibrating bottom-end" machines have been created. In these machines, minced meat is immersed in liquid nitrogen in a long and narrow vat, whose bottom part vibrates to allow the proceeding of the meat through the machine. The meat is, therefore, immersed in the liquid during its entire journey through the machine.

Risks of lumping are reduced, but the meat tends to undergo a sort of "burning effect" caused by its prolonged immersion in the liquid nitrogen. The meat, in fact, reaches a negative temperature down to – 100°C.

High waste of nitrogen is another inconvenient of those machines, as the meat is processed in the open air.

The aim of this invention is to build a machine which can freeze each "vermicello" of meat separately, avoiding the risks of lumping. It also has to work non-stop, reduce nitrogen consumption and give a satisfactory hourly production: 500/600 kg per hour.

This machine is composed of a closed, long and narrow vat where liquid nitrogen stagnates. The bottom of the vat is characterised by decreasing depth, from the inlet area to the outlet area, so that the meat emerges from the liquid before reaching the outlet area.

The progress of the meat along the bottom of the vat is assured by a rotating bladed shaft. This shaft propels the meat on its journey through the machine, including when it is immersed in liquid nitrogen and again when it emerges, frozen, to complete the final tract which separates it from the outlet case at the end of the vat.

The introduction of the meat inside the vat takes place by dropping the "vermicelli" through the inlet case located on the lid of the vat. The vat is equipped with a nozzle which sprays liquid nitrogen and which is placed right under the inlet case in order for the "vermicelli-shaped" meat to be sprayed before reaching the bottom of the vat.

The spray causes an instant cooling of the external surface of each "vermicello" which falls from the mincer, placed above the inlet case. This initial cooling is enough to avoid lumping when the "vermicelli" are in the vat, pushed forward by the rotating bladed shaft in the liquid nitrogen for the first tract, and along the bottom of the vat up to the outlet case, for the final tract.

For further explanations the description of this invention continues with reference to three pages of designs which are attached for illustrative purposes.

- Fig n. 1 is a prospective view, from the front and the side, of the

machine with its lid shut.

- Fig. n. 2 is a prospective view of the machine with its lid open, from the top and the side where the outlet case is,
- Fig. n. 3 is a vertical cutaway view which shows the inlet case.
- Fig. n. 4 is a view of the machine from the front without a portion of its outer surface to show the liquid nitrogen inside.

As shown in the pictures, the machine is composed of a long and narrow steel tank (1) with a hollow space insulation (1a). It is closed by a drop-leaf lid (2) on its upper side and delimited by a semi-cylindrical wall (3) on its lower side.

The inlet case (2a) is placed on one end of the lid (2) of the vat (1), on which the mincer has to be put in order for the "vermicelli" of minced meat to fall inside the vat (1) and in the liquid nitrogen (A). The outlet case (5) is located at one of the bottom end of the vat (1), opposite the inlet case (2a).

A shaft (6) crosses the vat (1) for all its length. It is moved by an engine (M) and equipped with a radial set of rotating blades (6a) whose peculiar shape determines the progress of the meat from the part placed under the inlet case to the outlet case.

By rotating, the blades (6a) also lift the meat from the bottom of the vat and let it fall down again in the liquid nitrogen. This process shortens the time of immersion and reduces negative effects like the "burning effect".

A tap (7) for the supply of liquid nitrogen (A), necessary to fill the bottom part (1), is placed at one of the inner sides of the vat (1).

The opening and closing of the tap (7) is determined by an electric valve which is controlled by a thermostat.

Inside the machine there is a liquid nitrogen spraying nozzle (8) located right under the inlet case (2a) and far above the stagnant liquid nitrogen on the bottom of the vat (1).

The nozzle (8) is pointed so as to spray the meat while it is falling and before it reaches the bottom of the vat where the liquid nitrogen is.

The vat is equipped with an overturning system which can tilted the vat along two opposing horizontal levels: the first one is slightly tilted backwards,

that is to say towards the inlet case, while the other one is slightly tilted forward, towards the outlet case.

While the machine operates, that vat (1) is tilted backwards, as shown in Fig. 4. The depth of the liquid nitrogen, in fact, decreases from the inlet area to the outlet area and the meat is completely out of the liquid as it reaches the middle of the vat. This system has been introduced to avoid long immersion times which provoke the "burning effect" in "vibrating bottom-end" machines.

The frozen meat, although out of the liquid (A), is enveloped in a cloud of nitrogen inside the vat (1) as long as the lid (2) remains shut.

As the freezing process ends, tilting the vat (1) will be enough to empty it since the liquid nitrogen spontaneously tends to flow outside through the outlet case (5). The same principle can be applied to water when the cleaning of the vat (1) will be necessary.

This overturning system is equipped with a lever (9), placed on the front side of the machine, which gives the possibility to lift and lower the axle (10a) of two back wheels (10) where the vat lays. The vat also lays on a set of two twirling front wheels (11).

Number (12) indicates a thermostatic probe placed inside the vat (1). Above the outlet case (5), on the outer side of the vat, instead, there is a suction room (13) to recycle outgoing nitrogen.

Claims

1. Freezing machine for minced meat composed of:
   - A long and narrow steel vat (1) equipped with an insulation hollow space, a folding lid (2) on its upper side and delimited by a semi-cylindrical wall (3) on its lower side.
   - An inlet case (2a) placed at one end of the lid (2)of the vat (1), and an outlet case (5) located at one of the bottom end of the vat (1), opposite the inlet case (2a).
   - A motorized rotating bladed shaft (6a) which determines the progress of the meat from the part placed under the inlet case to the outlet case.
   - A tap (7) for the supply of liquid nitrogen (A), necessary to fill the bottom part (1)
   - A liquid nitrogen spraying nozzle (8) located right under the inlet case (2a) and far above the stagnant liquid nitrogen on the bottom of the vat (1).

2. The freezing machine is equipped with an overturning system which can tilted the vat along two opposing horizontal levels: the first one is slightly tilted backwards, that is to say towards the inlet case, while the other one is slightly tilted forward, towards the outlet case.

3. The overturning system is equipped with a lever (9), placed on the front side of the machine, which gives the possibility to lift and lower the axle (10a) of two back wheels (10) where the vat lays. The vat also lays on a set of two twirling front wheels (11).

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AMENDED CLAIMS

1. Freezing machine for minced meat composed of:
- a long and narrow steel vat (1) equipped with an insulation hollow space, a drop-leaf lid (2) on its upper side,
- an inlet case (2a) placed at one end of the lid (2) of the vat (1), and an outlet case (5) located at one of the bottom end of the vat (1), opposite the inlet case (2a),
- a motorized rotating bladed shaft (6a) which determines the progress of the meat from the part placed under the inlet case to the outlet case,
- a tap (7) for the supply of cryogen (A), necessary to fill the bottom part of the vat (1), and
two back wheels (10) having an axle (10a) and two twirling front wheels (11), the vat (1) laying on said back wheels (10) and front wheels (11),
characterized in that
the insulation hollow space of the vat (1) is delimited by a semi-cylindrical wall (3) on its lower side,
the cryogen is liquid nitrogen,
a liquid nitrogen spraying nozzle (8) is located right under the inlet case (2a) and far above the stagnant liquid nitrogen on the bottom of the vat (1), and
the freezing machine is equipped with an overturning system with a lever (9), placed on the front side of the machine, which gives the possibility to lift and lower the axle (10a) of two back wheels (10) where the vat lays
2. The freezing machine according to claim 1, characterised in that said overturning system can tilted the vat along two opposing horizontal levels: the first one is slightly tilted backwards, that is to say towards the inlet case, while the other one is slightly tilted forward, towards the outlet case.

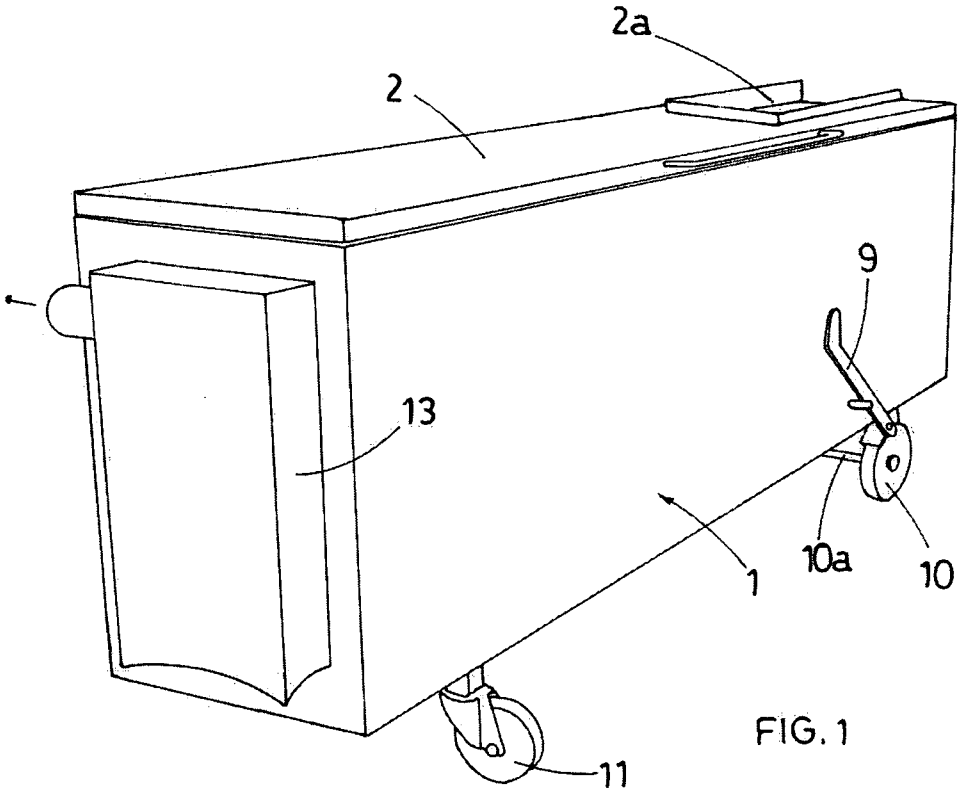

FIG. 1

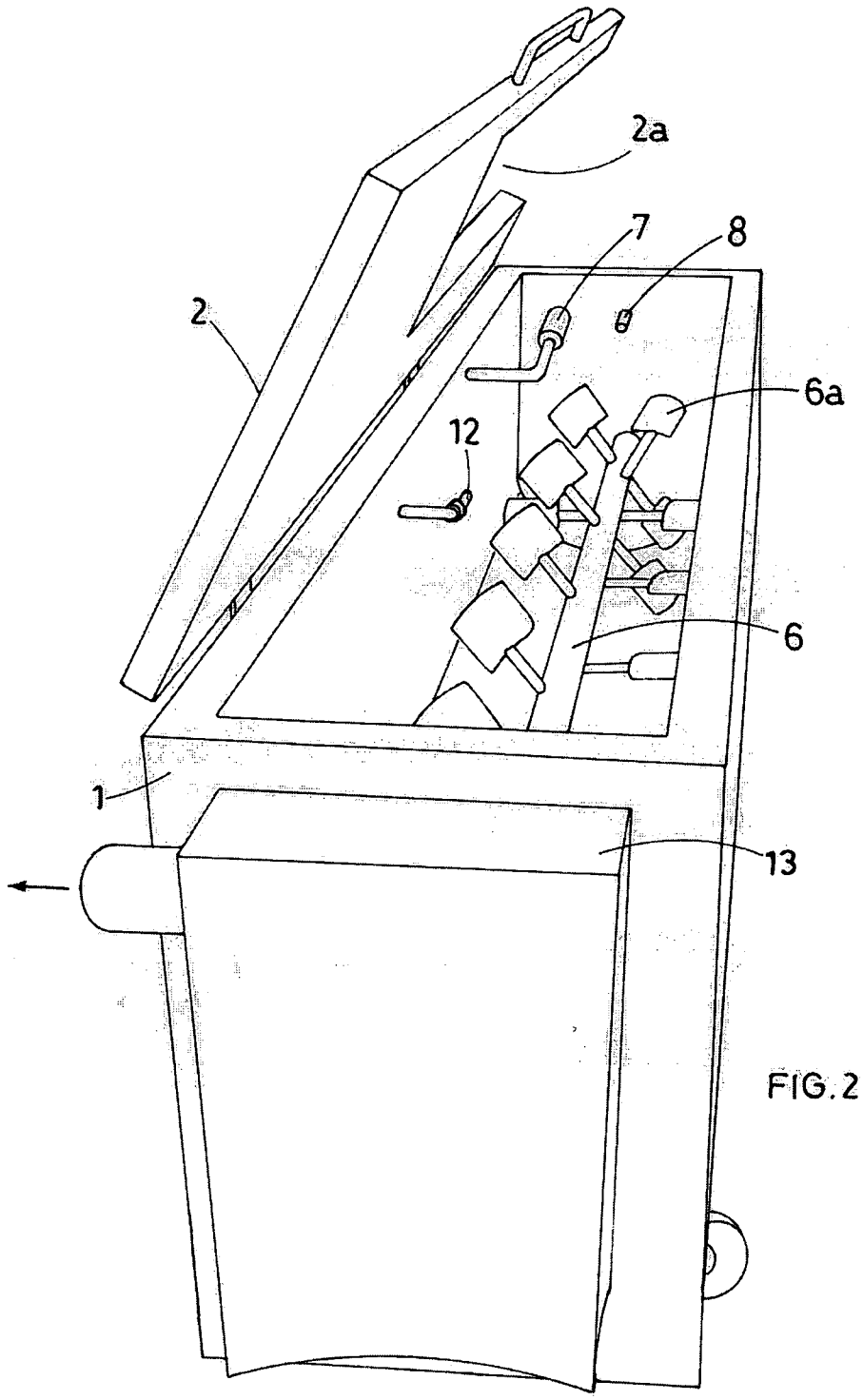

FIG. 2

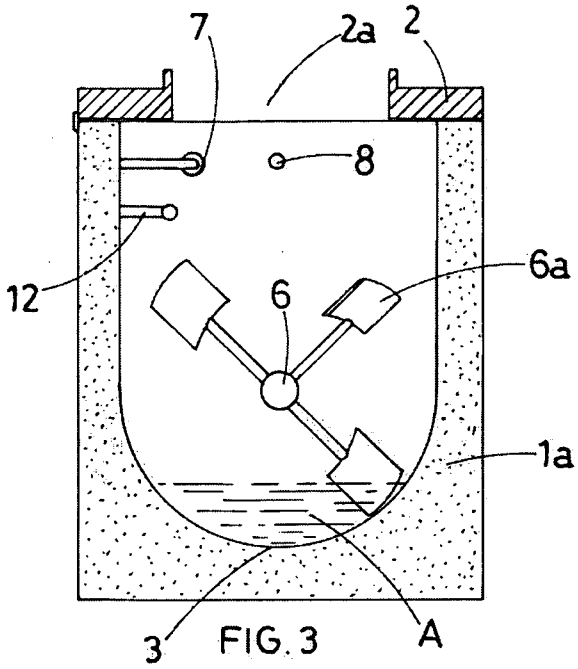

FIG. 3

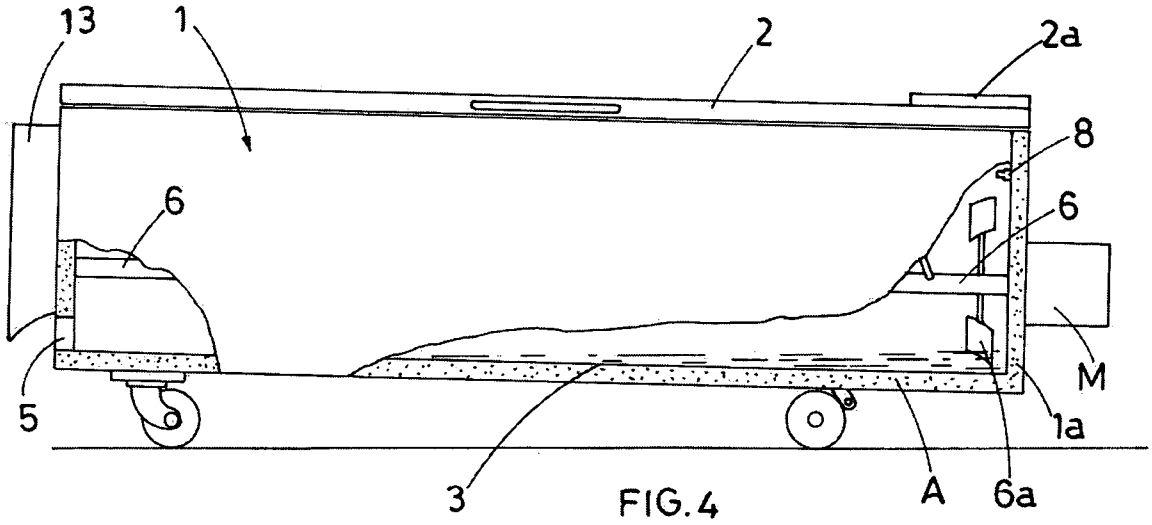

FIG. 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/IT2007/000847

A. CLASSIFICATION OF SUBJECT MATTER
INV. A23B4/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A23B A23L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	US 4 569 204 A (OTT LESLEY E [US] ET AL) 11 February 1986 (1986-02-11) abstract; claims 1-17; figures 1-5 column 1, line 8 - column 8, line 48	1-3

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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Date of the actual completion of the international search	Date of mailing of the international search report
25 August 2008	03/09/2008

Name and mailing address of the ISA/	Authorized officer
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INTERNATIONAL SEARCH REPORT

International application No
PCT/IT2007/000847

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR 2 616 300 A (SENAN SARL CHARCUTERIE BRETONN [FR]) 16 December 1988 (1988-12-16) abstract; claims 1-18; figures 1-8 page 1, line 1 - page 16, line 29	1-3
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IT2007/000847

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