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MECHANIZED CONTINUOUS LINES FOR RENDERING FATS.

By

G. A. FALEEV

The processing of cattle and the production of meat is constantly increasing in the USSR and will exceed in 1958 by 35 per cent the 1955 figures. The production of raw fat and its processing into a ready melted fat product is increasing simultaneously.

The annual production of melted fat at the enterprises of the state meat industry amounts to over 100 thousand tons and will increase sharply in the next few years. Therefore the problems of mechanizing the process of treating fats and improving their quality is of great importance.

The primary method of obtaining fat from the soft fatty tissue in slaughtered animals, practised in many countries, is the method of thermal rendering of the raw fat in open two-wall kettles at 65 to 75°C and in closed autoclaves by means of live steam under 2 atm. pressure for 3.5 hours. The rendered fat is settled then in two-wall settling tanks in the course of 5 to 6 hours. Apart from the fact that this process requires much time, it does not provide sufficient rendering of the fat, the equipment occupies much floor space and the quality of the fat does not meet the requirements.

Fat rendering installations of continuous action have been developed therefore in the USSR making it possible to eliminate the above drawbacks, to improve the quality of the fats, to increase the output from the raw fat, to decrease the floor space required at a high productivity and output per one worker. Besides, these installations allow to carry out the process continously, under best sanitary conditions and do not require preliminary chilling of the raw fat.

The present paper describes two designs of original installations developed in the USSR.

1. The "AVZh" Centrifugal Installation

The installation consists of the following apparatus: centrifugal apparatus for crushing and rendering the raw fat, a centrifuge for separating the fat and the cracklings, separators for the removal of moisture from the fat, a cooler, a fat heater with pumps and intermediate vessels. Fig. 1 illustrates the general view of the installation.

The main centrifugal machine, model "AVZh", is designed for simultaneous crushing and rendering of the fat by live steam in a very short period of time (from 4 to 5 seconds) thereby favouring the production of a good flavour and odour of the fat. The machine consists of a 600 mm dia. cylinder the lateral surface of which bears approximately 6500 holes of 3 to 4 mm diameter arranged in a chequered order. The cylinder is mounted on a shaft driven from a 14 kW electric motor and rotates at 1460 r.p.m. The cylinder is enclosed on the outside in a stationary housing having on top an opening designed for charging the raw fat into the cylinder. A circular working space from 50 to 230 mm wide, to which the live steam is supplied, is located between the stationary housing and the revolving cylinder.

Two knives are fixed on the upper lid of the stationary housing vertically so that the distance between their cutting edge and the inner wall of the revolving cylinder is equal to 0.5 - 1.0 mm and can be adjusted. Four revolving knives for preliminary coarse crushing of the raw fat are secured on the bottom of the revolving cylinder. The apparatus operates as follows: the washed and fresh from the slaughtered animal raw fat is charged uniformly from the top through

the charging tunnel into the revolving cylinder where it is cut preliminarily into pieces by the revolving knives arranged on the bottom of the cylinder. The fat is thrown then under centrifugal force to the internal walls of the cylinder, pressed through the holes and cut by the immovable vertical knives. The cut off pieces of raw fat are pressed through the holes in the cylinder wall and supplied to the circular space between the cylinder and the housing where they encounter the live steam performing the necessary thermal influence and rendering the fat from the crushed cells of the fatty tissue. The steam is condensed forming a mass on the bottom of the circular space consisting of fat, protein particles and water which is continuously drained from the apparatus through an orifice in the bottom. By adjusting the distance between the knives and the cylinder wall it is possible to change the degree of crushing the raw fat in the apparatus that is highly important. The fatty mass flows by gravity or is pumped to the horizontal centrifuge of continuous action where the cracklings are separated from the fat and water and simultaneously defatted. The centrifuge operates at 3500 r.p.m. and has a 2200 separation factor. The mixture of fat and water containing the remainder of finest protein particles, is supplied, after warming in the preheater, for final purification to self-dumping separators where it is separated in a thin layer under the action of centrifugal force. The separated fat is delivered from the separator for chilling and packaging.

The duration of the process is as follows:-

in "AVZh" installation	3 to 5 sec.
in centrifuge	15 sec.
in separators	4 min. 25 sec.
in cooler	2 min. 10 sec.
Total time	6 min. 55 sec.

The "AVZh" installation provides the possibility to render raw fats of all kinds with the exception of raw fat containing solid tissues and meat trimmings.

The fat produced is of good quality, the acid number does not exceed 0.6 - 0.65, and therefore the entire fat is of the highest grade. The capacity of the "AVZh" installation depends on the kind of raw fat and is, for example, from 2 to 2.5 tons per hour for hog fat, the consumption of electric power being 14 kW-hrs per one ton of raw fat, and from 70 to 80 kg of steam for rendering one ton of raw fat.

The installation occupies a floor space of nearly 20 sq. metres and ensures rapid processing of the raw fat.

2. The "Leningrad" Installation

The operating principle of this installation is based on the mechanical destruction of the fatty tissue by pressing it under pressure through a system of holes with the subsequent rendering of the fat in a thin circular layer at continous motion, separation of the fat and water from the cracklings, separation of the fat and water in the separators and chilling of the fat produced.

In accordance with the above technological process the "Leningrad" installation (Fig. 2) consists of the following machines: mechanical crusher with a feeder for the raw fat, melter, horizontal centrifuge of continuous action with a washing device, dehydrator for the cracklings with a fat catcher, press, separators and cooler of continuous action.

The raw fat is charged uniformly to the feeder from which it is

delivered into the crusher where by means of two screw conveyors it is pressed through a disc bearing 2 - 3 mm dia. holes. As a result the fatty cells are destroyed and the fat is already partially extracted. The mass is delivered from the crusher to a thin-layer melter where the fat is finally rendered under 1.5 - 2 atm steam pressure and then pumped into the centrifuge. The mass is separated on the centrifuge into the fluid phase (water + fat) and solid phase (cracklings + fat). The fluid phase is supplied to the self-dumping separator to separate the water, and the solid phase is delivered to the washing device where it is treated with hot water. The latter is fed with the separated fat to the separator, while the cracklings are directed to the press which removes the fat. The mass, delivered from the press containing 75 per cent of moisture and 8 per cent of fat, is used for the production of feeding meal.

The "Leningrad" installation provides a continuous rendering process, a good quality of the fat and high output of ready product. The duration of the rendering process, like in the "AVZh" line, is 6 minutes, including:

Passing through the feeder	40 sec.
Passing through the crusher	5 sec.
Passing through the melter	30 sec.
Passing through the centrifuge	8 sec.
Passing through the separators	2 min. 27 sec.
Passing through the cooler	2 min. 10 sec.
Total time	6 min.

The capacity of the "Leningrad" installation is round 1 ton per hour, the consumption of electric power being from 25 to 30 kW-hrs. per one ton of raw fat, and from 60 to 80 kg of steam per one ton of raw fat. The installation occupies a floor space of nearly 50 sq. metres.

The acid number of the fat is 0.5 - 0.8, and the grade is the highest.

No. 1

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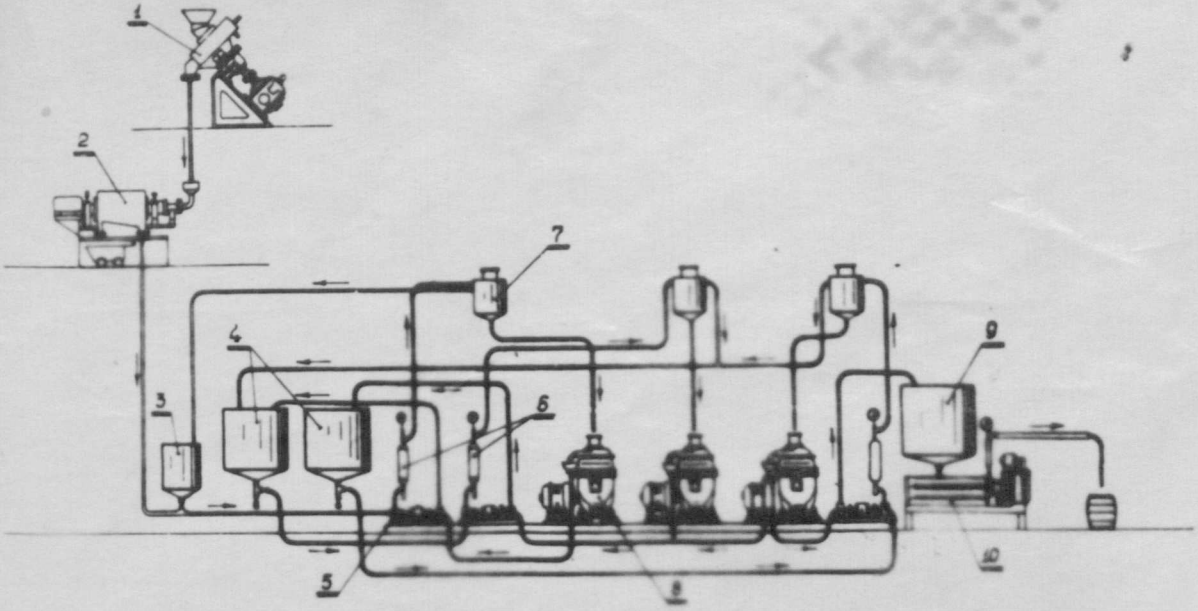
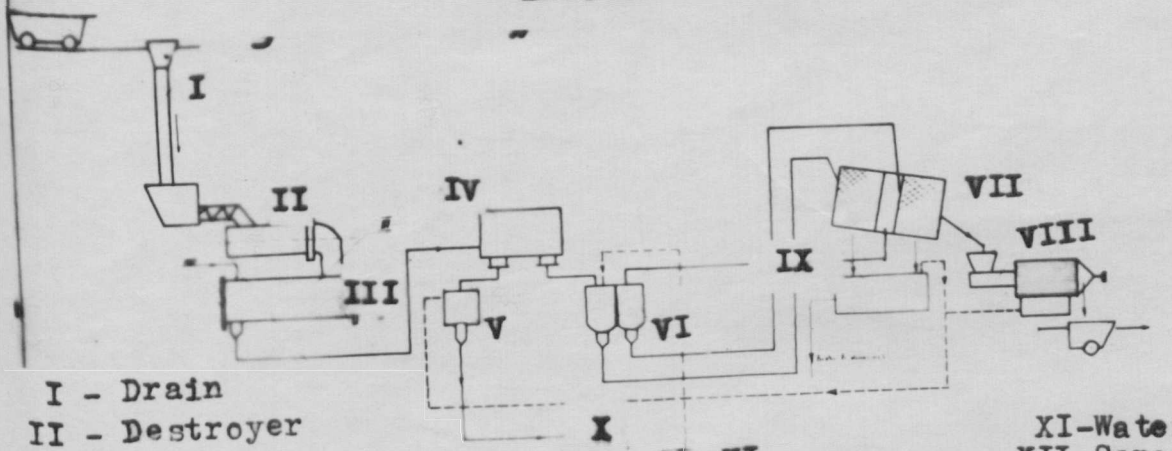


1. AVZh Centrifugal Machine
2. NOGSh-325 Centrifuge
3. Spare receiver
4. Intermediate vessels
5. Pumps
6. Heaters
7. Feeding tanks
8. Separators
9. Feeding reservoir
10. Cooler

No.2

СХЕМ

DIAGRAM OF EXTRACTING FAT FROM SOFT RAW FAT ON THE "LENINGRAD" INSTALLATION



I - Drain
II - Destroyer
III - Smelter
IV - Centrifuge NOGSh-230
V - Fat receiver
VI - Washer
VII - Dehydrator
VIII - Press
IX - Settler
X - Fat receiver

XI-Water receiver
XII-Separator
XIII-Separator ISA
XIV-Feeding tank
XV-Cooler.