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PROCESS FOR PRETREATING VEGETABLE MATERIALS

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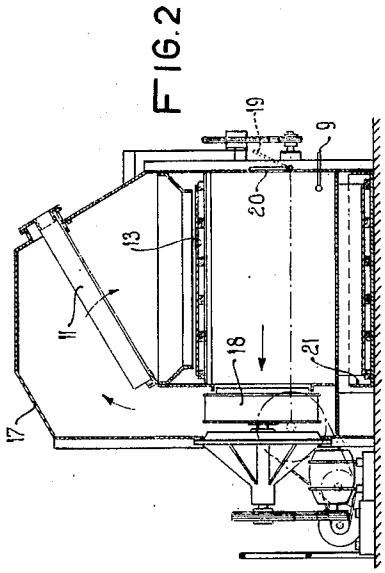


FIG. 2

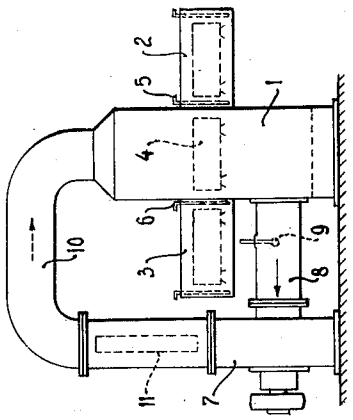


FIG. 1

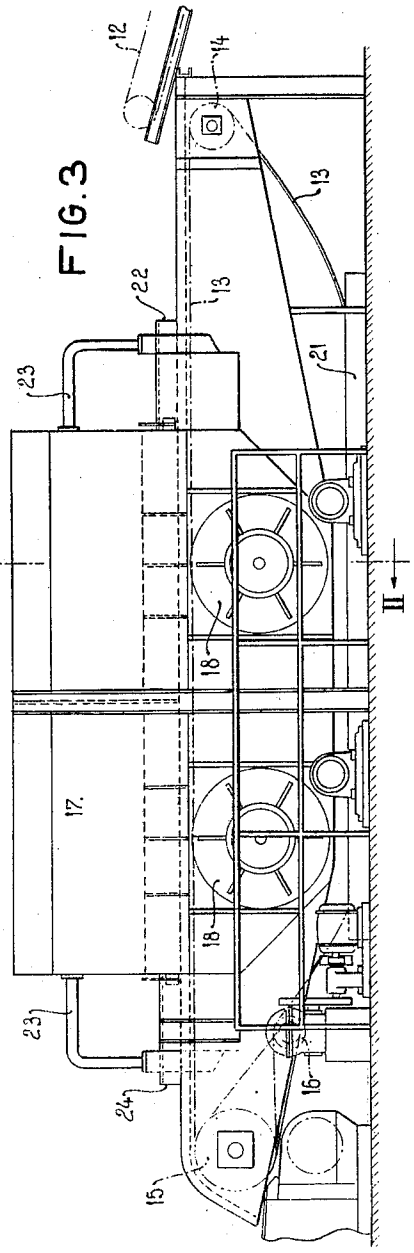


FIG. 3

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PROCESS FOR PRETREATING VEGETABLE MATERIALS

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1 Claim. (Cl. 99—154)

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This invention relates to a process and an apparatus for pretreating vegetables, fruits and like materials.

When preserving vegetables, certain kinds of fruits, tubers etc. it is usual or advantageous to heat them to a definite temperature and to maintain said temperature during a certain time in order to destroy enzymes before the proper preservation takes place which may be obtained by freezing, sterilising or drying the material. Said preliminary treatment is known as blanching in preserving processes for vegetables, tubers and fruits by freezing or drying them and in sterilizing processes for vegetables etc. in tins.

Hitherto said blanching process was generally carried out by immerging the material in hot water. Said method, however, has the drawback that valuable constituents, such as nutritious matter, vitamines and colouring matter, are lixiviated.

It has also been proposed to blanch the material by means of steam. The blanching process is then usually carried out at atmospheric pressure so that the temperature of the steam is 100° C. Said temperature, however, has still a detrimental influence on many products so that they are deteriorated in quality by said treatment. If it is desired to lower the temperature of the treatment it is required to also decrease the pressure of the steam and to carry out the process in vacuo. Such a process, however, has the drawback that it requires an expensive installation as besides a steam boiler also a condenser is needed. Moreover the process cannot be carried out continuously as the treatment-room should be sealed against the air.

The invention has for its object to replace said blanching-process by a pre-treatment, whereby the disadvantages of the heating with hot water are avoided and yet the treatment can be carried out at a temperature of less than 100° C.

According to the invention the material to be treated is subjected in a closed or substantially closed room to the action of a hot humid air- or gas stream circulating through the material and of normal pressure and of such a humidity that the temperature of the cooling limit of the air or gas (corresponding to the temperature of a wet

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body placed in said air- or gas stream) lies above 65° C. The material under treatment is thereby treated to such an extent that the conversion aimed at with the usual blanching process is here also obtained.

The temperature of the humid air- or gas stream may be maintained at the required degree by conducting the stream through an airheater. For regulating the humidity of the air- or gas stream atmospheric air or gas or air from another source may be supplied. Also steam or vapour may be introduced into the air- or gas stream.

Experiments have shown that the humidity of the air- or gas stream may be maintained at the desired degree by evaporating moisture exclusively or nearly exclusively from the material under treatment. During the treatment the generated vapour is then taken up by the heated air so that the humidity of the air is gradually increased. The material, therefore, will during this pretreatment lose a certain amount of its moisture but the drying action is not continued to such an extent that a dried product is obtained by said treatment. With the increase of the humidity of the air also the temperature of the cooling limit (that is the temperature of a wet body placed in the air-stream) of the air-stream is increased. Said temperature is approximately indicated by a wet thermometer placed in the air-stream and the indications of said thermometer substantially correspond to the temperature of the outer layer of the humid material under treatment. Hereby a simple control and regulation of the temperature of the treatment is obtained by regulating the temperature of the cooling limit of the air- or gas stream in accordance with the indications of a wet thermometer or like body placed in said stream.

To this end an aperture having an adjustable area may be provided at a convenient point in the air- or gas stream, where the pressure is below atmospheric pressure, so that a certain quantity of fresh air is sucked in through said aperture. Said control of the humidity of the air or gas may be effected manually or automatically. In said latter instance the area of said supply-aperture is controlled by a valve and in the air-stream a wet thermometer may be placed which

is provided with adjustable maximal- and minimal contacts controlling the actuating mechanism of the valve and thus maintain the humidity and consequently also the temperature of the process at the desired degree.

The drawing illustrates by way of example two embodiments of an apparatus for carrying out the process according to the invention.

Fig. 1 is an elevation view of an apparatus arranged for periodical operation.

Fig. 2 is a cross section of a continuously operating apparatus.

Fig. 3 shows a side elevation of the apparatus according to Fig. 2.

Into the casing 1 (Fig. 1) which at the entrance and the outlet side is provided with a sluice 2 and 3 respectively, a tray 4 is introduced filled with the material to be treated, e. g. with green stuff and subsequently the doors 5, 6 are closed. With the casing 1 a fan 7 is connected, the suction conduit 8 of which comprises a wet thermometer 9. The pressure conduit 10 of the fan which is connected to the upper end of the casing 1 contains an airheater 11.

The mode of operation of said apparatus is as follows: The air circulating in the apparatus along the arrows is heated by the heater 11 and thereby obtains a relatively large drying capacity so that it evaporates and takes up the water adhering to the vegetables and eventually also the fruit-water or cell-water. On account of the increasing humidity of the air also its cooling limit-temperature will increase and accordingly also the temperature at the surface of the vegetables will increase. As more moisture is evaporated from the vegetables the temperature will increase until it reaches the desired level. Said temperature corresponds with non-hygroscopic material to the indication of the wet thermometer 9 situated in the suction conduit 8. When the vegetables have been subjected to said temperature for the required lapse of time, the tray 4 is removed by opening the door 6 and a next tray is introduced into the apparatus through the door 5.

In the apparatus shown in Figures 2 and 3 the vegetables are supplied by the conveyor 12 and delivered on an endless band 13 passing over rollers 14, 15, 16, the roller 15 of which is driven. The band 13 runs through a casing 17 which contains two fans 18 each generating an air-stream directed transversally to the band according to the arrows indicated in Fig. 2 and passing along a heater 11. The mixture of air and vapour is not heated above 150° C. in the heater in order to avoid detrimental influences on the material sensitive to strong heating such as vegetables and fruits. For regulating the humidity of the air and thus the temperature of the treatment a quantity of fresh air is supplied through the aperture 20 which may be more or less closed by an adjustable valve 19.

The loose run of the conveyor band 13 is dragged through a receptacle 21 filled with water in order to keep the band clean.

At the entrance opening 22 of the casing underneath the band 13 where the pressure is below atmospheric pressure air from the outside can enter the casing. In order to prevent said leakage of air the space at the underside of the band 13 is at the entrance opening 22 and at the outlet opening 24 by means of conduit 23 connected to a part of the treatment-room where the pressure is above atmospheric. The air flowing through conduit 23 for the greater part will then again be sucked into the casing so that only a small quantity of air is lost. Above the band 13 the pressure in the casing 17 exceeds the atmospheric pressure a little so that here the entrance opening and the outlet opening may be mainly sealed by the vegetables themselves.

Example I

Scraped, washed and sliced carrots are spread in such a quantity in a loose layer on a grid which is permeable to air, that each square metre of the grid surface contains 20 kilogrammes sliced carrots. Said layer of carrots is subjected in an apparatus according to Fig. 1 to the action of a mixture of steam and air circulating through the layer. The steam and air mixture is heated by the heater 11 and the temperature of the mixture when entering the layer of vegetables is 125° C., whereas the mixture contains 0.95 kilogramme steam for each kilogramme of dry air, so that the temperature of the cooling limit of the mixture is 85° C. After a period of action of 3 minutes and 20 seconds the mass of carrots has been heated to 86° C. The sliced material does not obtain a higher temperature as its surface is still humid. From the mass of green stuff 16 kilogrammes of moisture are then withdrawn for every 100 kilogrammes of material, so that per 100 kilogrammes of carrots under treatment at most 16 kilogrammes of air together with the vapours generated from the carrots should be withdrawn from the treatment-room and an equivalent quantity of air should be supplied to said room. For maintaining the required degree of humidity of the air exclusively the moisture evaporated from the carrots is employed. The so pre-treated carrots are suitable for being dried in a drier.

Example II

For pre-treating peas which are to be preserved by freezing they are supplied to an apparatus according to Figures 2 and 3 by the conveyor 12 in such a manner that on every square metre of the conveyor band 13 seven kilogrammes of peas are uniformly distributed. The band 13 has such a velocity that the peas stay in the treatment room 17 for 60 seconds. The steam and air mixture entering the layer of peas has a temperature of 95° C. and the humidity of said mixture has such a value, that the temperature of the cooling limit of the mixture is 90° C. For maintaining said degree of humidity steam is introduced into the room 17 and air is supplied therein by means of valve 19. The airheater 11 only supplies such a quantity of heat as is required for maintaining the temperature of 95° C. for the steam and air mixture at the desired cooling limit temperature of 90° C. There is practically no loss of weight to the peas; the surfaces of the treated peas, however, feel dry as the superficial water (wash-water) has been evaporated.

What we claim is:

A method of blanching humid vegetable materials prior to their preservation comprising continuously circulating through the said materials a closed humid air stream at a normal pressure which air stream has been heated to effect its dehumidification, humidifying the said air stream by the moisture evaporated from the materials under treatment and controlling the heating and the humidification of said continu-

ous air stream to maintain its wet bulb temperature at a range between above 65° and below 100° C.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
648,248	Edwards	Apr. 24, 1900
1,259,637	King	Mar. 19, 1918
1,346,986	Stamm	July 20, 1920
1,685,511	Thomas	Sept. 25, 1928
1,947,115	Skinner	Feb. 13, 1934
1,982,944	Anderson	Dec. 4, 1934
2,097,198	Lesley et al.	Oct. 26, 1937
2,312,339	Jones	Mar. 2, 1943

FOREIGN PATENTS

Number	Country	Date
339,859	Italy	Apr. 29, 1936