MACHINE FOR COOKING, DEHYDRATING, AND/OR COOLING FOODSTUFFS

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This invention relates to a machine for cooking, dehydrating and/or cooling foodstuffs and industrial products, and particularly to a machine combining all the means necessary to condition the product to be treated, so that same may be canned or otherwise disposed of directly upon leaving the machine.

It is well known that the present machines used in the canning and other similar industries perform a single function, and this makes it necessary to transfer the product, after having been treated in one machine, to a further machine or machines for the subsequent treatments required in order to condition same, and this means that the process is complicated due to the different transfers required, apart from the cost represented by the plurality of machines forming the general plant.

The ideal no doubt is to combine the plant in a single body having simple operating means in order to control the action in successive or combined steps until the process is completed, and this is achieved with the machine subject of the present invention which, due to its special features and advantages is particularly well adapted for use in connection with foodstuffs.

The machine subject of the present invention comprises a cylindrical chamber having therein a rotary drum with perforated walls, so combined that the capacity of the machine will be determined by the space between the wall of said chamber and the perforated wall of the drum. In this manner, the product entering the chamber will acquire a cylindrical structure of annular section, i.e., the general mass will be hollow due to the central disposition of said drum which is in turn provided with a screw conveyor for self-charging same. Said drum is equipped with heating means and means for receiving currents of air and other suitable fluids, whereby it may be combined with the assembly so as to obtain the cooking, dehydration and even the refrigeration or thermal conditioning during the process, by means of a double wall provided as a complement to the main chamber.

One of the main objects of the invention resides in the provision of means whereby the process may be carried out with maximum speed.

A further object of the invention is to avoid the necessity of transferring the product, all the different treatments being carried out in the same position and location.

A still further object of the invention resides in the possibility of collecting the juices of the product being treated, so as to reincorporate them to the same product, if necessary, during the general treatment or subsequent thereto, or otherwise dispose of them.

A still further object of the invention is to obtain the admission, displacement, agitation and discharge by means of a single action, i.e., through the motion of the drum acting coaxially within the chamber.

A further object of the invention is to produce heat, by means of a current of steam, capable of quickly and effectively cooking the product, so that it will hold all its flavor, with or without the recovered juices.

A still further object of the invention is to rapidly dehydrate the product under treatment, through the action of air or other fluid passed from the interior of the chamber to the exterior thereof, through the evolution caused by the mechanical motion of the drum.

Other objects and advantages of the invention will become apparent from the course of the following description, when read in connection with the accompanying drawings illustrating the invention by way of example and in a preferred embodiment, and wherein:

Fig. 1 is a side view of the machine subject of the present invention, shown in section so as to disclose in the interior thereof the combination obtained with the drum forming the central hollow portion and having fins and a screw conveyor, said drum constituting the main moving element of the invention.

Fig. 2 is a cross-sectional view of the same machine, showing the manner in which the internal drum is combined so as to form and determine the charge capacity.

The same reference characters indicate like or corresponding parts or elements throughout both drawings.

As may be seen from the drawings, a is a fixed chamber having a cylindrical bottom and which is practically closed. Said chamber a is provided with a hopper 1 and an outlet 2, the latter being arranged at the bottom of the chamber a and opposite said hopper 1, so that the product entering through hopper 1 is caused to travel through the entire length of said chamber a. Also, the upper end of said chamber a comprises a hood 3 ending in a chimney serving to release the used gases and fluids.

Concentrically to the cylindrical curvature of chamber a is a drum b having perforated walls and constituting the main element of the present invention.

Said drum b is mounted in a rotary manner by means of a set of rings 5 engaging on rollers or
wheels 6. As may be seen in Fig. 1, drum b extends in both directions beyond the limits of chamber a. Thus, the drum b extends beyond the ends of chamber a, whereby both terminals project externally to said chamber.

One of the projecting ends of drum b is provided with a gear or pulley 8 to which is coupled a lead from any suitable motor.

A pipe 9 leads into said rotary drum b through one end thereof, said pipe 9 having branches communicating with a plurality of tubes 10 arranged parallel to the perforated walls of said drum. Said tubes 10 are provided with orifices aligned in front of the perforated walls of drum b, so that a stream of hot steam is fed through pipe 9, same will project towards the perforations of said drum and into the space to be occupied by the product to be treated.

The outer surface of drum b is provided with a helicoid 11, the general radius of which is slightly smaller than the radius of the cylindrical portion of chamber a. This helicoid 11 constitutes a screw conveyor so that the product introduced through the hopper 1 may be discharged through the outlet 2, after being treated within the chamber.

Apart from the helicoid 11, the outer surface of drum b carries a plurality of fins 12 serving as stirring elements, so that through a certain action of the drum, the product will be stirred during the treatment.

The projecting ends of drum b, indicated at 13, are connected to conduits 14 which constitute a branch from the air pump or suctioning or projecting element 15 which should be capable of causing a current of air by projection or suction, so as to dry the product to be treated.

The connection of the projecting ends 13 of drum b with said conduits 14 should be telescopic and without great friction, in order to allow the free rotation of said drum.

The ends of chamber a are provided with a set of collectors 16 for the purpose of collecting the juices given by the product under treatment, and inasmuch as said juices might also pass through the perforations in the walls of drum b, a second collector 17 is provided, derived from the lower portion of conduit 14.

Both sets of collector 16 and 17 lead into a common tank 18 for the purpose of providing heat so as to prevent coagulation of certain substances. As shown in Fig. 1, two pipes 18 and 18' located at different levels lead into said tank c, the opposite ends of said pipes being coupled to the inlet of a pump 19 so as to convey the juices again into chamber a. For this purpose, a pipe 19 is connected to the outlet of said pump 19, said pipe 19 terminating in a further pipe 19' entering through the upper portion of chamber a and provided with orifices so as to act as a juice dispenser and reintegrate part of the juices or greases which are thus returned to the chamber.

Surrounding chamber a is a double wall 21 through which cold water or a heating fluid is circulated, in order to heat the product, as required, during the treatment thereof.

Operation
The product to be treated, which may be, for example, meat, vegetables or other foodstuffs or industrial products, is fed through hopper 1. By means of a corresponding motor (not shown) transmitting its action to pulley 8, the drum b is rotated in the corresponding direction so that the helicoid 11 will act as a conveyor to admit the product until the space between the wall of drum b and the wall of the air or other fluid fully charged with the product to be treated. In these circumstances, the outlet 2 should be kept closed by means of cover 22.

Once the space between the drum and the wall of chamber a has been fully charged, the control is changed so that drum b, instead of rotating in a single direction, will be given an alternate motion with a semi-rotation on both directions. Thus, the helicoid 11 and fins 12 will suitably stir the mass of the product contained in the chamber.

At the same time, steam is supplied through pipe 9, and by means of branches 10, said steam will be projected in a diffused manner, invading the internal cavity of said drum and passing into and mixing with the mass or product being treated. This provides an effective heating by means of which the product is cooked, and the juices released thereby are gathered in collectors 16 and 17. Said juices arrive at tank c where they can be independently disposed of or returned to the product, in a closed circuit by means of pipe 18 and pump 19, and delivered to the orifices in pipe 19'. In order to avoid coagulation of said juices, they are preferably kept warm by means of heat applied to the double wall c'. Inasmuch as pipes 18 and 18' are located at different levels, the juices and greases separated by density may be withdrawn one layer at a time, so as to return same to the mass of product in the most suitable manner. This means that, if desired, only part of the grease may be returned to the mass, or else grease combined with gravy, in suitable proportions.

Once the product has been cooked, the steam heat is cut off. If the product requires drying or dehydrating, the fan or pump 15 is started, so as to establish a passage of air between the interstices of the mass of the product, by projection or suction, said passage of air being sufficient to evaporate the aqueous matter. In this manner, the product may be dehydrated according to the requirements in each case, which will depend on the type and condition of the product being treated. If the dehydrator is to work by projection, fan 15 should direct air into a double wall 21', the air or other fluid will enter into the mass of the product, and then pass through hood 3 and chimney 4, to the atmosphere.

On the other hand, if the element 15 acts by suction, the depression originated in the central portion of drum b causes the air which might penetrate into the chamber to pass through the mass of the product, leaving through the cavity of the drum, conduit 14, etc.

If after being cooked and dehydrated, the product contained in the chamber is to be canned or packed, refrigeration is applied to the double wall 21, which may consist of a current of cold water or a circulation of other fluid or ice at low temperature. This cooling action should take place in cooperation with the alternate semi-rotary motion of drum b in both directions, so as to speed up the process.

In certain instances it may be desirable to heat the product in order to condition same, and in such case the heat may be applied in the double wall 21.

Finally, by opening the door 22 and combining
the control means so as to rotate the drum in a given direction, said drum b will act as a conveyor in displacing the product towards the outlet 2, through which it is discharged for disposal.

In short, the invention comprises an elongated chamber of suitable structure provided with a hollow perforated rotary drum b having heating means therein, while the outer surface of said drum is provided with a helicoid 11. Said chamber is in turn provided with a hopper and an outlet, and comprises means for exhausting the gases or vapors released by the product being treated, said drum b being arranged so as to rotate in one direction or alternately in both directions.

It is evident that in carrying out the invention many changes will occur to those skilled in the art, without departing from the scope of the invention as clearly set forth in the appended claims.

What is claimed is:

1. Apparatus of the character disclosed, comprising an elongated chamber, a cylindrical drum having a perforated wall disposed within said chamber and having its opposite ends rotatably journaled in the ends of said chamber, the sides of said chamber merging into a semi-cylindrical bottom wall below the axis of said drum, the said side and bottom walls comprising spaced wall members defining a chamber for receiving a cooling medium, the first chamber having a top wall which with the inner of said wall members merges into a hood intermediate the ends of the chamber, a chimney extending upwardly from the hood, a hopper in said top wall adjacent one end of the chamber, an outlet in said bottom wall at the other end of said chamber, a spiral fin externally of said drum for advancing the product to be treated from said hopper toward said outlet, steam ejecting means within and adjacent the wall of said drum, an air circulating conduit communicating with the opposite ends of said drum, juice collecting means beneath said chamber, and means for returning the juice from said collecting means to within the chamber above the drum therein.

2. Apparatus according to claim 1, wherein said juice collecting means comprises a tank, conduit connections between said first chamber and the interior of said drum and said tank, and wherein said returning means comprises a pump, vertically spaced conduits between said tank and said pump, and a conduit extending from said pump and terminating in a perforated longitudinal extension within said chamber above the drum therein.

3. Apparatus for cooking, dehydrating, and cooling foodstuffs or other industrial products, comprising an elongated chamber having upright side walls, a semi-cylindrical bottom wall and axially aligned cylindrical end extensions, a cylindrical drum extending through said chamber and having its opposite ends rotatably mounted in said end extensions, said chamber having an inlet at one end thereof and an outlet at the opposite end, the wall of said drum being perforated and being exteriorly provided with a spiral fin for advancing the product to be treated from said inlet toward said outlet, heating means within said drum for effecting cooking of the product within said chamber and externally of said drum, means for effecting air circulation through the wall of the drum and said chamber for dehydrating the cooked product, refrigerant receiving means for cooling the product within the chamber, a juice collecting tank beneath said chamber, conduits between said chamber and tank for directing juices thereto, a conduit extending from said tank to within said chamber above the drum therein, and a pump in said conduit for returning juices from said tank to said chamber.

4. Apparatus for cooking, dehydrating, and cooling foodstuffs or other industrial products, comprising an elongated chamber having upright side walls, a semi-cylindrical bottom wall and axially aligned cylindrical end extensions, a cylindrical drum extending through said chamber and having its opposite ends rotatably mounted in said end extensions, said chamber having an inlet at one end thereof and an outlet at the opposite end, the wall of said drum being perforated and being exteriorly provided with a spiral fin for advancing the product to be treated from said inlet toward said outlet, heating means within said drum for effecting cooking of the product within said chamber and externally of said drum, means for effecting air circulation through the wall of the drum and said chamber for dehydrating the cooked product, refrigerant receiving means for cooling the product within the chamber, a juice collecting tank beneath said chamber, conduits between said chamber and tank for directing juices thereto, a conduit extending from said tank to within said chamber above the drum therein, and a pump in said conduit for returning juices from said tank to said chamber.

5. Apparatus for cooking, dehydrating and cooling foodstuffs or other industrial products, comprising an elongated chamber having upright side walls, a semi-cylindrical bottom wall and axially aligned cylindrical end extensions, a cylindrical drum extending through said chamber and having its opposite ends rotatably mounted in said end extensions, said chamber having an inlet at one end thereof and an outlet at the opposite end, the wall of said drum being perforated and being exteriorly provided with a spiral fin for advancing the product to be treated from said inlet toward said outlet, heating means within said drum for effecting cooking of the product within said chamber and externally of said drum, means for effecting air circulation through the wall of the drum and said chamber for dehydrating the cooked product, refrigerant receiving means for cooling the product within the chamber, a juice collecting tank beneath said chamber, conduits between said chamber and tank for directing juices thereto, a conduit extending from said tank to within said chamber above the drum therein, and a pump in said conduit for returning juices from said tank to said chamber.

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