

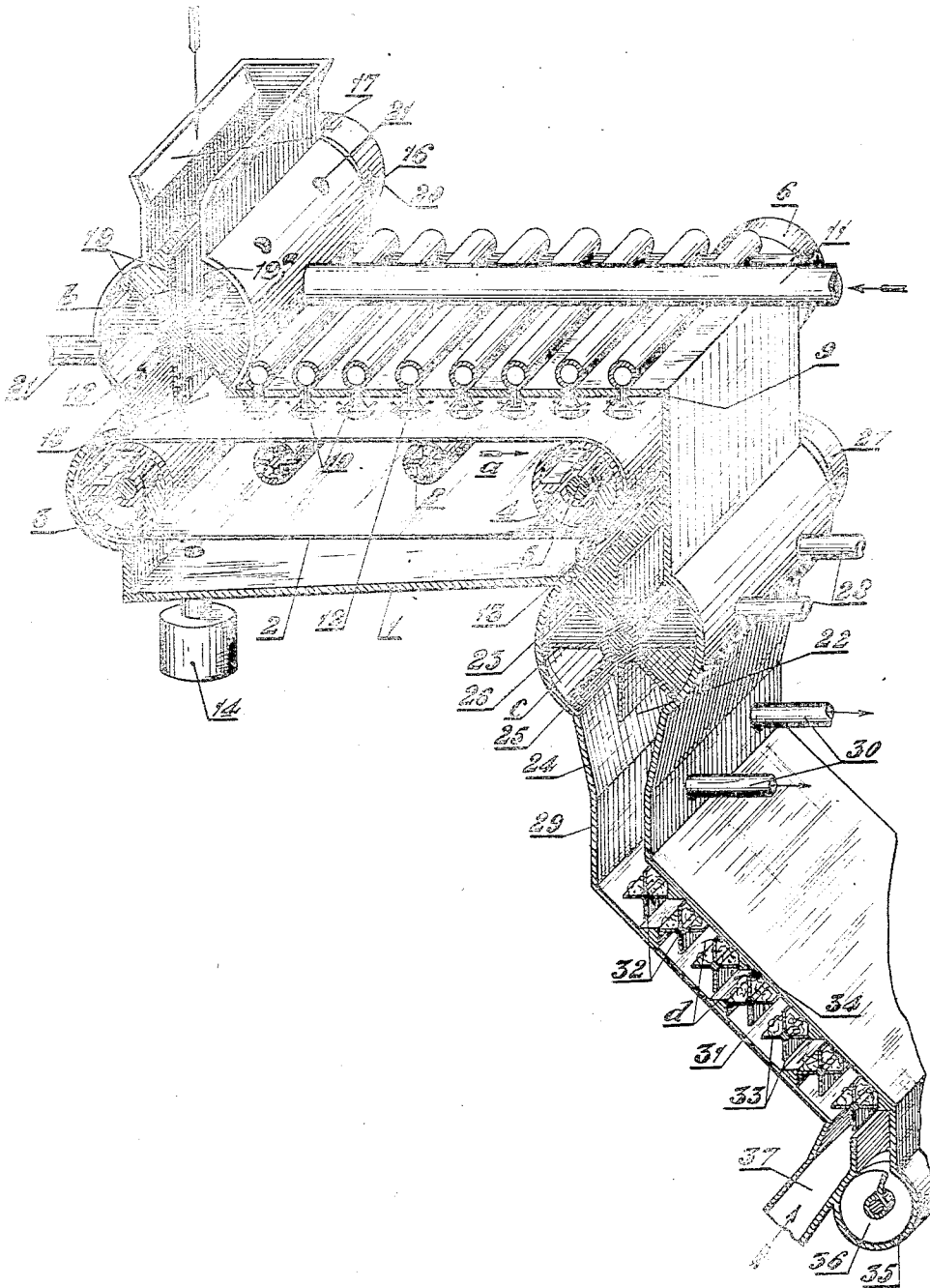
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APPARATUS FOR TREATING AND DRYING VEGETABLES

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APPARATUS FOR TREATING AND DRYING VEGETABLES.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, DOMINICUS JOSEPHUS PENNOCK, a subject of the Queen of the Netherlands, residing at Zevenbergen, the Netherlands, have invented certain new and useful Improvements in Apparatus for Treating and Drying Vegetables, of which the following is a specification.

The invention relates to apparatus for treating and drying vegetables in which the vegetables, reduced to small particles, or otherwise, are subjected in a closed receptacle to the action of steam having a pressure exceeding the atmospheric pressure.

The accompanying drawing represents a perspective view, partly in cross-section, of an embodiment of the present invention.

The apparatus comprises a casing 1 in which a conveyer band 2 is mounted on two drums 3, 4. The band 2 may conveniently be made of metallic gauze, wire netting, perforated metal plates or the like. The drum 4 is mounted on a shaft 5 which passes through a stuffing-box in the rear wall of the casing 1, said shaft 5 carries a pulley 6 by means of which it may be driven with a suitable speed in such a manner that the conveyer band 2 is moved in the direction of the arrow *a*. Intermediate guide rollers 7 and 8 serve the purpose of supporting the top part of the band 2 to prevent sagging thereof.

The top wall 9 of the casing 1 contains a plurality of steam nozzles 10 in connection with a pipe 11 through which steam having a pressure of say two to three atmospheres may be admitted into the casing 1. Secured vertically below the nozzles 10 are cup-shaped baffle-plates 12 for preventing the steam jets from blowing directly on the band 2, and permitting the steam to flow over their edges substantially parallel with the said band.

Near the bottom of the casing 1 there is a scraper 13 whose cutting edge is arranged in the immediate proximity of the conveyer band 2 at the under side of the drum 4.

A steam trap 14 of any suitable construction is mounted in the bottom of casing 1.

At the left hand side the top wall of the casing 1 has a comparatively narrow opening 15 extending the whole width of the casing, and tightly secured on the edges of said opening there is a feed hopper comprising a cylindrical portion 16 and a funnel-shaped portion 17. Rotatably mounted in

the cylindrical portion 16 is a shaft 18 with a plurality of radial blades 19 which are provided with means such as strips of rubber or other suitable material 19^a for insuring the required tightness between the edges of the blades and the inner walls of the cylindrical portion 16. The shaft 18 extends through a stuffing-box in the rear wall of the hopper and mounted thereon is a pulley 20 by which rotary motion in the direction of the arrow *b* may be imparted to said shaft. In the left hand side wall of the cylindrical portion 16 nozzles 21 are provided which open into the atmosphere, or may be connected with a vacuum-space.

At the right hand side the bottom of the casing 1 has a comparatively narrow opening 22 which also extends through the entire width of the casing. Tightly secured on the edges of this opening there is a discharge hopper of the same construction as the feed hopper 16, 17 just described, and comprising in combination a cylindrical portion 23 ending in a funnel-shaped portion 24, a shaft 25 rotatable in the direction of the arrow *c* and provided with radial blades 26 and with a pulley 27, and nozzles 28 opening into the atmosphere or connected with a vacuum-space.

The funnel-shaped portion 24 is secured to a rectangular casing 29 having nozzles 30 by which it may be connected with the suction side of an air pump.

At its bottom the casing 29 is in communication with an inclined casing 31 containing a plurality of shafts 32 arranged the one below the other and all rotatable in the direction of the arrow *d*. Each of the shafts 32 carry four radial blades disposed at right angles relative to each other. The shafts 32 are coupled to a mechanism (not shown in the drawing as it does not form part of the present invention) adapted to impart to them intermittent rotary motion so that when at rest the blades 33 are always either vertical or horizontal. The said mechanism should conveniently operate in such a manner that first the lowermost shaft 32 is turned through an angular distance of 90°, then the next higher shaft, and so on; the arrangement may be so that the lowermost shaft receives a second rotary motion before the uppermost shaft is revolved for the first time.

The inner walls of the casing 31 are provided with horizontal ribs 34 in such a man-

ner that the horizontal blades 33 of the successive shafts 32 fit tight against these ribs alternately at the left hand side and at the right hand side, sufficient clearance being
 5 left between the blade edges and the opposite walls of the casing for allowing drying air to pass upward through the casing 31.

At its bottom the casing 31 communicates with the casing 35 of a worm conveyer 36,
 10 and it is further provided with a plurality of nozzles 37 by which it may be connected with a hot air admission pipe.

The operation of the apparatus is as follows:

15 When the vegetables, in a finely reduced condition or otherwise, are fed into the funnel 17, they are received in a compartment between two adjacent blades 19, and owing to the rotary motion of the shaft 18 they
 20 will after moving through a certain distance be discharged on the conveying band 2 whereby they are slowly fed in a horizontal direction through the casing 1. During this motion on the band 2 they are subjected to
 25 the action of the steam admitted through the nozzles 10 and having a pressure exceeding the atmospheric pressure, so that the cells are disrupted and the moisture inclosed therein is set free. When the vegetables
 30 have reached the right hand end of the band 2 they are discharged into the cylindrical casing 23, the speed of the shaft 5 being such that by the time it has reached the end of the band 2, the material has been sufficiently
 35 acted upon by the steam, to bring the vegetables into a well done condition. The scraper 13 prevents the steamed material from adhering to the bottom part of the band.

40 Owing to the rotary motion of the shafts 18 and 25 the steam entering the casings 16 and 23 is discharged through the nozzles 21 and 28 respectively, the number of blades 19 and 26 being such that at no moment is
 45 there free communication between the casing 1 and the nozzles 21 and 28 respectively, or between the casing 1 and the hoppers 17 and 24 respectively, or between the latter and the nozzles 21 and 28 respectively.

50 The condensed steam is discharged by means of a steam trap 14 of suitable construction.

When the vegetables, the cells of which are disrupted and which by the comparatively long action of the steam under pressure are brought to a well-done condition, are discharged into the hopper 24 and thence into the casing 29, they will, owing to the intermittent rotary motion of the
 60 blades 33 on the shafts 32, be carried step by step through the casing 31, and during their passage through said casing they are subjected to the action of air supplied through the nozzles 37 and drawn away
 65 through the nozzles 30. The ribs 34, which

are arranged as hereinbefore described and illustrated in the drawing, form a zig-zag passage for the air which, therefore, has an opportunity of taking up a considerable quantity of moisture. It will be noticed
 70 that the action of the air is based on the counter-current principle, and this fact answers for the steamed mass being perfectly dry when being discharged into the casing 35 of the worm conveyer 36, provided
 75 always that the apparatus is properly dimensioned and that the speed of the various driving shafts is properly adjusted.

The described apparatus may be varied in many respects without departing from
 80 the scope and the spirit of the present invention.

What I claim as my invention and desire to secure by Letters Patent is:

1. In apparatus of the type referred to,
 85 in combination a closed receptacle adapted to stand internal pressure, a conveyer mounted in said receptacle, a number of nozzles on said receptacle for the admission of steam under a pressure exceeding
 90 the atmospheric pressure, means for feeding the material to be treated at the top side and means for discharging the treated material at the bottom side of the said receptacle, each of said means comprising a cylindrical
 95 casing, a shaft rotatably mounted therein, and radial blades secured on said shaft and adapted to move with their edges tight over the inner walls of said casing.

2. In apparatus of the type referred to,
 100 in combination a closed receptacle adapted to stand internal pressure, a band conveyer mounted in said receptacle, a plurality of nozzles in the top wall of said receptacle for the admission of steam under a pressure
 105 exceeding the atmospheric pressure, baffles in said receptacle at some distance from said nozzles for preventing the steam jets discharged from blowing directly on said conveyer, means for feeding the material
 110 to be treated at the top side and means for discharging the treated material at the bottom side of the said receptacle, each of said means comprising a cylindrical casing, a shaft rotatably mounted therein, and
 115 radial blades secured on said shaft and adapted to move with their edges tight over the inner walls of said casing.

3. In apparatus of the type referred to,
 120 in combination a closed receptacle adapted to stand internal pressure, a conveyer mounted in said receptacle, a number of nozzles on said receptacle for the admission of steam under a pressure exceeding the
 125 atmospheric pressure, means for feeding the material to be treated at the top side and means for discharging the treated material at the bottom side of the said receptacle, each of said means comprising a cylindrical casing formed with an opening in
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its wall between the inlet and the outlet openings for the material, said first mentioned opening providing communication between said casing and a space wherein the pressure does not exceed atmospheric pressure, a shaft rotatably mounted in said casing, and radial blades secured on said shaft and adapted to move with their edges tight over the inner walls of said casing.

4. In apparatus of the type referred to, the combination of a closed receptacle adapted to stand internal pressure, a band conveyer mounted in said receptacle, a number of nozzles on said receptacle for the admission of steam under a pressure exceeding the atmospheric pressure, means for feeding the material to be treated at the top side and means for discharging the treated material at the bottom side of the said receptacle, each of said means comprising a cylindrical casing, a shaft rotatably mounted therein, and radial blades secured on said shaft and adapted to move with their edges tight over the inner walls of said casing, with means in communication with the discharge means and adapted to allow the treated material to fall by degrees under the influence of its own weight in a counter current of air.

5. In apparatus of the type referred to, the combination of a closed receptacle adapted to stand internal pressure, a band conveyer mounted in said receptacle, a number of nozzles on said receptacle for the admission of steam under a pressure exceeding the atmospheric pressure, means for feeding the material to be treated at the top side and means for discharging the treated material at the bottom side of the said receptacle, each of said means comprising a cylindrical casing, a shaft ro-

tatably mounted therein, and radial blades secured on said shaft and adapted to move with their edges tight over the inner walls of said casing, with a casing in communication with the discharge means and provided with means for allowing air to flow upward through it, the last said casing containing a plurality of rotatably mounted shafts carrying radial blades and mounted the one below the other.

6. In apparatus of the type referred to, the combination of a closed receptacle adapted to stand internal pressure, a band conveyer mounted in said receptacle, a nozzle on said receptacle for the admission of steam under a pressure exceeding the atmospheric pressure, means for feeding the material to be treated at the top side and means for discharging the treated material at the bottom side of the said receptacle, each of said means comprising a cylindrical casing, a shaft rotatably mounted therein, and radial blades secured on said shaft and adapted to move with their edges tight over the inner walls of said casing, with a casing in communication with the discharge means and provided with means for allowing air to flow upward through it, the last said casing containing a plurality of rotatably mounted shafts carrying radial blades and mounted the one below the other, said casing being provided with ribs on its inner walls forming a zig-zag passage for the said current of air.

In testimony whereof I have affixed my signature in presence of two witnesses.

DOMINICUS JOSEPHUS PENNOCK.

Witnesses:

K. N. BOSCH,
PLANTE FÉHRE.