Sept. 2, 1952 S. L. VITALE 2,609,100

DRYING MACHINE HAVING CENTRIFUGAL UNITS

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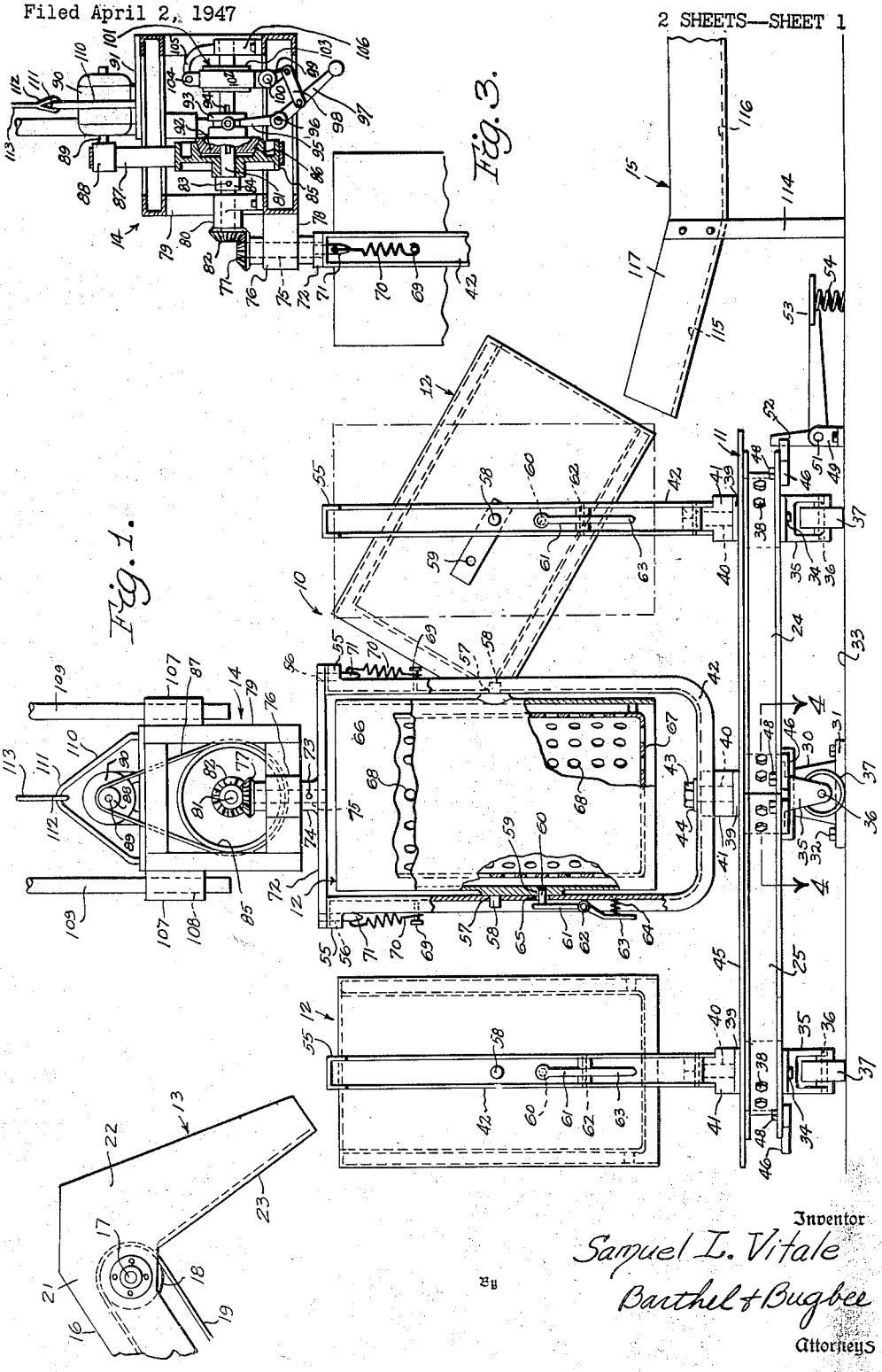


Fig. 1.

Fig. 3.

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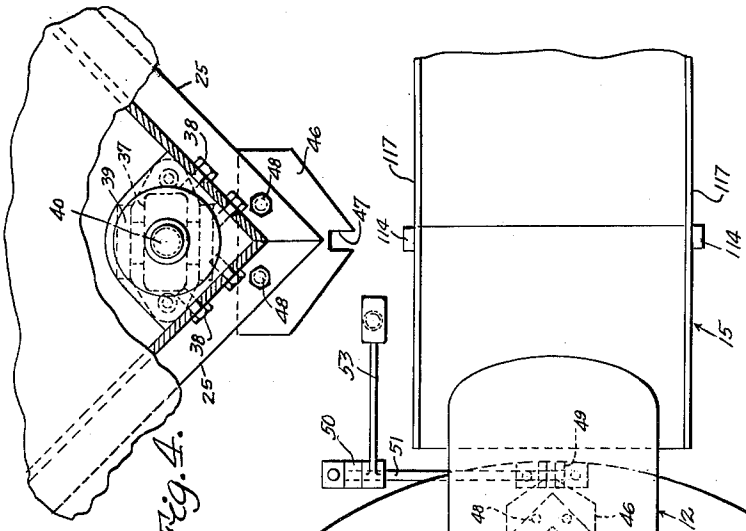


Fig. 4.

Fig. 2.

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DRYING MACHINE HAVING CENTRIFUGAL UNITS

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4 Claims. (Cl. 210—63)

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This invention relates to drying machines having centrifugal units.

One object of this invention is to provide a drying machine which is especially well adapted to the rapid and thorough drying of wet articles, such as freshly-washed vegetables or the like and which will handle such articles in a convenient cycle of operations.

Another object is to provide a drying machine for drying wet articles which is arranged for substantially continuous operation and for handling large quantities of the wet articles, yet which is capable of operation by a single operator.

Another object is to provide a drying machine, as set forth in the preceding objects wherein the drying receptacles are arranged upon a turntable whereby one receptacle is being filled with the wet articles while another is being rotated to expel the water and a third receptacle is being unloaded by the operator.

Another object is to provide a drying machine, as set forth in the preceding objects, wherein the water is expelled rapidly by a centrifugal action from a rotatable perforated receptacle which is also tiltable for unloading purposes.

Another object is to provide a drying machine, as set forth in the preceding objects, wherein the machine is provided with a power-operated receptacle-rotating device at a drying station to which each of a plurality of receptacles may be moved by rotating a turntable, another station being employed for filling the receptacles and a third for unloading the receptacles after drying has taken place.

In the drawings:

Figure 1 is a front elevation of a drying machine according to a preferred form of the invention, with the upper portion of the nearest drying receptacle broken away to disclose the receptacle behind it;

Figure 2 is a top plan view of the drying machine shown in Figure 1;

Figure 3 is a side elevation of the receptacle-rotating device at the drying station, with the clutch in longitudinal section; and

Figure 4 is an enlarged top plan view of a portion of the turntable immediately beneath one of the drying receptacles.

Hitherto, the drying of freshly-washed vegetables in large quantities has presented great difficulties, particularly the problem of drying the vegetables at a sufficiently rapid speed without damaging them. Another difficulty to the rapid drying of vegetables by apparatus used for drying other articles has been that heat is not conveniently used because of the danger of wilting the vegetables, especially green vegetables, such as spinach, broccoli, endive, parsley, watercress or the like. Such prior methods and apparatus for drying green vegetables has also not been adaptable to the mass handling of large quantities of vegetables without the employment of an unnecessarily large labor force, with consequent high expense for the drying operation.

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The drying machine of the present invention eliminates these difficulties and solves the problem of the mass drying of freshly-washed vegetables by receiving the washed vegetables in rotatable receptacles mounted upon a turntable which is itself rotatable to different stations by a single operator, operations being carried out simultaneously at each of these stations. While one of the receptacles is being filled with the freshly-washed vegetables at a loading station, another receptacle is being rotated at a drying station to expel the water centrifugally, and a third receptacle is being tilted at an unloading station and its vegetables removed to a handling or packing table or chute. The turntable is indexed so that it can be locked in any of the stations. The rotating device is attachable to and detachable from the receptacles at the drying station merely by raising and lowering the device and coupling or uncoupling the driving member thereof. Since no heat is employed there is no damage to green vegetables and the major portion of the water is expelled quickly and easily without causing any bottlenecks in the vegetable cleaning and packing process, as has hitherto been the case.

Referring to the drawings in detail, Figures 1 and 2 show a drying machine generally designated 10, according to a preferred form of the invention, as consisting of a turntable 11 upon which a plurality of receptacles 12 are rotatably mounted. The receptacles 12 are filled at the loading station by a loading device 13 and rotated at the drying station by a rotating device 14. The dried vegetables in the receptacles 12 are unloaded at an unloading station onto a receiving table or chute 15.

The loading device 13 forms no part of the present invention and may consist of any suitable loading machine. As shown (Figures 1 and 2), the loading device 13 consists of a vertically-inclined frame 16 (the upper portion only being shown) in which is journaled a pair of shafts 17 (one only being shown) carrying drums or sprockets 18 over which a belt conveyor 19 is trained. One of the shafts 17 is power-driven

as by a pulley 20 (Figure 2) from any suitable prime mover, such as an electric motor (not shown). It will be assumed that the vegetables being carried upward on the belt conveyor 19 have been previously washed by conventional machinery forming no part of the present invention, and that, accordingly, the vegetables are very wet. As the vegetables pass upward on the conveyor 19, they are prevented from falling off laterally by side plates 21 forming a part of the frame 16, the side plates 21 having downwardly-inclined extensions 22 forming sides to a delivery duct 23, in the form of a chute or spout. Water-spraying devices are ordinarily mounted above the belt conveyor 19 to additionally spray the vegetables with water as they are carried upward by the conveyor 19, but these spraying devices form no part of the present invention and are accordingly omitted from the drawings.

The turntable 11 consists of an approximately square frame structure 24 formed of channel members 25 secured at their corners to one another. Two of the opposite channel members 25 are interconnected by spaced parallel channel members 26 which in turn are interconnected at their midpoints by plates 27 (one only being shown) which serve to support a vertical journal bearing 28. Mounted in the journal bearing 28 is a pivot shaft or pintle 29 projecting upward from a pedestal 30 which has a flange 31 bolted as at 32 to the floor 33 of the buiiding in which the machine is mounted.

Bolted as at 34 to the underside of the frame structure 24 at each corner thereof is a wheel mount 35 in which is journaled an axle 36. Rotatably mounted upon the axle 36 is a wheel or roller 37, each axle 36 being aligned with the axis of the pivot shaft 29. Since the axles 36 are thus radially mounted, the wheels 37 travel in tangential directions in a circular path on the floor 33 with the pivot shaft 29 at its center.

Mounted inside each corner of the frame structure 24 and bolted thereto as at 38 (Figure 4) is a support 39 for a vertical pivot shaft, bolt, or stud 40. Mounted upon each support 39 is a rotatable collar 41 upon which rests a U-shaped frame 42 of channel cross-section, the above-described structure being held in assembly by the head 43 of the pivot, bolt or shaft 40, aided by a washer 44.

Mounted upon the frame structure 24 is a circular plate or table 45 forming a floor for the turntable 11. In order to index and lock the turntable 45 at its various stations, a plate 46 with an indexing notch 47 is bolted as at 48 (Figure 4) to the frame structure 24 at each corner thereof. Bolted to the floor 33 are spaced shaft bearing brackets 49 and 50 in which is rotatably mounted a shaft 51 carrying a locking arm 52 at a location opposite the stopping point of the indexing notch 47. Also mounted upon the shaft 51 is the hub of a foot pedal 53, the latter being urged upward by a coil spring 54 which therefore normally urges the locking arm 52 into the indexing notch 47.

The U-shaped frame 42 at its upper ends is provided with outwardly-bent portions 55 having vertical holes 56 therein for engagement by the rotating device 14, as described below. At an intermediate point, the U-shaped frame 42 is provided with horizontal bearing bores 57 (Figure 1) which rotatably support trunnions 58 secured to the opposite sides of the receptacle 12. The receptacles 12 are also provided with recesses 59 for receiving locking pins 60 mounted on hand levers 61 which are pivoted at 62 to the U-shaped frames 42 and are provided with handles 63 urged outward by coil springs 64 in order to normally urge the locking pins 60 into their recesses or sockets 59. The locking pin 60 passes through a hole 65 in the U-shaped frame 42 before entering the recess or socket 59.

Each receptacle 12 consists of a casing 66 of cylindrical form open at the top and bottom and provided with the trunnions 58 and locking pin sockets 59 previously mentioned. Mounted within the casing 66 is a perforated container or basket 67, the walls of which are spaced away from the adjacent walls of the casing 66. The container 67 is open at the top and is provided with multiple holes 68 in the side and bottom walls thereof for the escape of the water. The U-shaped frames 42 are also provided with anchoring pins 69 to which are secured the lower ends of springs 70, the upper ends of which are hooked to downwardly-projecting driving pins 71 mounted in the outer ends of a rotatable driving bar 72 forming a part of the rotating device 14. The springs 70 thus prevent accidental dislodgement of the driving pins 71 after they have been inserted in the holes 56 in the U-shaped frame member portions 55.

The rotatable device 14 has the rotatable driving bar 72 secured as at 73 to a hub 74 mounted on the lower end of a vertical shaft 75 (Figures 1 and 3). The shaft 75 is journaled in a vertical bearing bracket 76 and to its upper end is secured the hub of a bevel pinion 77. The bearing bracket 76 is mounted in a horizontally-projecting portion 78 forming part of a box-like frame structure 79. Mounted in the frame structure 79 is a bearing bracket 80. Journaled in the bearing bracket 80 is a horizontal shaft 81 to the outer end of which is secured a bevel pinion 82 meshing with the bevel pinion 77. Secured as at 83 to an inner portion of the shaft 81 is a thrust collar 84. Loosely and rotatably mounted on the shaft 81 and engaging the collar 84 is the hub of a driving pulley 85 having an internal conical clutch portion 86 thereon. The pulley 85 is driven by a belt 87 from a pulley 88 upon the armature shaft 89 of an electric motor 90 mounted upon a bed plate 91 on top of the frame structure 79. A driving connection between the pulley 85 and shaft 81 is made by means of an external or male cone clutch member 92 (Figure 3) which is movable into and out of engagement with the internal conical clutch portion 86 by means of an annularly grooved collar 93 which is keyed or splined as at 94 to the shaft 81. The collar 93 and male clutch member 92 are shifted into and out of clutching engagement with the clutch portion 86 by means of a shifting yoke 95 which is mounted upon a pivot shaft 96 journaled in the frame structure 79. Also mounted on the shaft 96 is a hand lever 97 by which the shifting yoke 95 may be shifted to and fro. A link 98 pivotally connects the hand lever 97 with an operating arm 99 mounted on the operating shaft 100 of a brake unit 101. The operating shaft 100 is provided with the usual devices such as cams (not shown) for urging a brake band 102 into contact with a brake drum 103. The brake band 102 carries ears 104 by which it is pivotally connected to an arm or bracket 105 projecting upward from the top of a bearing bracket 106 in which the rearward end of the shaft 81 is rotatably mounted.

In order to raise and lower the rotating device 14, the frame structure 79 is provided with laterally-projecting portions 107 which in turn are

provided with parallel vertical bores 108 through which pass parallel guide shafts 109 (Figure 1). The upper ends of the guide shafts 109 are mounted on the wall or ceiling of the room in which the machine is installed. Secured to the upper portion of the frame structure 79 is a bail-like rod 110 of approximately triangular shape to the apex 111 of which the eye 112 of a raising and lowering flexible member 113 is attached. The member 113 (Figures 1 and 3) may consist of a wire cable or a chain to which a conventional chain-hoisting mechanism (not shown) is attached.

The receiving chute 15 (Figures 1 and 2) is mounted upon vertical frame members 114 and is provided with an upwardly-inclined bottom portion 115 leading to a horizontal bottom portion 116, the bottom portions 115 and 116 being bounded laterally by side walls 117. The receiving chute 115 is preferably made of stainless steel, Monel metal or other material over which the vegetables will slide easily and which will be clean and sanitary and easily washed.

In the operation of the invention, it will be assumed that the wet vegetables are being continuously conveyed up the belt conveyor 19 and dumped into the duct or spout 23, which guides them into the receptacle 12 which is adjacent the loading station of the machine. While the loading is occurring, a previously-loaded receptacle 12 is drivingly connected to the rotating device 14 by lowering the latter upon the former, inserting the pins 71 in the holes 56 and locking these in place by the springs 70 (Figure 1). The clutch-shifting lever 97 is then thrown so as to engage the clutch members 92 and 86 so that the motor 90 rotates the shaft 75 and the cross bar 72. This action rotates the U-shaped frame 42 around its pivot shaft or bolt 40, causing the water in the vegetables to be expelled by centrifugal force through the holes 68 in the basket 67. The water striking the inside of the cylindrical casing 66 is deflected downward through the open bottom thereof and discharged.

When the vegetables have been sufficiently dried in this manner, the operator unhooks the springs 70, disconnects the pins 71 of the driving bar 72 from the U-shaped frame 42 and, by operating a chain hoist (not shown), raises the rotating device 14 out of contact therewith. He then depresses the foot pedal 53 to swing the locking arm 52 out of engagement with the indexing notch 47, whereupon he pushes the turntable 11 around to the next station. This brings the receptacle 12 in which the vegetables have just been dried into registry with the receiving chute 15, whereupon he releases the foot pedal 53 and locks the turntable in this position. He then lowers the driving device 14 and reconnects it to the receptacle 12 which has just been loaded and moved into position beneath it, in the manner previously described. He then turns on the power so as to rotate the receptacle 12 and expel the water.

While the water is being expelled, he returns to the receptacle 12 which is opposite the mouth of the receiving chute 15, operates the locking lever 63, 61 to pull the locking pin 60 out of the recess 59 and tilts the receptacle 12 downward into the position shown at the right-hand side of Figure 1. This enables the vegetables to be transferred from the tilted receptacle 12 to the receiving chute 15, in a quick and easy manner, aided by a trowel or similar hand tool. After the tilted receptacle 12 has been emptied of its vegetables, it is again swung into the vertical position, and the locking pin 60 reinserted in the recess 59. The turntable is then rotated to the next station and the foregoing operations repeated.

What I claim is:

1. A drying machine comprising a turntable having a plurality of vertically-disposed bearings spaced in a circular path outwardly from the center thereof, a plurality of open-sided frames having bearing-engaging portions rotatably mounted in said vertical bearings, each frame having a pair of spaced vertical uprights disposed on opposite sides of the axis of its respective bearing substantially in a plane passing through the axis of said bearing, each frame having a pair of horizontally-disposed coaxial trunnion bearings mounted thereon, a perforated vertically-disposed receptacle having trunnions positioned on the sides thereof intermediate the upper and lower ends thereof, said receptacle being tiltably mounted in said trunnion bearings in each frame, each of said frames having a coupling-receiving portion thereon, said trunnion bearings being mounted on said uprights, a latching device mounted on said frame and engageable with said receptacle in its vertical rotatable position, and a power-driven receptacle rotating device having a power-transmitting coupling thereon mounted adjacent said turntable in successive registry with each of said frames upon rotation of said turntable, said coupling being selectively engageable with and disengageable from the coupling-receiving portion of each of said frames upon arrival of each frame in registry with said coupling.

2. A drying machine comprising a turntable, a plurality of U-shaped frames rotatably mounted on said turntable and having trunnion bearings mounted thereon, a perforated receptacle having trunnions tiltably mounted in said trunnion bearings in each frame, a power-driven rotating device selectively engageable with said frames for rotating said receptacles, and a latching device mounted on said frame and engageable with said receptacle for latching said receptacle in its rotatable position.

3. A drying machine comprising a turntable having a plurality of vertically-disposed bearings spaced in a circular path outwardly from the center thereof, a plurality of U-shaped frames having bearing-engaging portions rotatably mounted in said vertical bearings on said turntable, each frame having a pair of horizontally-disposed coaxial trunnion bearings mounted thereon, a perforated receptacle tiltably mounted in each frame, and a power-driven rotating device selectively engageable with said frames for rotating said receptacles, said rotating device including a motor, a rotary shaft, a rotary cross bar connected to said shaft and having its outer ends selectively engageable with the upper ends of said U-shaped frames, and power-transmitting mechanism drivingly connecting said shaft to said motor.

4. A drying machine comprising a turntable having a plurality of vertically-disposed bearings spaced in a circular path outwardly from the center thereof, a plurality of U-shaped frames having bearing-engaging portions rotatably mounted in said vertical bearings on said turntable, each frame having a pair of horizontally-disposed coaxial trunnion bearings mounted thereon, a perforated receptacle tiltably mounted

in each frame, a power-driven rotating device selectively engageable with said frames for rotating said receptacle, said rotating device including a motor, a rotary shaft, a rotary cross bar connected to said shaft and having its outer ends selectively engageable with the upper ends of said U-shaped frames, and power-transmitting mechanism drivingly connecting said shaft to said motor, and a detent engageable between said cross bar and said frame for separably locking said cross-bar to said frame during rotation of said frame.

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