

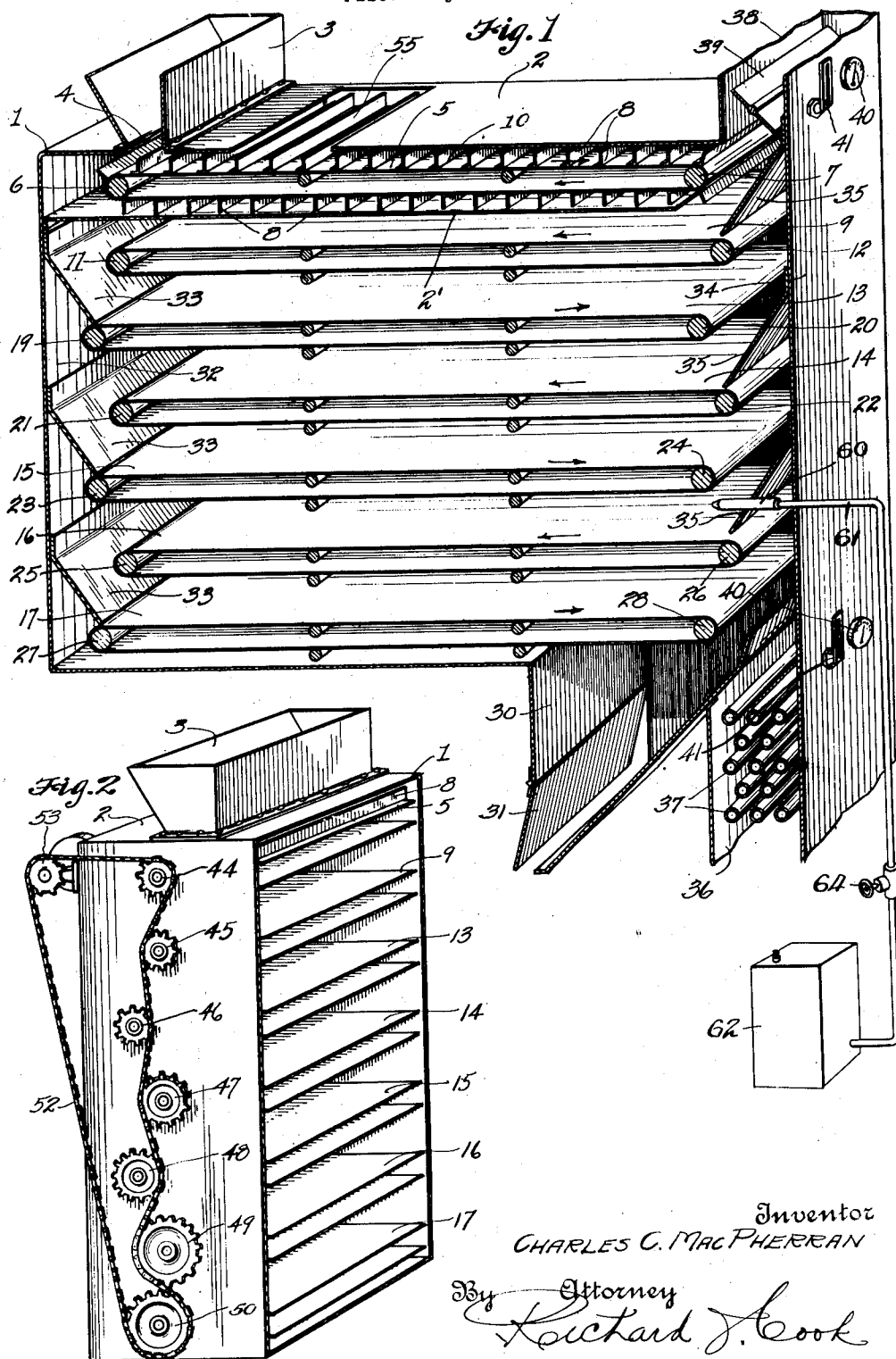
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METHOD OF AND MEANS FOR DEHYDRATING FRUITS AND VEGETABLES

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METHOD OF AND MEANS FOR DEHYDRATING FRUITS AND VEGETABLES.

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This invention relates to a method of and means for dehydrating fruits and vegetables, and has for its principal object to provide a dehydrating apparatus wherein the material may be started in an atmosphere of relatively high humidity from that moisture which has previously been extracted from material farther advanced in the process so that no injection of steam or other addition of moisture is required in the initial stages.

Another object of the invention resides in the provision of apparatus for and the method followed whereby those volatile oils and flavorings which in straight evaporation methods are lost entirely, will be retained to the greatest extent.

A still further object resides in the provision of a dehydrating machine wherein there is employed a plurality of horizontally moving belts, alternately operating in opposite directions and so arranged as to deliver material from one to the other until it has been advanced through the machine from normal temperature and high humidity through a constantly increasing temperature and lowered relative humidity to the finished stage.

Other objects reside in the details of construction of the apparatus which provides for automatic operation from start to completion and whereby handling by human hands is eliminated.

In accomplishing these and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein—

Figure 1 is a perspective view showing in longitudinal, vertical section, a dehydrating machine embodied by the present invention.

Figure 2 is a detailed perspective view showing the belt driving means and a cross sectional view of the oven.

Referring more in detail to the drawings: 1 designates, as a whole, the dehydrating oven, which preferably would be of metal construction, rectangular in form and of any desired or suitable dimensions which would provide space for the required number of conveying belts and which would permit the belts to be of considerable length.

Mounted on the top wall 2 of the oven, and near one end thereof, is a hopper 3 into which the fruit, or vegetables, to be de-

hydrated are placed and from which they are fed automatically, through an opening 4, into the oven and onto one end of a continuous conveyor belt 5. This belt is mounted to operate about rollers 6 and 7 supported at their ends from the opposite side walls of the oven and in the same horizontal plane at opposite ends of the oven, and is driven, as presently will be described, so that the upper part thereof travels beneath the hopper opening and toward the opposite end of the oven. Cleats 8 are fixed transversely on the belt at regularly spaced intervals, which automatically feed the material from the hopper into the machine and deliver it from the opposite end of the belt onto the upper portion of an oppositely moving belt 9 located at a spaced interval beneath the belt 5 and operating, at its ends, about rollers 11 and 12. A wall 2' is placed in the oven parallel with the top wall and spaced slightly therefrom, which serves as a means of supporting the lower section of belt 5, and also provides an upper warming oven 10 separate from the dehydrating oven proper.

The cleats 8 while serving as means for feeding the material into the oven are primarily for the purpose of preventing the escape of air from the oven through the feeding opening. These cleats preferably would be of a flexible character so that they will not cause mashing of the product. Another purpose of the cleats 8 is to provide means whereby the product to be dehydrated, after entering the machine, is isolated in practically air tight compartments between the cleats and may be heated as it is passed through the warming oven 10 to a proper temperature for dehydration before it enters the dehydrating atmosphere. The character of the cleats used and their position is immaterial so long as this result is accomplished, and the result may be arrived at by other means.

Supported successively, one below the other, in parallel relation as are the belts 5 and 9, and at spaced apart intervals, are belts 13, 14, 15, 16 and 17 which, in the order named, operate at their opposite ends about rollers 19 and 20, 21 and 22, 23 and 24, 25 and 26, and 27 and 28, which are driven in such manner that alternate belts operate in opposite directions.

It is to be noted also that the ends of the belts are so arranged in offset relation that

each will receive thereon the material delivered from the end of the next higher belt and the belts are so operated that they will advance this material to their opposite ends and there deliver it onto the next lower belt. In this way the material is carried back and forth along the air passages provided between the belts from the top of the oven to the base thereof, where it is finally delivered from the belt 17 into a receiving hopper 30 having a door 31 which normally is closed but which may be opened when it is desired to remove the material from the machine.

Secured to the end wall 32 of the oven, that being the wall at the left as shown in Figure 1, are deflector plates 33 which close off the passage or space between the wall and ends of belts 13, 15 and 17. Likewise, secured to the opposite end walls 34 of the oven, are deflector plates 35, which close off the passage between this wall and ends of belts 9, 14 and 16. There is an air inlet pipe 36 leading into the base of the oven, in which steam, or hot water pipes, 37 are located to heat the air admitted into the oven, and the deflector plates are so arranged that the heated air is caused to circulate back and forth between the belts and in a direction opposite to their direction of movement until it finally reaches the top of the oven where it escapes through an outlet pipe 38 leading upwardly from the end of the oven opposite the end wherein the hopper 3 is located. A damper 39 is mounted in the pipe 38 and this may be rotatably adjusted to control the flow of air.

In order that the air entering the machine may be maintained at an absolutely standardized condition of both humidity and temperature, I have equipped the device with thermometers, as indicated at 40, and hydrometers as at 41, within the oven adjacent the air inlet and outlet openings. The air preferably would be drawn from an underground chamber in order to insure a uniformity of temperature and humidity and, by controlling the amount of heat generated by the steam pipes in the air inlet and, by adjustment of the damper to effect a faster or slower movement of air through the machine, the desired conditions may be maintained.

The means provided for driving the several conveyor belts consists of sprocket wheels 44, 45, 46, 47, 48, 49 and 50, which are fixed respectively on the outer ends of the supporting shafts for the rollers, 6, 11, 19, 21, 23, 25 and 27. These sprockets are made of such diameter that the three upper belts move at the same speed of about sixty feet per hour, while the next two lower belts will move at about 45 feet per hour and the two bottom belts will be advanced at about thirty feet per hour. In this way, the belts will be kept filled with material regardless

of shrinkage of the dehydrated product. A chain belt 52 operates about a motor driven sprocket wheel 53 and about the roller driving sprockets in such manner that the several belts are thereby advanced in opposite directions, as is indicated by the arrows thereon.

It is also desired that an opening, as at 55, be placed in the top wall of the oven adjacent the hopper, so that the operator may properly distribute the material over the feeding belt.

With the device so constructed and operated as described, it is apparent that the material is started in the process in an atmosphere of a relatively high humidity that is derived from that moisture which has previously been extracted from the material farther advanced in the process and that, in this way, no additional moisture is required.

It is also apparent that the condition of the air at both the inlet and outlet can be determined at all times by reading the instruments provided and that should the conditions vary from those desired, they can be made right by the variation of the amount of heat admitted or by the control of the amount of air delivered through the machine.

If the proper humidity is not possible without additional moisture being added, this can be done by spraying fruit juices into the inlet pipe 36 to be carried in with the air. In this way none of the desirable final results are lost. The means for spraying may consist of a spray nozzle 60 mounted within a wall of the oven and which is connected by means of a pipe 61 with a container 62 wherein the fruit juices may be contained under air pressure. A valve 64 may be provided in the pipe to control the flow of the juices to the nozzle and the latter may be of such character that it will spray the juices into the air passage in a very finely atomized condition.

By the use of a machine of this character a better product is insured since the fruit flavors and juices ordinarily lost by ordinary process of evaporation are retained. Having thus described my invention, what I claim as new therein and desire to secure by Letters-Patent is:

1. In a dehydrating machine, a dehydrating oven having a wall with an opening through which material may be fed into the oven and a conveyor belt operating parallel with the wall beneath the opening, and cleats fixed to the belt at closely spaced intervals for feeding material into the oven and which extend close to the said wall to prevent the escape of air from the oven by flowing between the belt and wall to the feeding opening.

2. In a dehydrating machine, a preheat-

ing oven having a top wall provided with a receiving opening, a dehydrating oven, a series of conveyors for transferring material discharged from the preheating oven
5 through the dehydrating oven, a conveyor belt operating within the preheating oven beneath said receiving opening parallel with the wall and cleats fixed transversely to said belt and extending into close relation with
10 the wall to provide separate warming compartments into which definite amounts of the material may be delivered through the receiving opening and within which it is heated to the dehydrating temperature be-

fore being delivered into the dehydrating 15 oven.

3. The process of dehydrating fruits and vegetables which consists of advancing the material to be dehydrated through an oppositely moving air current which at the
20 start is of high temperature and low humidity and at the end is of relatively low temperature and high humidity by the introduction into the air current of vaporized
25 fruit juices.

Signed at Seattle, Washington, this 19th day of July, 1922.

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