No. 674,309. Patented May 14, 1901.

J. WATERHOUSE.

DRIER.

(Application filed Oct. 12, 1900.)

(No Model.)

Fig. 1.

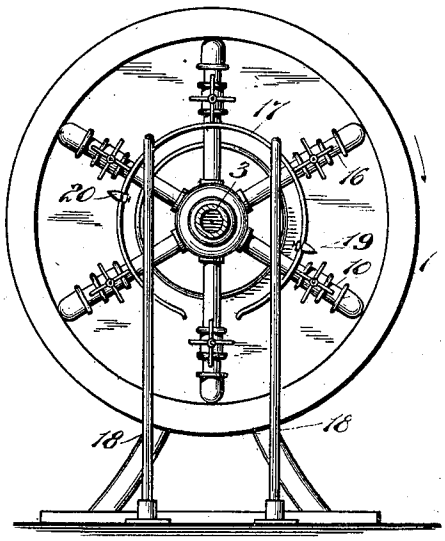


Fig. 2.

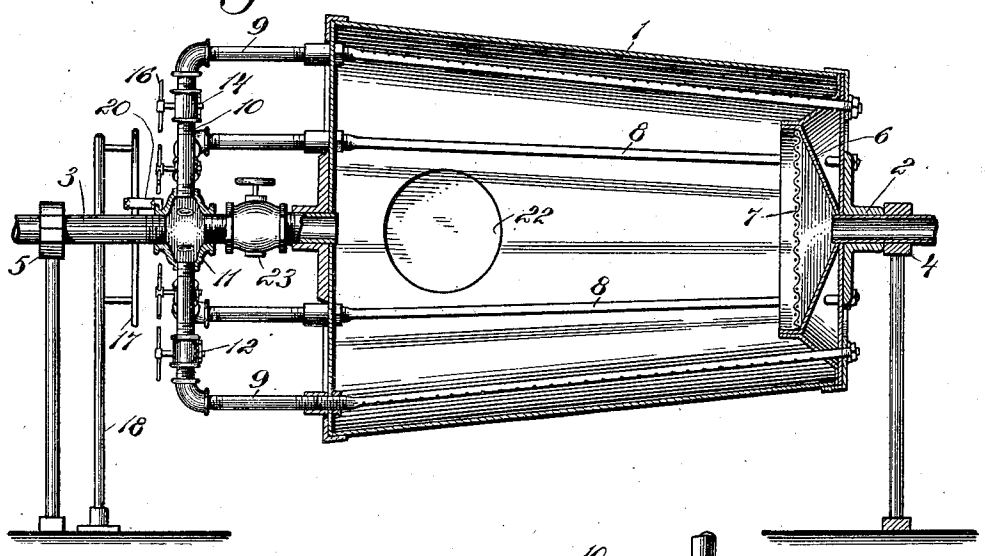


Fig. 3.

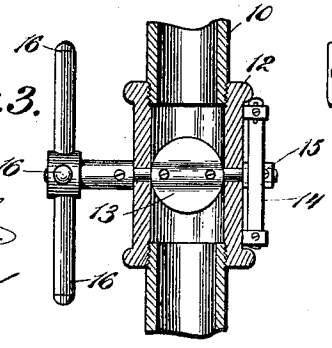
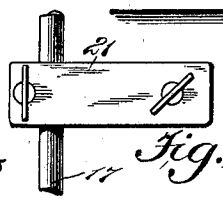


Fig. 4.



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UNITED STATES PATENT OFFICE.

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DRIER.

SPECIFICATION forming part of Letters Patent No. 674,309, dated May 14, 1901.

Application filed October 12, 1900. Serial No. 32,887. (No model.)

To all whom it may concern.

Be it known that I, JOHN WATERHOUSE, a citizen of the United States, and a resident of the city of New York, borough of Manhattan, in the county and State of New York, have invented a new and Improved Drier, of which the following is a full, clear, and exact description.

This invention relates to improvements in machines for drying fruit, meats, sand, and matter containing precious metals or gems; and the object is to provide a machine of this character that shall be very simple in its construction and with which moisture and light dust may be quickly and effectually separated from material.

I will describe a drier embodying my invention and then point out the novel features in the appended claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is an end view of a drier embodying my invention. Fig. 2 is a longitudinal section. Fig. 3 is a sectional detail showing a form of valve employed; and Fig. 4 shows a tappet-clamping device employed.

In using the machine dry air is employed for absorbing and carrying away the moisture; but it is not deemed necessary to show the air-supplying device herein, as a very effective device for this purpose is shown in my Patent No. 649,376 of May 8, 1900.

Referring to the drawings, 1 designates a tumbler, here shown as longitudinally tapered and having at its smaller end an outlet-pipe 2 for dust and moisture and an inlet-pipe 3, communicating with the tumbler through its larger end. These pipes 2 and 3 form the shafts for the tumbler, the said pipes having bearings in blocks 4 and 5. At the outlet end and communicating with the pipe 2 is a funnel 6, in which a sieve or screen material 7 is located.

Arranged longitudinally in the tumbler is a series of air-distributing pipes 8. These pipes are arranged close to the wall of the tumbler and are provided with perforations on the side nearest the wall. The several air-distributing pipes 8 communicate, by means of pipe-sections 9 and 10, with the inlet-pipe 3. As here shown, this inlet-pipe 3 has an enlarged chamber portion 11, to which the said sections 10 are attached. Arranged in each section 10 or in a casing 12, attached to said section, is a valve in the form of a damper 13. Each valve is designed to be successively opened and closed, and as a means for holding the valve in either of its adjusted positions, in such manner, however, that it may be moved at the required time, I employ a spring-plate 14, attached at its ends to lugs formed on the casing 12 and bearing between its ends on an angular portion 15, attached to the valve-shaft at one end. Attached to the valve-shaft at the opposite end are four radial arms 16, which are arranged in the form of a cross, as clearly indicated in Fig. 1. The arms are designed to be engaged for opening or closing the valves during the rotary motion of the tumbler. Of course the several valves in the pipes are arranged at equal distances apart.

A supporting-plate 17 surrounds the pipe 3 and is supported by uprights 18. Adjustably mounted on this ring-shaped plate or support 17 and at diametrically opposite sides are tappets 19 and 20. When these tappets are in operative position, they will extend outward from the support 17, as indicated in Fig. 1; but when it is not desired to operate the valves the said tappets by loosening clamping-plates 21 may be moved out of the line of movement of the arms 16.

In operation the material to be operated upon is passed through the manhole 22 into the tumbler. If the material to be dried is found to be refractory and will not dry readily with the dry air passing through the hollow shaft 3, the air may be shut off from passing through this shaft by means of a valve 23 and may be made to pass through in one or all of the branch pipes 8 by turning the cross-arms 16 by hand to open or close the several valves 13, as the case may require. In order to know when the valves are open or closed, the two opposite arms of the cross parallel with the valve may have distinctive marks thereon. When the air is designed to pass through all of the pipes 8, the tappets 19 and 20 will be moved out of their operating position. If it is desired to have the dry air pass into the tumbler through the perforated

pipes 8 while the latter are covered by the material to be dried, the tumbler may be revolved in either direction. Assuming that the tumbler is rotating to the right, as indicated by the arrow shown in Fig. 1, and that the surface of the material takes a slope of about forty-five degrees, the tappets 19 and 20 are arranged at about this angle on the support 17, as indicated in Fig. 1. If the tumbler is to be turned to the left instead of to the right, the tappets must be set to the same angle, but opposite that shown. Having set the tappets on the supporting-ring and having turned all the valves to the closed position above the tappets and all below open and the tumbler revolves, say, to the right, one of the arms 16 on the upper side comes in contact with the tappet 19 and sets the valve open as the material in the chamber is rolling down upon and covering the pipe controlled by this valve, thus permitting the dry air to pass into the pipe 8 and out through its small perforations, permeating the material, absorbing the moisture, and conveying it along with dust, if there be any, to the screen 7 and then away through the hollow shaft 2. The valve of this particular pipe 8 remains open as long as it is covered with the material, and when about to enter the open space above the material another arm of the cross comes in contact with the tappet 20 on the left and moves the valve to its closed position. Therefore it will be seen that the pipes 8 are consecutively opened and closed. The tappets may be set to the necessary slope of the material, well up when the tumbler is nearly full or well down when there is but little material in the tumbler. The tumbler may remain stationary and the valves of the pipes 8 covered by the material left open. The pipes 8 are made to pass entirely through the tumbler, and by removing plugs on the outer ends of the pipes they may be easily cleaned.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a drier, a rotary tumbler, a series of perforated pipes extended through said tumbler, the perforations being at one side only, and nearest the wall of the tumbler, means for supplying air to said pipes, valves in the supply-pipes, and means for alternately opening and closing said valves, substantially as specified.

2. A drier, comprising a rotary tumbler, perforated pipes extended through the same, said perforations being at the side nearest the wall of the tumbler, an air-supply pipe forming one of the trunnions or shafts of the tumbler, an outlet-pipe forming the other shaft or trunnion of the tumbler, branch pipes leading from the inlet-pipe to the perforated pipes, and valves in said branch pipes, substantially as specified.

3. A drier, comprising a tumbler, perforated distributing-pipes leading longitudinally through the tumbler and near its wall, an air-supply pipe leading into one end of said tumbler, a discharge-pipe leading from the other end of said tumbler, a valve in said supply-pipe, a series of perforated pipes arranged within the tumbler, branches or connections between said perforated pipes and the air-supply pipe, valves in said branches, crossed arms on the stem of said valves, tappets for engaging with said arms, and a fixed support on which said tappets are adjustable, substantially as specified.

4. In a drier, a rotary tumbler, perforated pipes arranged longitudinally in said tumbler, an air-supply pipe leading into the tumbler, branch connections between said air-supply pipe and the perforated pipes, valves in said branches, crossed arms on the stems of said valves, a ring-shaped plate supported on standards, and tappets adjustable on said ring-shaped plate, substantially as specified.

5. A drier, comprising a rotary tumbler, perforated pipes extended longitudinally through said tumbler and near its wall, the perforations being only at the side nearest the tumbler-wall, means for supplying air to said perforated pipes, and means for opening a lower pipe to a supply of air and for cutting off the supply of air to the perforated pipes above it, substantially as specified.

6. A drier, comprising a rotary tumbler, a series of perforated pipes extended through the tumbler, an air-supply pipe, branch connections between said air-supply pipe and the perforated pipes, valves in said branch pipes, means for opening and closing the valves alternately, and springs engaging with angular portions of the valve stems or shafts for holding the valves as adjusted, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN WATERHOUSE.

Witnesses:
JOS. O. OSGOOD,
ALFRED W. TROTTER.