T. W. W. FORREST.

APPARATUS FOR DRYING FRUIT.

APPLICATION FILED APR. 1, 1918.

1,275,547.

Patented Aug. 13, 1918.

3 SHEETS—SHEET 1.

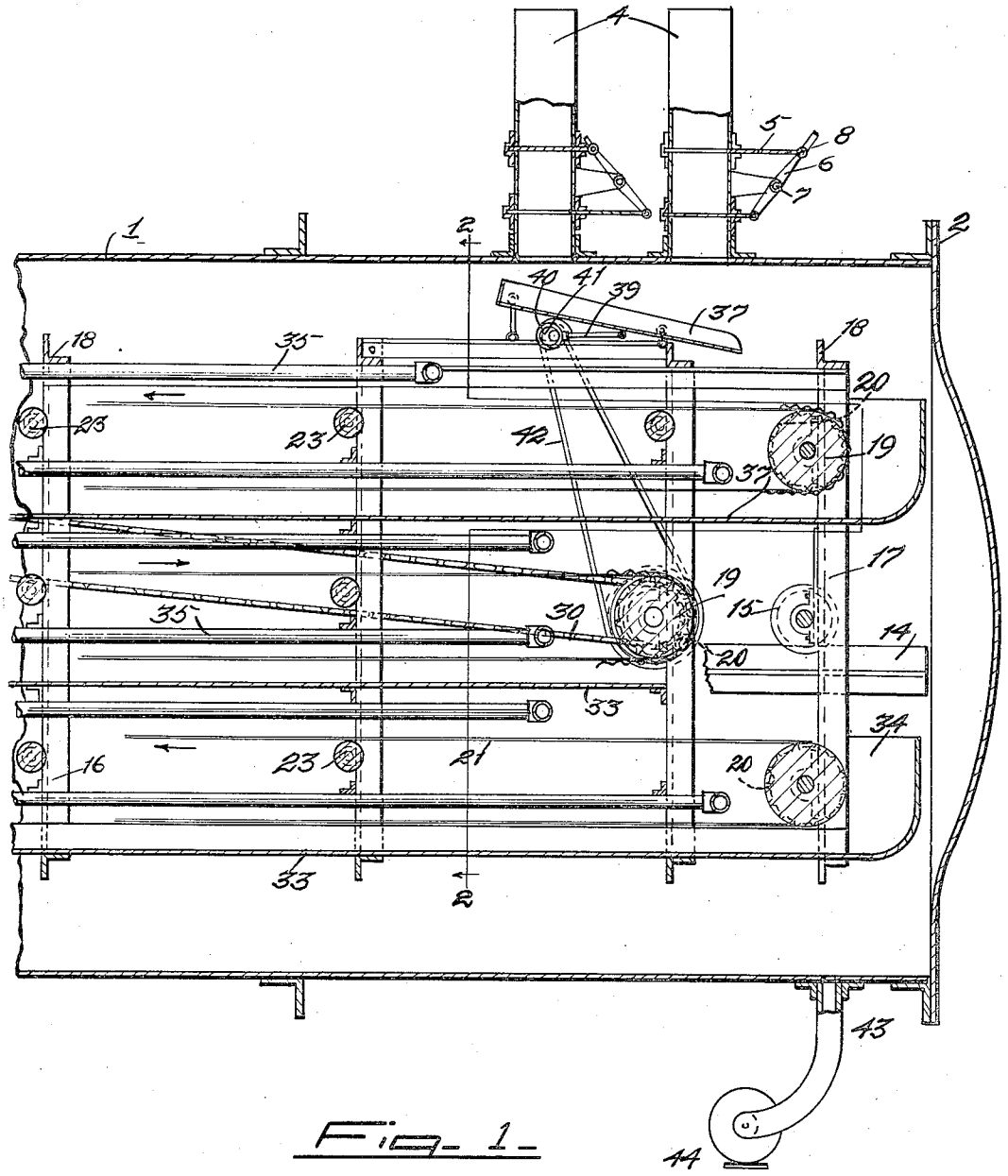


Fig. 1.

WITNESS:

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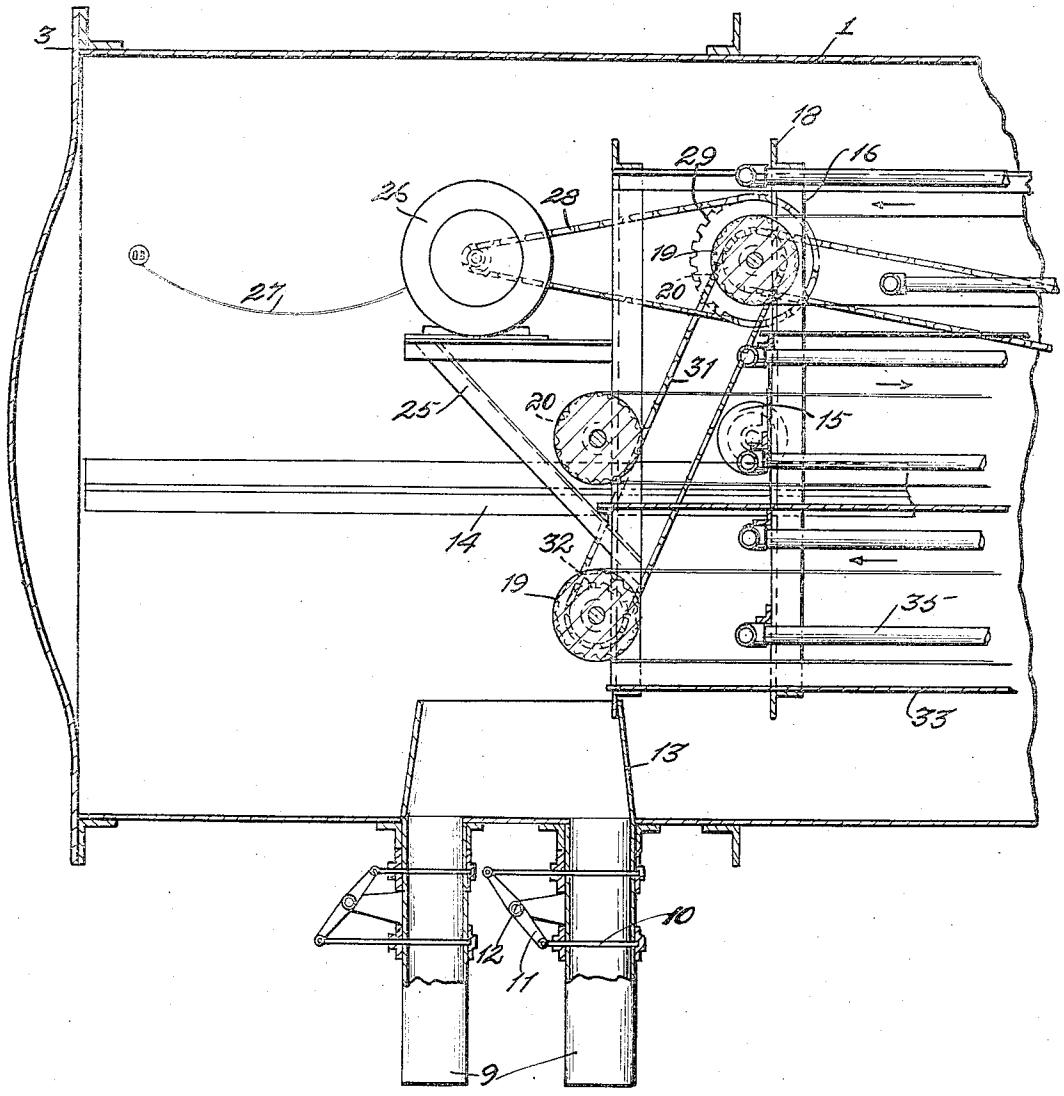
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3 SHEETS—SHEET 2.

FIG. 1.



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3 SHEETS—SHEET 3.

Fig. 5.

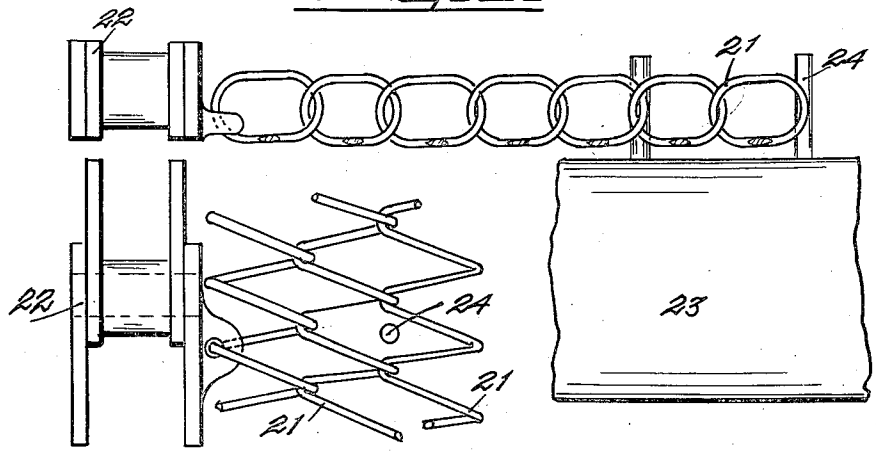
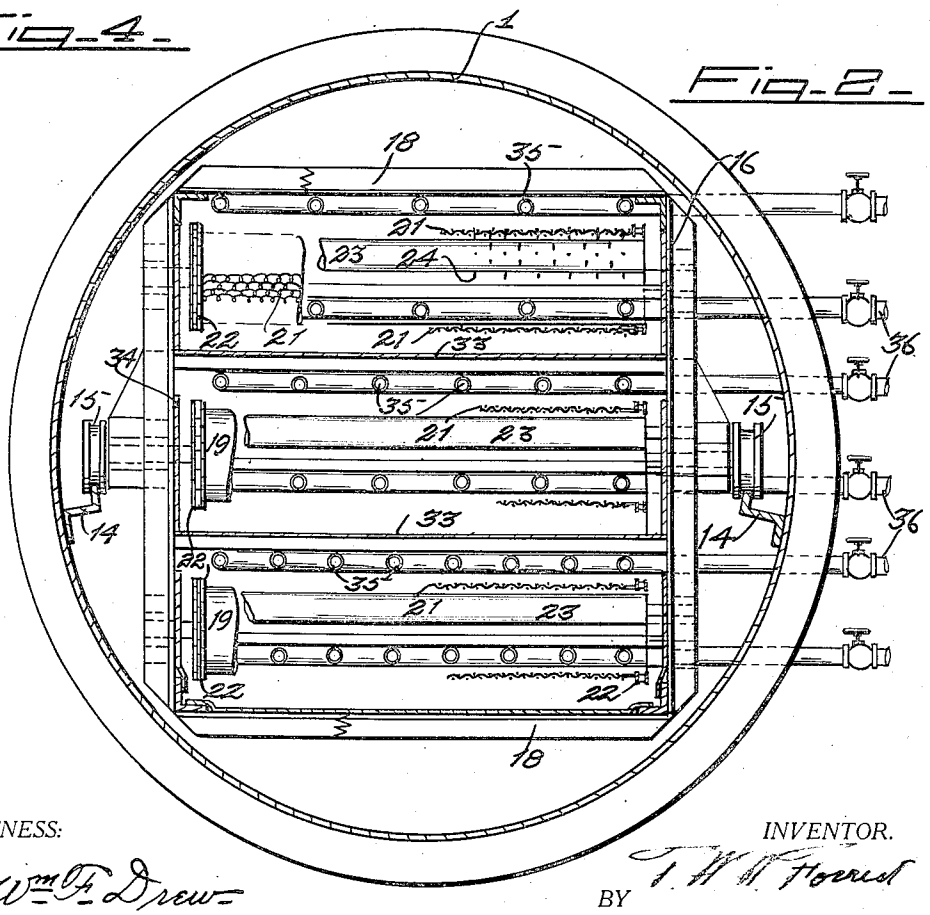


Fig. 4.

Fig. 2.



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UNITED STATES PATENT OFFICE.

THOMAS W. W. FORREST, OF OAKLAND, CALIFORNIA.

APPARATUS FOR DRYING FRUIT.

1,275,547. Specification of Letters Patent. Patented Aug. 13, 1918.

Application filed April 1, 1918. Serial No. 225,879.

To all whom it may concern:

Be it known that I, THOMAS W. W. FORREST, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented certain new and useful Improvements in Apparatus for Drying Fruit, of which the following is a specification.

The present invention relates to a continuous automatic apparatus for drying of material, particularly fruits. The one illustrated is adapted more particularly for the drying of raisins prior to the seeding of the same.

The principal object of the invention is to provide a drier of the closed type having valve controlled inlet and discharge openings, and provided with means for maintaining a vacuum therein, whereby the material as conveyed from the feed to the discharge opening is subjected to a high degree of heat under vacuum, whereby the moisture therein is more readily evaporated than by the use of the apparatuses for this purpose now in universal use.

With the above mentioned and other objects in view, the invention consists in the novel construction and combination of parts hereinafter described, illustrated in the accompanying drawings and pointed out in the claims hereto appended; it being understood that various changes in the form, proportion, size and minor details of construction within the scope of the claims may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

To more fully comprehend the invention, reference should be had to the accompanying sheets of drawings, wherein—

Figures 1 and 1[A] disclose a longitudinal sectional view of the preferred embodiment of my invention.

Fig. 2 is a cross sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is a transverse sectional view of a portion of the preferred form of conveyer belt, illustrating the agitator and supporting rolls coöperating therewith.

Fig. 4 is a view in plan of a portion of the conveyer belt.

Referring more particularly to the several views of the drawings, wherein like characters of reference, designate corresponding parts, 1 indicates a cylindrical shell or housing closed at its ends by the end plates 2 and 3, the end plate 3 being preferably removable to admit access to be had to the interior of the cylindrical shell or housing. The shell or housing is provided at one end with the feed pipes 4 which communicate with the interior thereof and said feed pipes are controlled by the slide gates 5 alternately operated by the lever 6 fulcrumed to a support as at 7, and connected as at 8 to the ends of said gates, this construction permitting the admittance of intermittent charges of material through the feed pipes into the interior of the shell or housing.

A like construction is provided at the opposite end of the shell or housing and constitutes a discharge for the dried material, the same consisting of a pair of outlet pipes 9 extending from the interior of the shell or housing and the discharge of material therefrom being controlled by the slidable gates 10 alternately operated by a lever 11 fulcrumed as at 12 to a support. A conical discharge hopper 13 extends upwardly within the shell or housing and surrounds the upper ends of the discharge pipes 9, thereby preventing the clogging of the dried material at the point of inlet of said discharge pipes.

The shell or housing 1 is formed at opposite sides of its interior surface with longitudinally disposed supporting rails 14 on which rest the wheels 15 carried by a suitable frame 16 substantially rectangular in cross section, said frame being insertible into the shell or housing through the end closed by the end plate 3.

The frame 16 is adapted to support the conveyer mechanism, the heating coils, the baffle plates and the operating devices for the conveyers, and is formed with the vertical members 17 connected by the horizontal connecting members 18, and certain of said members 17 adjacent the ends of said frame support, the rotatable rolls 19 having at opposite ends sprockets 20 and around said rolls 19 extend the endless conveyer 21, preferably of open mesh material formed by interlaced coils, as illustrated in Figs. 3 and 4 of the drawings.

Connected to the opposite edge of the conveyer are the supporting chains 22 of the link type, which pass over the sprockets

20. The conveyers are preferably, as illustrated in the drawings, three in number, and the upper flight of the respective conveyers are supported intermediate the rolls 19 by the agitating and supporting rolls 23 carrying on their surface radially disposed pins 24 which are adapted to project upwardly through the mesh of the conveyer and agitate the material received on the upper surface thereof. Said conveyers are adapted to operate in opposite directions and the material received on the uppermost conveyer is adapted for delivery to the uppermost surface of the conveyer immediately below the same, which in turn deposits the material on the lowermost conveyer, which in turn discharges the material into the hopper 13, and to accomplish this result, the receiving end of the intermediate conveyer projects beyond the discharge end of the uppermost conveyer, and the receiving end of the lowermost conveyer projects beyond the discharge end of the intermediate conveyer.

A frame 25 is carried at one end of the frame 16, and said frame supports an electrical motor 26 adapted to be operated through a plug connection 27 extending to a point exteriorly of the shell or housing 1, and from the drive shaft of said motor extends a chain 28 operating a sprocket 29 carried by one of the rolls 19 of the uppermost conveyer, driving said conveyer in the direction of the arrow—Fig. 1 of the drawings. From a sprocket on said driven roll 19 extends a flexible driving connection 30 connecting with one of the supporting rolls 19 of the intermediate conveyer to operate said conveyer in the direction of the arrow—as in Fig. 1 of the drawings, and from said driven roll 19 there is also extended a flexible driving connection 31 passing over a sprocket 32 on one of the supporting rolls 19 of the lowermost conveyer, driving the same in the direction of the arrow—Fig. 1 of the drawings.

The conveyers are separated by the longitudinally disposed baffle plates 33 extending approximately the full length of the frame 16, and the side walls of said conveyers intermediate said baffles are preferably inclosed by the members or plates 34. Thus it will be apparent that each conveyer of the series is inclosed in a housing opening at its opposite ends and extending for approximately the full length of the respective conveyers. Positioned within said housings, at a point above and below the upper flight of each conveyer, are the heating coils 35, each supplied with a heating medium, preferably steam, through a valve controlled pipe 36 extending exteriorly of the shell or housing 1, the pipes 36 being connected to their respective coils by any of the well known connections permitting a separation of the coils and pipes by the movement of the coils from the same. Thus the material as conveyed in successive different horizontal planes longitudinally of the conveyer is subjected to heat for the evaporation of the moisture therein.

Carried by the frame 16 immediately below the feed pipes 4 is a downwardly inclined shaking table 37 supported by links 38 and operated in any suitable manner by an arm 39 connected at one end to the table and at its opposite end to a ring 40 carried by a cam 41 which is rotated through a connection 42 driven from the driving roll 19 of the intermediate conveyer. Thus it will be apparent that the material intermittently fed into the shell or housing 1 through the feed pipes 4 will be received on the table 37 and be gradually deposited on the upper flight of the uppermost conveyer 21.

Communicating with the interior of the shell or housing 1, preferably at the base thereof, is a pipe 43, connected with a suitable pump or other means 44 of sufficient capacity to create a vacuum within said shell or housing 1, and to withdraw from the interior thereof during the creation of said vacuum, the moisture evaporated from the material during the drying thereof.

The device operates in the following manner. The material intermittently fed into the shell or housing 1 through the feed pipes 4 is received on the shaking table 37 and is deposited by the movement thereof in a thin layer on the upper surface of the upper flight of the upper conveyer, and due to the movement of the conveyer, is carried through the housing surrounding the same and between the heating coils 35 therein, said material being agitated during its travel by the pins 24 projecting upwardly through said open mesh conveyer and is discharged from the discharge end of said upper conveyer onto the receiving end of the intermediate conveyer, which carries it through said chamber surrounding said intermediate conveyer and deposits the same onto the receiving end of the lowermost conveyer, which, in turn, discharges it into the hopper 13 from which it is released in intermittent charges through the discharge pipe 9 by the operation of the slidable gates 10.

By the application of heat to the conveyed material while the same is maintained in agitation and in vacuum, the moisture contained within the material is rapidly evaporated therefrom, thereby enabling the material to be quickly dried and providing an apparatus of comparatively small dimensions which is capable of treating a comparatively large quantity of material within a short period. The member 44 for creating a vacuum within the shell or housing 1

is of such capacity as to overcome the air leakage admitted through the feeding and discharge of the material thereto, whereby the vacuum is maintained at an even pressure within said shell or housing.

It will be apparent that I have provided an apparatus wherein the conveyers, heating coils and conveyer operating mechanism is capable of withdrawal from or insertion into the shell or housing as a unit, as said elements are all carried by the frame 16 which is supported on the track 14 and is capable of removal through the end of the shell or housing, closed by the removable end plate 3.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent is:—

1. A drier comprising a closed shell provided with valve controlled material feed and outlet passages, means for maintaining a vacuum within said shell, a longitudinally disposed conveyer for receiving the material to be treated and for conveying the same therein from the feed to the outlet passage, means for agitating the material as transported on said conveyer, baffle plates providing a chamber through which said conveyer passes, and heating members within said chamber for heating the material to dry the same as transported in said conveyer under vacuum.

2. A drier comprising a closed shell provided with valve controlled material feed and discharge passages, means for maintaining a vacuum within said shell, an endless conveyer within said shell, baffle plates within said shell providing an open ended chamber therein through which said conveyer passes, and heating members within said chamber above and below the said conveyer for heating the material to drive the moisture therefrom as conveyed under vacuum.

3. A drier comprising a closed shell provided with valve controlled material feed and discharge passages, means for maintaining a vacuum within said shell, a plurality of open mesh superimposed endless flexible conveyers within said shell extending longitudinally thereof, means for feeding the material to be treated to the uppermost conveyer, means for operating succeeding conveyers in opposite directions whereby the material supplied to the uppermost conveyer is deposited by the movement thereof onto the conveyer immediately below the same, baffle plates providing an open ended chamber surrounding each of said conveyers, and heating members within said chambers for heating the material to drive the moisture therefrom as conveyed under vacuum.

4. A drier comprising a closed shell provided with valve controlled material feed and discharge passages, means for maintaining a vacuum within said shell, a plurality of open mesh superimposed endless flexible conveyers within said shell extending longitudinally thereof, means for supporting the conveyers intermediate the ends thereof, devices carried by said supporting means for projecting through the conveyers to maintain the material thereon in agitation during the conveying thereof, means for feeding the material to be treated to the uppermost conveyer, means for operating succeeding conveyers in opposite directions whereby the material supplied to the uppermost conveyer is deposited by the movement thereof onto the conveyer immediately below the same, baffle plates providing an open ended chamber surrounding each of said conveyers, and heating members within said chambers for heating the material to drive the moisture therefrom as maintained under agitation and conveyed under vacuum.

5. A drier comprising a closed shell provided with valve controlled material feed and discharge passages, means connected with said shell for maintaining a vacuum therein, a frame removably positioned within said shell, an endless conveyer of flexible open mesh material carried by said frame and onto which the material as fed into said shell is deposited, means carried by said frame for operating said conveyer, baffles carried by said frame and providing an open ended chamber through which said conveyer operates, heating members within said chamber for heating the material as conveyed therethrough under vacuum, said frame being capable of removal from within said shell.

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

THOMAS W. W. FORREST.

Witnesses:

HARRY A. TOTTEN,

D. B. RICHARDS.