June 16, 1925. 1,542,616

C. A. GREEN

DEHYDRATOR

Filed Aug. 26, 1922 2 Sheets-Sheet 1

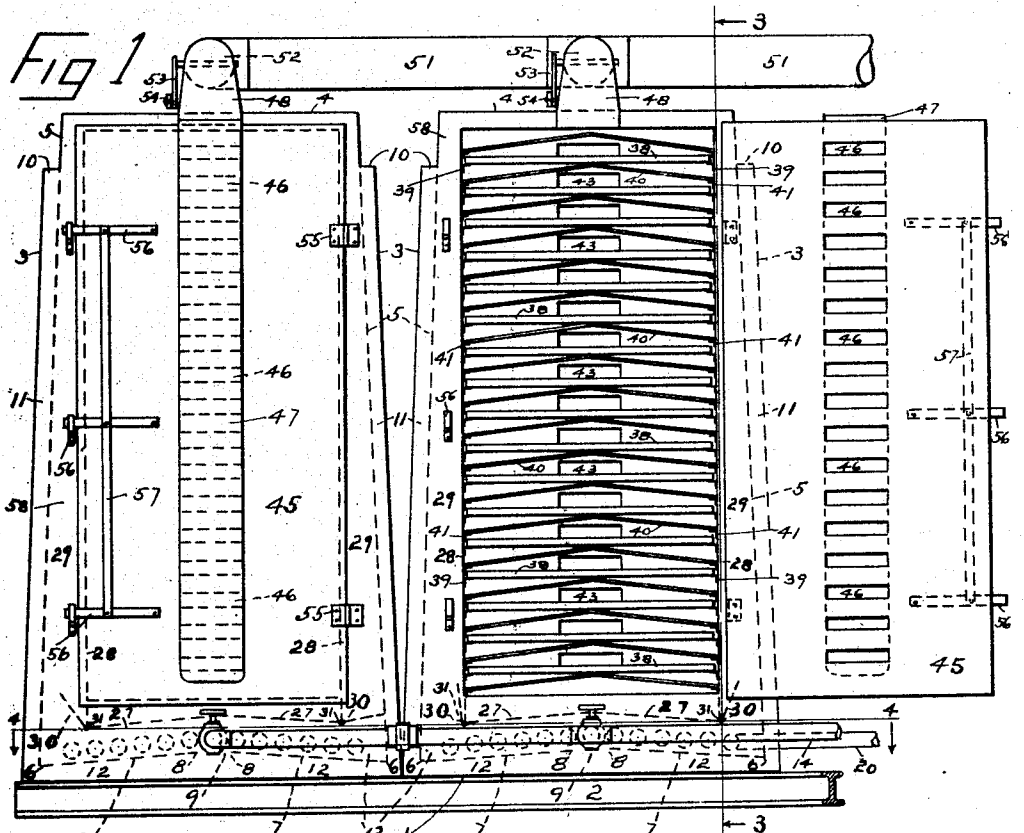


FIG 1

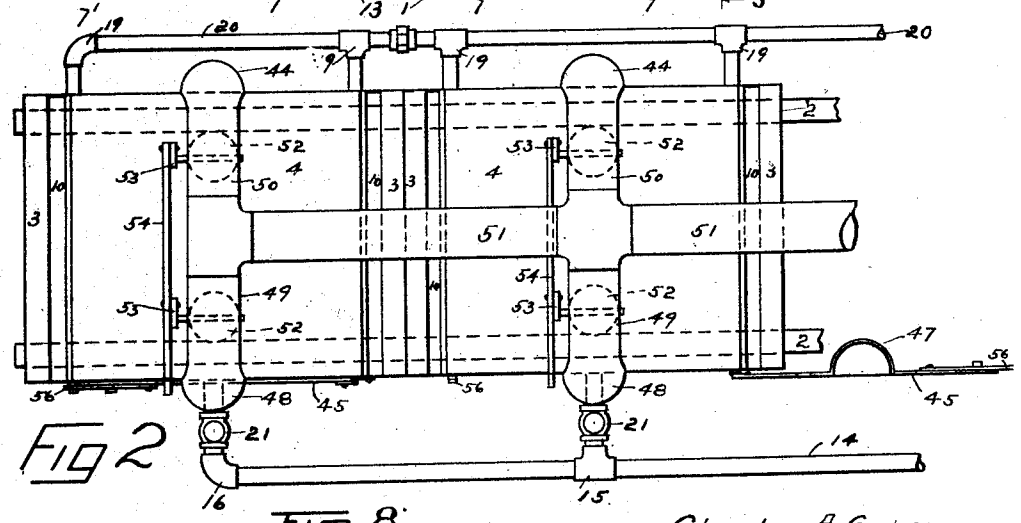
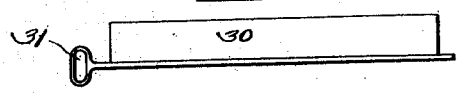


FIG 2

FIG. 8.



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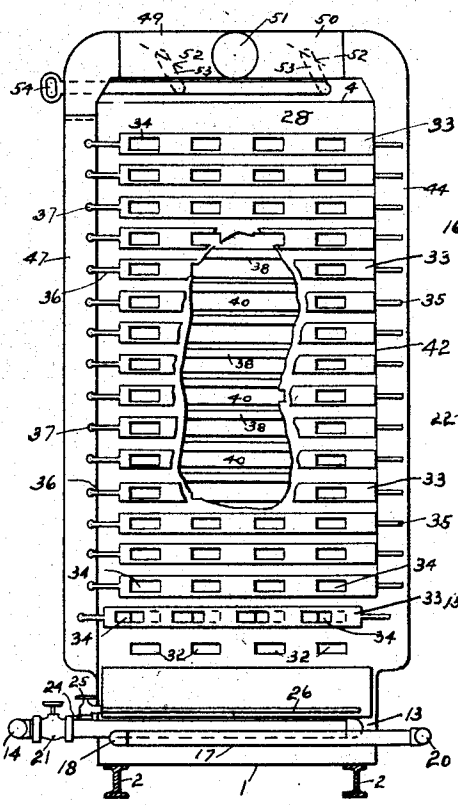


Fig 3

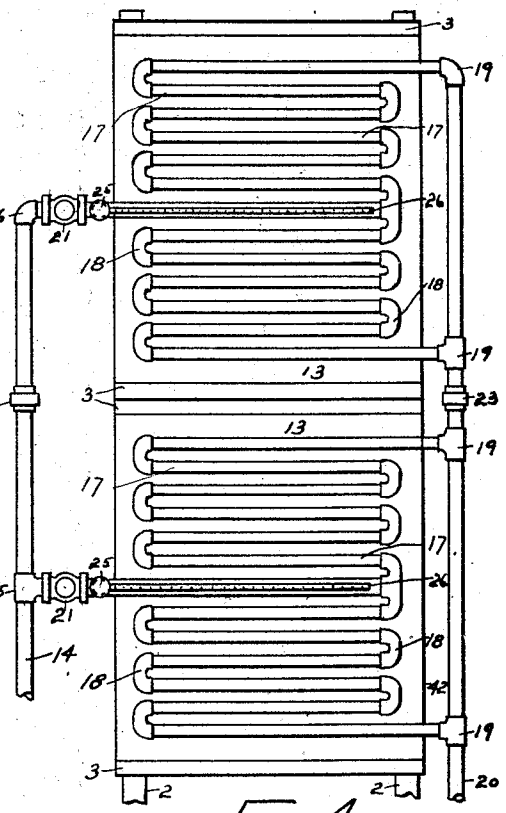


Fig 4

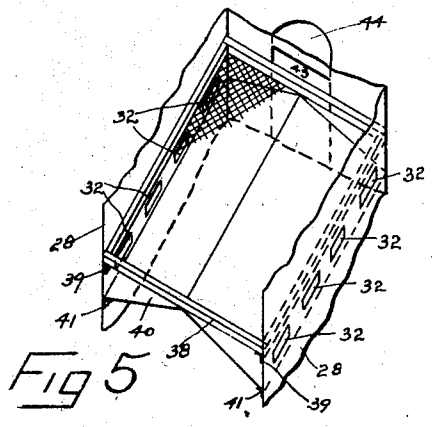


Fig 5

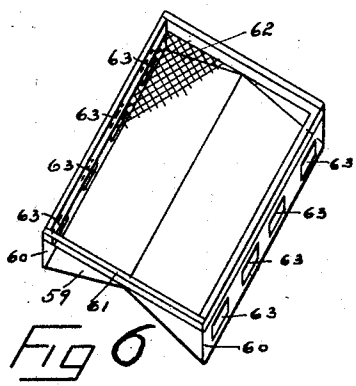


Fig 6

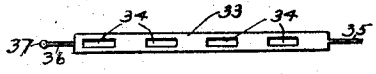


Fig 7

Charles A. Green,
Inventor,
by Hamilton J. Schmidt
his Attorney.

Patented June 16, 1925. 1,542,616

UNITED STATES PATENT OFFICE.

CHARLES A. GREEN, OF WHITEHOUSE, FLORIDA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO FLORIDA DEHYDRATING AND PRESERVING CO., OF JACKSONVILLE, FLORIDA, A CORPORATION OF FLORIDA.

DEHYDRATOR.

Application filed August 26, 1922. Serial No. 584,456.

To all whom it may concern:

Be it known that I, CHARLES A. GREEN, a citizen of the United States, residing at Whitehouse, in the county of Duval and State of Florida, have invented certain new and useful Improvements in Dehydrators, of which the following is a specification.

My invention relates to an apparatus for dehydrating food-stuffs and other commodities by means of heated air.

The main and particular objects and advantages of my invention are, to provide a dehydrator consisting of interchangeable units, which may be assembled in any number, so as to increase or decrease its capacity, and to so construct these units that the dehydator may be used either as a portable or stationary apparatus.

A further object is to provide a dehydrator which will be economic in operation, comparatively simple and inexpensive in construction, easy to erect and assemble, and having ready and efficient control of the circulation of the heated air, as well as perfect distribution of same. A still further object is to provide a dehydrator in which the heated air only comes in contact with the material being dehydrated once, thus making it possible to dehydrate various materials in the same unit without contaminating these materials with the odors or flavors of one another.

These and other objects and advantages will be clearly understood from the following specification and from the accompanying drawing of a preferred embodiment of my invention, but it will be understood that various modifications might be made without departing from the scope of the invention.

Fig. 1 is a front elevation, showing two units of the dehydrator connected together. One unit is shown with the door closed and the other unit with the door open, so as to expose the dehydrating chamber.

Fig. 2 is a plan view of Fig. 1.

Fig. 3 is a sectional side elevation of one unit as indicated by line 3—3 on Fig. 1. A part of the side baffle plate broken away to show the trays and tray baffle plates.

Fig. 4 is a sectional plan view of two units, as indicated by line 4—4 on Fig. 1, and shows the arrangement of the steam coils which heat the air before it enters the dehydrating chamber.

Fig. 5 is a perspective view of a tray and a tray baffle plate on their respective supports and also shows the air vent in the back plate. The door has been omitted.

Fig. 6 is a modification of the tray and tray baffle plate shown in Fig. 5.

Fig. 7 is a side elevation of a side baffle plate shutter.

Fig. 8 is a detail view of the damper.

In a general way the dehydrator may be said to consist of an outer metal cabinet having a door in front and air passages on its outer sides extending nearly to the top. Near the bottom of the cabinet a steam heating coil is placed which causes the air entering through the side air passages to become heated. This heated air is then passed up through inner air passages and by means of baffle plates distributed through the trays, placed in an inner or dehydrating chamber. After the air has passed through the trays it is drawn out through openings formed in the door and back plate of the apparatus. These openings communicate with flue pipes placed vertically on the door and back plate, respectively, and these flues are, by means of suitable pipes and pipe fittings connected with an air exhaust fan, which keeps the air circulation constant. Any number of units may be connected together using steam from the same boiler and having their air circulation supplied by one fan.

The apparatus will now be explained in detail; similar parts of the two units are indicated by similar numerals.

Referring first to Figs. 1 and 2, the dehydrator consists of a base plate 1, which in this case rests on two iron beams 2; these beams extend the full length of all the units assembled together. Upon the base 1 the outer side walls 3 are erected, these walls do not extend clear to the top, but terminate a short distance below the top. Extending downwardly from the top plate 4 are two inner side plates 5, these plates do not extend to the bottom but terminate at the points 6. Inner bottom plates 7 are jointed to the inner side plates 5 at the points 6 and extend, slightly curved, toward the points 8 where they terminate, thus forming an

elongated opening 9. It is through this opening that the air enters the heating chamber.

The outer side plates 3, the inner side plates 5, as well as the inner bottom plates 7 extend the whole depth of the apparatus. Where the outer side plates 3 terminate at the top openings 10 are formed, these openings also extend the whole depth of the apparatus. Between the outer side plates 3 and the inner side plates 5 air passages 11 are formed. In like manner air passages 12 are formed between the base plate 1 and the inner bottom plates 7. Thus the outside air is free to pass through openings 10, air passages 11 and 12, and opening 9 into the air heating chamber 13 in which steam heating coils are placed.

By referring to Figs. 3 and 4, the steam coils and their construction will be readily understood. A steam supply pipe 14 connects with a boiler, not shown on the drawing; at regularly spaced distances this pipe is provided with pipe fittings 15 and 16 which supply steam to each separate unit. The coils, as shown, consist of pipes 17 connected at their ends with return elbows 18. The center pipe being of larger dimension than the rest on account of having to feed to the coils on either side.

The extreme outer pipes in the coils are connected by means of pipe fittings 19 to the return pipe 20; this pipe carries the condensing water and return steam back to the boiler. Each coil feed pipe is connected to the steam supply pipe by a steam valve 21. For the sake of ease in assembling, the steam pipe 14 as well as the return pipe 20 are supplied with union couplings 22 and 23. Right back of the valve 21, in the center coil pipe 17, a hole is drilled and tapped, and into this hole a short pipe 24 is screwed; the other end of pipe 24 is connected with a steam cock 25 into which is screwed a perforated pipe 26. The purpose of this cock and perforated pipe will be explained later.

Referring again to Fig. 1, the roof or top plate 27, of the air heating chamber 13, also forms the bottom plate of the inner or dehydrating compartment. This inner compartment is formed, in addition to the plate 27, by side baffle plates 28 and the top plate 4 and extends the whole depth of the apparatus. It will be seen that air passages 29 are formed between the side baffle plates 28 and the inner side plates 5, thus the air, after being heated in the air chamber 13, passes through openings at both sides of this chamber into air passages 29. These openings, which lead into the passages 29 and which extend the whole depth of the apparatus, are provided with dampers 30 for controlling the flow of air. Handles 31 for operating these dampers extend through the front of the dehydrator. One of the dampers is plainly shown in Fig. 8.

Referring now to Fig. 3, the side baffle plates and their construction will be explained. The baffle plates 28 extend clear to the top plate 4. A plurality of horizontal rows of rectangular slots or openings 32 are cut in the baffle plates, in front of these rows of slots shutters 33 are slidably mounted. These shutters are also provided with rows of slots 34, corresponding in size and location to the slots 32. By means of the shutters 33 the size of the openings 32 may be diminished or entirely closed. The shutters are also provided with guide rods 35 and 36, sliding in holes in the front and rear walls, and with knobs or handles 37.

The slots 32, as well as the construction and operation of the shutters 33, are plainly shown in the two lower rows on Fig. 3. The shutter is removed from the lower row to show the slots 32 and the shutter in the row immediately above is partly drawn forward, thus partly closing the slots 32. All the other shutters are shown open. The location of the horizontal rows of slots is such that they will be directly below the trays placed in the inner compartment. It will be noted that the air passages 29 are tapered so that they narrow down at the top. This is done to distribute the heated air evenly through the horizontal rows of slots.

Referring again to Fig. 1, in the inner compartment the removable trays 38 are placed and on these trays the material to be dehydrated is spread. The trays 38 consist of a rectangular metal or wood frame and are provided with wire mesh bottoms. The trays are supported on angle iron supports 39, riveted to the inner sides of the baffle plates 28, and are free to slide on these supports. Between each shelf and over and under the upper and lower trays, removable tray baffle plates 40 are placed. These tray baffle plates are slightly curved so as to distribute the air which flows over them evenly through the wire mesh bottoms of the trays above. These baffle plates are, like the trays, supported on angle iron supports 41 riveted to the side baffle plates and are free to move on these supports.

As the heated air passes up through the air passage 29 it flows through the slots 34 in shutters 33 and through the slots 32 in side baffle plate 28 and enters the space between the tray baffle plate 40 and the tray 38, whereupon it rises through the wire mesh in the bottoms of the trays. This flow of the heated air will be readily understood by referring to Fig. 5 in which, for convenience of explanation, the shutters 33 have been removed and only part of the wire mesh shown.

After the heated air has passed through the trays 38 it is drawn toward the front

and the rear of the compartment, the tray baffle plates above the trays preventing it from rising upwardly. The back cover 42 is provided with a number of rectangular openings 43, placed directly above each of the trays, and these openings communicate with a semicircular flue 44 which extends vertically from below the lowest opening 43 to some distance above the apparatus. This flue is rigidly attached to the back plate. The door 45 is similarly provided with openings 46 and flue 47. The flue 47 terminates a short distance above the door so that when the door is closed this flue will make an air tight joint with a continuation 48 of the flue attached on the top plate 4.

As the flue 44 and flue continuation 48 rise above the top plate, their semicircular cross section is gradually changed to circular, and these circular parts are connected by pipes 49 and 50 to a main suction pipe 51. At the end of this pipe a suction fan, not shown on the drawing, operates. Dampers 52, connected by levers 53 to an operating handle bar 54, are placed in the pipes 49 and 50. The door 45 is provided with hinges 55 and latches 56, these latches are connected with a bar 57 to facilitate their operation. A door jamb 58 covers such parts of the front of the apparatus as is not covered by the door.

In Fig. 6 a modification of the trays and tray baffle plates is shown. In this modification the baffle plate 59 has upturned side walls 60 by means of which the baffle plate is attached to the frame 61 of the tray. The bottom of the tray is covered with wire mesh 62 and openings 63, similar in size and corresponding to the location of the openings 32 in the side baffle plates 28, are cut in the side walls 60. When these trays are used the angle iron supports 39 are omitted and the trays slide on the angle iron supports 41.

The operation of the dehydrator is as follows:

The material to be dehydrated having been spread on the trays 38, these trays are inserted in their places and the door 45 is closed. The steam from the boiler enters the steam coil located in the chamber 13 through the pipe 14. When the fan, connected to the pipe 51, is started a current of air is drawn through the apparatus. Air from the outside is drawn through the openings 10 into the heating chamber, as previously explained. In the heating chamber 13 the air is heated to the required temperature; this heated air is now drawn up through the inner air passages 29 and distributed through the openings 32 between the trays 38 and their respective baffle plates 40. It will be noted that any heat which may be radiated through the side plates 5 will not be lost, but will tend to preheat the air passing down through the outer air passages 11. The air having passed through the openings 32 now rises through the wire mesh bottoms of the trays 38 and thus pass between the material placed on the trays.

The air coming in contact with the material will absorb the moisture contained therein. This moisture laden air is drawn out through the openings 43 and 46 and into the flues 44 and 47 and is finally expelled from the apparatus by the fan.

The reason for having the tray baffle plates removable is to facilitate the cleaning of these as well as of the whole apparatus. The modified trays 61, with baffle plates 59 attached, are used for such materials as when dehydrating have a tendency to fall through the wire mesh 62, such particles as fall through will be emptied out together with the materials on the trays, when these are raised on end.

As it is sometimes advisable to partly blanch the material, just before starting the process of dehydration, the perforated pipe 26 is provided. After the door 45 has been closed the steam cock 25 is opened and steam enters the apparatus through the perforated pipe, after a certain interval, varying with the materials treated, the fan is started and the steam drawn off together with the moisture laden air. The steam cock 25 is then closed and the process carried on as before described.

It will be understood that this apparatus may be provided with thermostatic heat controls and moisture regulating devices and that any other suitable construction of a heating coil, than the one described, might be employed.

I claim:

1. In a dehydrating apparatus; an air heating chamber, having means for heating the air passing through it; means for dividing the heated air into two currents; tapered hot air passages for evenly distributing these currents; the inner walls of said tapered hot air passages provided with horizontal rows of passages communicating with the dehydrating compartment; and said rows of passages so situated as to direct the currents directly under each tray in the dehydrating compartment.

2. In a dehydrating apparatus; an air heating chamber; means for dividing the air heated in said chamber into two currents; tapered hot air passages for evenly distributing these currents; the inner walls of said tapered hot air passages provided with horizontal rows of passages communicating with the dehydrating compartment; said rows of passages so situated as to direct the currents directly under each tray in the dehydrating compartment; and shutters for regulating the size of said passages.

3. In a dehydrating apparatus; an air

heating chamber; means for dividing the air heated in said chamber into two currents; tapered hot air passages for evenly distributing these currents; the inner walls of said tapered hot air passages provided with horizontal rows of shutter controlled passages communicating with the dehydrating compartment; and removable trays and tray baffle plates alternately placed in said dehydrating compartment and so located that the heated air will enter between the tray and the tray baffle plates.

4. In a dehydrating apparatus; an air heating chamber; tapered hot air passages on opposite sides of the apparatus; the inner walls of said tapered hot air passages provided with horizontal rows of shutter controlled passages for directing the heated air into the dehydrating compartment directly under each tray; and tray baffle plates placed between each tray directing the air towards passages placed above the trays in the door and rear wall of the dehydrating compartment.

5. In a dehydrating apparatus; an air heating chamber; tapered hot air passages on opposite sides of the apparatus; the inner walls of said tapered hot air passages provided with horizontal rows of passages communicating with the dehydrating compartment and directing the flow of air between the trays and tray baffle plates; passages formed in the front and rear of the dehydrating compartment above each tray; and vertical flues into which said air currents are discharged.

6. In a dehydrating apparatus; an air heating chamber; tapered hot air passages on opposite sides of the apparatus; the inner walls of said tapered hot air passages provided with horizontal rows of passages communicating with the dehydrating compartment and directing the flow of air between the trays and tray baffle plates; passages formed in the front and rear of the dehydrating compartment above each tray; and vertical flues connected by damper controlled pipes to an air exhaust pipe.

7. In a dehydrating apparatus, of the class described; an air heating chamber; tapered hot air passages on opposite sides of the apparatus; horizontal rows of passages formed in the inner walls of said tapered hot air passages for directing the heated air into tray baffle plates attached rigidly to trays; and said trays arranged one above another in the dehydrating compartment; the tray baffle plate above each tray directing the air towards passages in the front and rear of the said dehydrating compartment.

8. In a dehydrating apparatus; an air heating chamber; tapered hot air passages on opposite sides of the apparatus; the inner walls of said tapered hot air passages provided with horizontal rows of passages communicating with the dehydrating compartment and directing the flow of air between the trays and tray baffle plates; passages formed in the front and rear of the dehydrating compartment above each tray; vertical flues connected by damper controlled pipes to an air exhaust pipe; and one or more perforated pipes extending into the air heating chamber for moistening the heated air.

In testimony whereof, I CHARLES A. GREEN have signed my name to this specification in the presence of two subscribing witnesses, this 28th day of July 1922.

CHARLES A. GREEN.

Witnesses:
AUG. J. HOEKSTRA,
JOHN EATON.