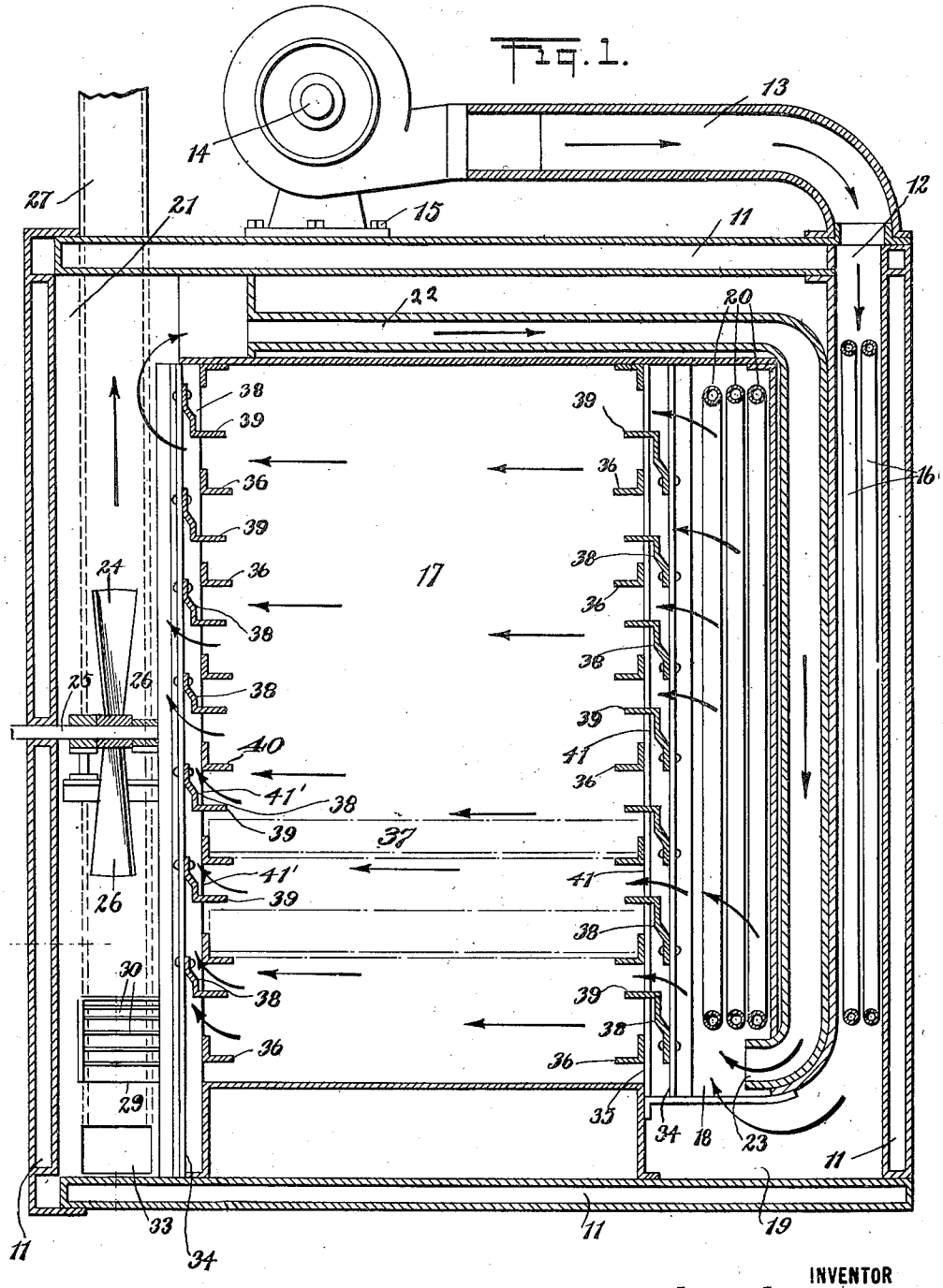
Feb. 24, 1925. 1,527,193

J. JUDELSON

PROCESS FOR DRYING MOISTURE CONTAINING MATERIALS

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Fig. 1.



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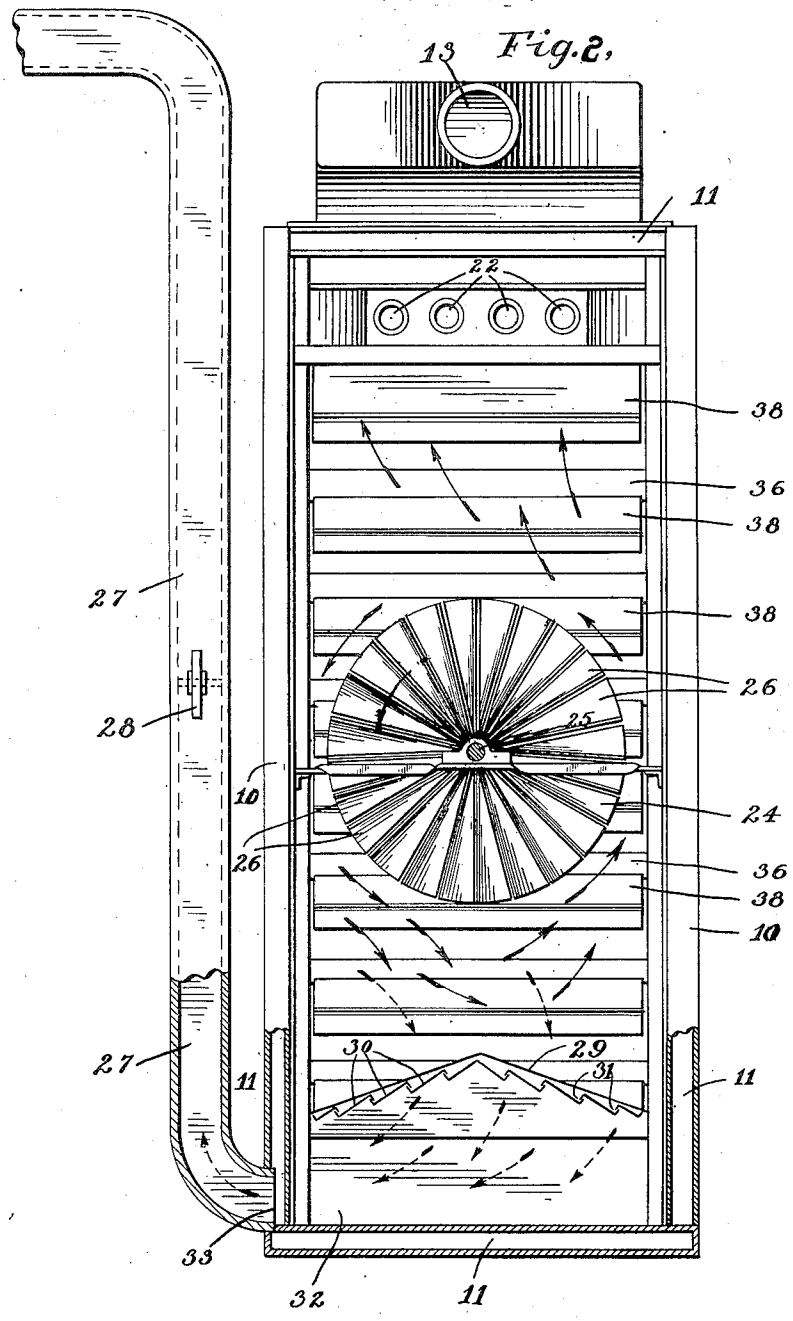
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Fig. 2.



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UNITED STATES PATENT OFFICE.

JULIUS JUDELSON, OF NEW YORK, N. Y., ASSIGNOR TO JUDELSON EVAPO-DRYER CORPORATION, A CORPORATION OF NEW YORK.

PROCESS FOR DRYING MOISTURE-CONTAINING MATERIALS.

Application filed January 7, 1921. Serial No. 435,709.

To all whom it may concern:

Be it known that JULIUS JUDELSON, a citizen of the United States and resident of the city of New York, in the county of Bronx and State of New York, has invented certain new and useful Improvements in Processes for Drying Moisture-Containing Materials, of which the following is a specification.

This invention relates to a process for drying moisture containing materials.

One object thereof is to provide a process of this character which shall be efficient in operation to a high degree.

Another object is to provide a process of the character described which shall be easy and simple to carry out and require comparatively simple and inexpensive apparatus.

Other objects of this invention will be in part obvious and in part hereinafter pointed out.

Certain features herein shown and described are shown, described and claimed in my co-pending application Serial No. 435,708 filed Jan. 7, 1921, for Dryers and accordingly are not claimed herein.

The process will be best understood by reference to the drawing in which are shown a preferred form of apparatus for carrying out the process, and in which

Fig. 1 is a longitudinal cross-sectional view of the apparatus; and

Fig. 2 is an end view of the dryer with an end wall of the casing removed and parts broken away to expose the means for exhausting and for recirculating the drying medium.

The apparatus herein described and shown forms the subject matter of my co-pending application Serial No. 435,708 filed Jan. 7, 1921 for evaporators, and is seen to comprise the casing 10 preferably of double-walled construction so as to include heat insulating air spaces 11 for preventing loss of heat from the interior of the dryer. The casing 10 is provided at one end with a passage 12 into which is supplied air or any other suitable vehicle through a conduit 13 which is suitably connected to a blower 14 of suitable type and which is secured preferably to the top of the casing as shown by means such as bolts 15. Located preferably in the passage 12 is a heating device such as the steam pipes 16 (shown diagrammatically) for preheating the air supplied to the passage to any desired temperature. On the interior of the casing and occupying substantially a greater portion of the volume thereof is the drying chamber 17, at the end of which adjacent the supply passage 12 is the passage 18 communicating at the bottom with the supply passage 12 at terminus 19. Located in this passage 18 is another heating device such as the steampipes 20 shown diagrammatically. Disposed at the other end of the chamber 17 is a passage 21 communicating at the top with a series of return flues 22 extending above the drying chamber 17 and down into the supply end of the evaporator and terminating at and communicating with the chamber 18 as shown at 23.

Located in the return passage 21 is a fan 24 suitably mounted on a shaft 25 adapted to be driven by a motor (not shown). The fan is preferably constructed so that the planes of the vanes 26 thereof do not pass through the axis of the fan shaft but are turned at various angles thereto as shown in my co-pending application above referred to. Opening from the bottom of the passage 21 is an exhaust flue 27 provided with a damper device 28. Beneath the fan 24 is provided a triangular venting device or louvers 29 comprising metal strips 30, angularly disposed adjacent each other as shown in Fig. 2, and forming the sides of the triangle and providing between their ends openings 31 through which the passage 21 communicates through the space 32 at the bottom of the passage with the opening 33 of the flue.

The drying chamber 17 is open at each end and is provided at each end with spaced supporting pieces 34, 35. To the inner support 35 are secured angle irons 36 which serve to support trays 37 on which are placed the layers of material to be dried. Secured to the outer supports 34 are bent deflecting pieces 38 having horizontal portions 39 substantially parallel to horizontal supporting flanges 40 on the angle irons 36, and forming between the horizontal portions 39 of the pieces 38 and said flanges 40, passageways 41 and 41′ oppositely disposed in each end of the drying chamber, said passageways 41 and 41′ serving to direct the drying medium across the top and bottom of the trays 37.

In carrying out my process, the heat vehicle such as air or the like medium is drawn in from the outside by means of the blower 14 and passed over the heating device such as the steam coil 16 so as to heat it to any desired temperature. As will be clear from the drawing, the drying medium is supplied through the conduit 13 and after being heated enters the chamber 17 through the delivery terminus 19 at the bottom thereof. This heated medium rises into the passage 18 and expands and diffuses into the chamber 17 through the passageways 41 as indicated by the arrows in full lines. The heat medium is drawn through the chamber in the direction of the horizontal arrows in Fig. 1 contacting with the layers of material on the trays both above and underneath the same, and abstracts some of the moisture from the wet materials as will be readily understood. The drying medium with the moisture thus evaporated therein passes through the openings 41′ into the passage 21, where it is acted upon by the fan 24, which is revolved in the direction shown by the arrow in Fig. 2. In the passage 21, the operation of the fan 24 aids in drawing the drying medium at a comparatively rapid rate through the compartment 17 and serves to force a portion of the moisture laden or used drying medium drawn into the passage 21 downward under the action or suction of the draft through the openings 31 in the vent 29 to the exhaust flue 27, the amount of drying medium thus exhausted being regulated by the damper 28. Another portion of the moist medium is forced upwardly through the return flues 22. It has been found in actual operation of dryers embodying this invention that the moisture contents in the medium being exhausted beneath the fan 24 is higher than that in the portion returned for circulating above the fan, the co-action of the various elements of the apparatus and their arrangement being effective to remove a large portion of the moisture with the exhausting medium. The fan 26 is revolved at a speed to impart to the returning drying medium sufficient pressure to recirculate the said medium against the propulsion pressure of the fresh air supply by the blower. The return medium is propelled through the flues 22 and past the reheating steam coils 20 whereby sufficient heat is supplied to the return drying medium to compensate for the reduction in temperature consequent to its first passage through the drying chamber, and contact with the moist materials. At the co-terminus 19, the return drying medium which has now been reheated mixes with the fresh supply and is again uniformly and simultaneously circulated under and above all of the trays 37. It will be noted that the fresh supply of air and the return drying medium in part again pass by the reheater 20 in rising into the passage 18. This insures a heated drying medium of definite temperature to be supplied into the drying chamber 17 and has the further advantage that the trays further removed from the bottom of the drying chamber and from the supply or delivery portion 19 will be acted upon by a drying medium of substantially the same temperature as those near the bottom of the chamber and closer to the terminus 19; for it will of course be understood that the trays in the lower portion of the chamber being close to the delivery or supply end of the heating medium receive the drying medium directly while a little time elapses before the medium has risen to the upper trays. Whatever the temperature loss in the interval may be, the loss is compensated for by the fact that the medium in rising up into the chamber 18 at the same time passes over the reheater 20. In this way, this reheater aids in maintaining a substantially constant temperature throughout the whole drying chamber.

It will thus be seen that there is provided a process in which the several objects of this invention are achieved and which is well adapted to effectively and efficiently meet the needs of practical use.

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

1. The process of evaporating moisture from materials to be dried consisting in heating a drying medium to a predetermined temperature, circulating the same into contact with the material to evaporate some of the moisture therefrom, withdrawing the moisture-laden drying medium and simultaneously exhausting a portion thereof, and recirculating another portion of the medium to contact with the material, and reheating said latter portion to compensate for the temperature loss thereof by reason of the first contact with the material.

2. The process of evaporating moisture from materials to be dried consisting in passing a drying medium into a chamber containing the material and allowing said medium to contact with the latter to evaporate some of the moisture therefrom, withdrawing the moisture containing medium from the chamber, exhausting a moisture laden portion of the medium and simultaneously returning another portion of said medium to the chamber into re-contact with the material and reheating the latter portion during the return passage thereof.

3. The process of evaporating moisture from materials to be dried consisting in placing the materials in spaced vertical layers in a drying chamber, applying a drying medium to said chamber, passing said

medium through or in contact with a heating device to heat the medium to a predetermined temperature before it enters the chamber, allowing said medium to contact with the materials in the chamber to evaporate some of the moisture therefrom, drawing the moisture containing vehicle through the chamber, exhausting a moisture laden portion of the medium, then propelling another portion of said vehicle back past the heating device and permitting the returned medium to continuously mix with a fresh medium supply and then recirculating it through the chamber together with the fresh supply.

4. The process of evaporating moisture from materials to be dried consisting in placing the materials in spaced vertical layers in a drying chamber, heating a drying medium to a predetermined temperature, supplying said medium to the chamber on the bottom thereof to allow the same to rise and diffuse into said chamber, so as to simultaneously contact with the layers of the material to evaporate some of the moisture therefrom, drawing the moisture containing medium through the chamber, exhausting the moisture laden portion of the heat vehicle, reheating the remaining portion of said drying medium and returning the latter through the chamber.

5. The process of evaporating moisture from materials to be dried consisting in placing the materials in a drying chamber, drawing through said chamber a drying medium preheated to a desired temperature, simultaneously exhausting a moisture laden portion of the medium, and returning another portion to the intake end of the chamber, reheating the latter portion during the return passage thereof, and again drawing the medium through the chamber.

6. A process of drying materials consisting in placing the material in spaced vertical layers in a compartment, passing a preconditioned drying medium across the compartment in one direction between the said layers to contact with the materials to evaporate moisture therefrom, exhausting a portion of the moisture laden medium, and simultaneously returning another portion for recirculation and preconditioning the latter portion during the return passage thereof.

Signed at New York city, in the county of New York and State of New York, this 30th day of December, A. D. 1920.

JULIUS JUDELSON.