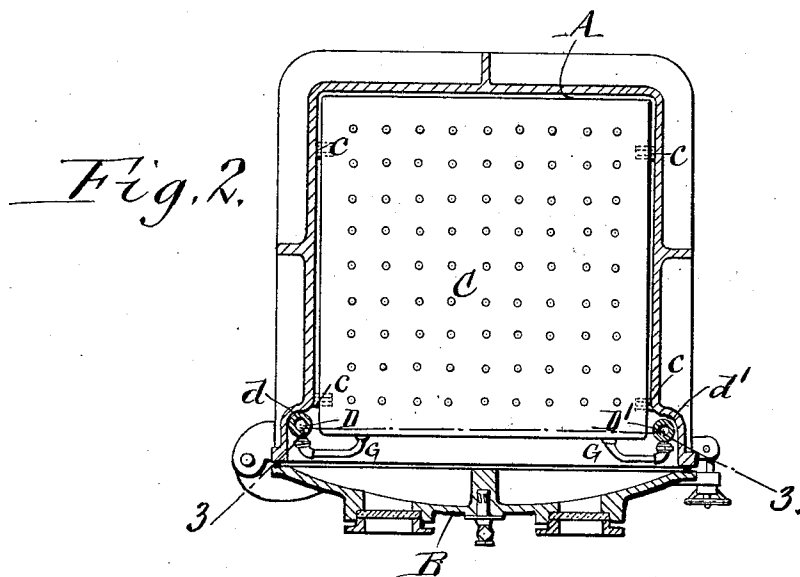
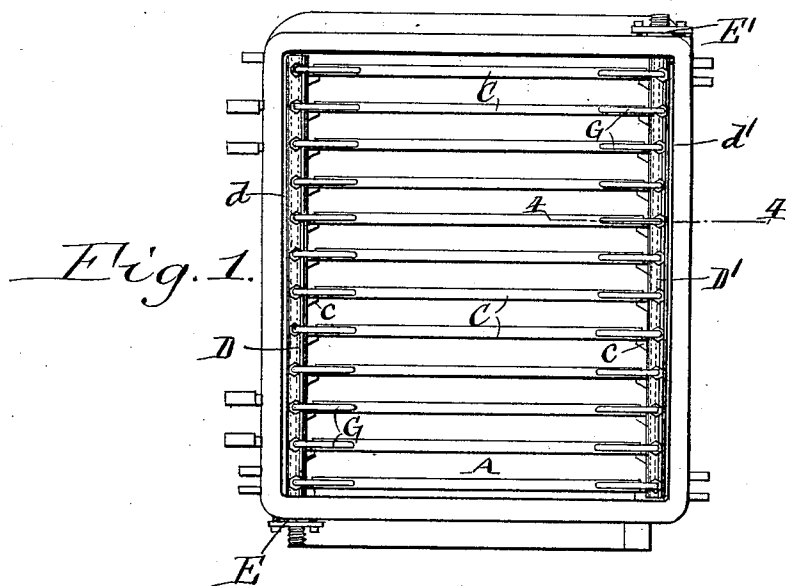


999,063.

O. S. SLEEPER.
SHELF DRIER.
APPLICATION FILED OCT. 4, 1909.

Patented July 25, 1911.

2 SHEETS—SHEET 1.



Witnesses:
John H. Shoemaker
Anna Heigis

Inventor
Oliver S. Sleeper
by Geyer & Popp
Attorneys.

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2 SHEETS—SHEET 2.

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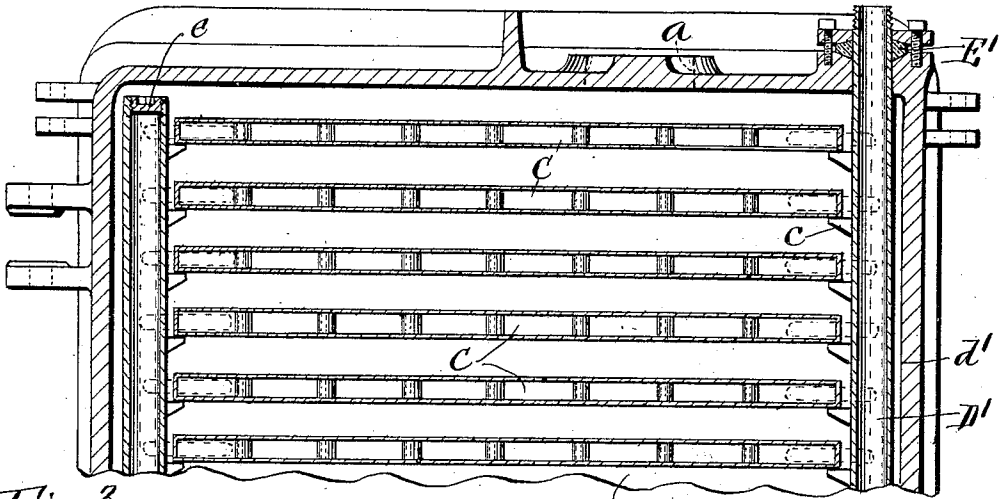


Fig. 3.

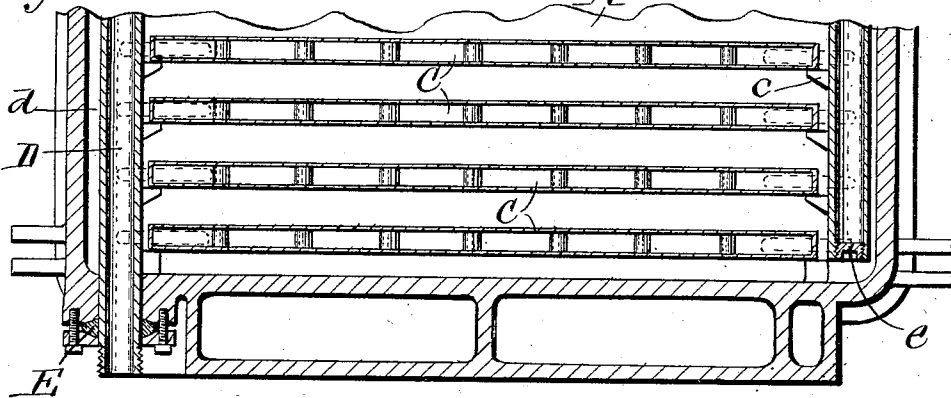
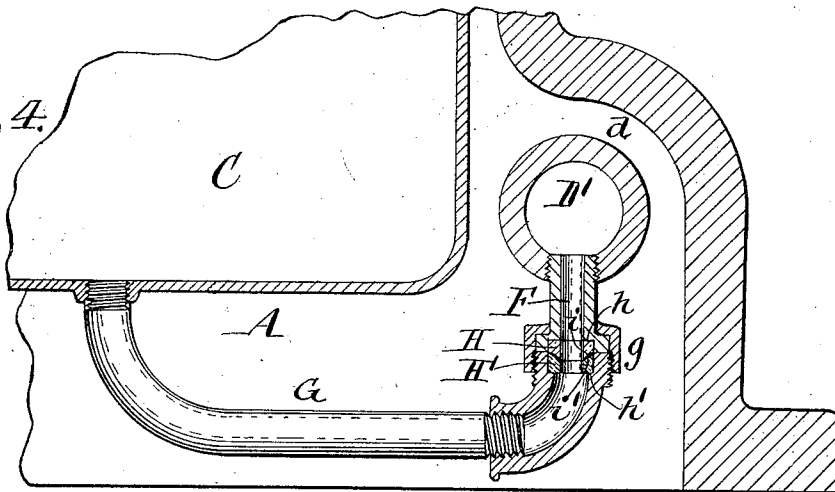


Fig. 4.



Witnesses:-

John H. Shoemaker
Anna Heigie

Twentor
Oliver S. Sleeper
by Keyer & Sopp
Attorneys.

UNITED STATES PATENT OFFICE.

OLIVER S. SLEEPER, OF BUFFALO, NEW YORK, ASSIGNOR TO BUFFALO FOUNDRY AND MACHINE COMPANY, OF BUFFALO, NEW YORK, A CORPORATION OF NEW YORK.

SHELF-DRIER.

999,063.

Specification of Letters Patent.

Patented July 25, 1911.

Application filed October 4, 1909. Serial No. 520,925.

To all whom it may concern:

Be it known that I, OLIVER S. SLEEPER, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Shelf-Driers, of which the following is a specification.

This invention relates more particularly to that class of driers in which the material to be dried is supported on a plurality of hollow horizontal shelves which are arranged in a drying chamber and into which a heating medium such as steam or hot water is admitted to facilitate the drying of said material, the drying operation being further promoted preferably by exhausting the air from the drying chamber so as to create a vacuum in the latter.

In driers of this character as heretofore constructed, the live heating medium has been supplied to and the spent heating medium has been discharged from the shelves by means of upright manifolds with which each manifold was connected at its opposite ends and each of which was mounted at its upper and lower ends on the walls of the drying chamber. This construction is objectionable because the expansion and contraction of the shelves due to changes in temperature loosens the connections between the manifolds and the shelves and causes leakage.

The object of this invention is to improve the means for supplying the shelves with the live heating agent and discharging the spent heating agent therefrom, so as to permit the shelves to expand and contract freely without liability of causing leakage.

In the accompanying drawings consisting of 2 sheets: Figure 1 is a front elevation of my improved drier with the door omitted. Fig. 2 is a horizontal section thereof. Fig. 3 is a fragmentary vertical section, on an enlarged scale, taken in line 3—3, Fig. 2. Fig. 4 is a fragmentary horizontal section, on an enlarged scale, taken in line 4—4, Fig. 1.

Similar letters of reference indicate corresponding parts throughout the several views.

A represents the drying chamber provided on its front side with an opening which preferably extends its full height and width and which is closed by a door B. The vapors are preferably withdrawn from this chamber through an outlet opening *a* in the top thereof by means of any suitable

exhausting device and thus facilitate the drying of the material within the chamber. This material is supported upon a plurality of hollow horizontal shelves C which are arranged in a vertical row or tier in the chamber and each of which rests slidingly at opposite ends of its underside on supporting lugs *c* arranged on the inner sides of the vertical walls of the chamber, so as to permit the shelves to expand and contract freely.

The above described parts may be of the usual and well known construction.

My improved means for supplying the live heating medium to the shelves and discharging the spent heating medium therefrom are preferably constructed as follows:—D, D¹ represent two upright manifolds or conduits which are preferably arranged within upright pockets or enlargements *d*, *d*¹ of the drying chamber on opposite sides of the front ends of the shelves and each of which preferably consists of a piece of round standard pipe one end of which is open while its other end is closed by a plug *e*, or otherwise. Each of these manifolds passes at its open end through a stuffing box in the adjacent wall of the chamber whereby this end of the manifold is connected with and mounted on the chamber while its other closed end is disconnected from the opposite wall of the chamber, thereby leaving the last mentioned end of the manifold free to move laterally as required. As shown in the drawings, the left hand manifold D is mounted at its lower end by means of the stuffing box E on the bottom of the drying chamber and its upper end is disconnected from the adjacent part of said chamber and the right hand manifold D¹ is mounted at its upper end by the stuffing box E¹ on the top of the drying chamber while its lower end is disconnected from the adjacent part of said chamber. Near opposite sides of its front end each of the shelves is connected respectively with the right and left hand manifold each of these connections being preferably constructed as follows: F represents a horizontal nipple which projects forwardly from the front side of the respective manifold and which is connected with said manifold by a screw joint, as shown, or in any other suitable manner. G represents a return bend or bow-shaped pipe which is arranged horizontally in front of the re-

spective shelves and connected at its inner rearwardly-turned end with the front side of the adjacent shelf by a screw joint, as shown or otherwise, and connected at its outer rearwardly-turned end with the front end of the respective nipple F by means of a union *g*, as shown in Fig. 4. The opposing outer end of the return bend pipe and the front end of the nipple are provided with annular seats *h*, *h*¹ in which bushings H, H¹ are mounted. The opposing sides of these bushings are provided with cooperating convex and concave faces *i*, *i*¹ which are ground, so that when the same are drawn against each other by means of the union *g* a perfectly tight joint is produced between the same.

When the shelves are heated by steam the same is admitted at the upper end of the right hand manifold, passes thence through the several hollow shelves and then enters the left hand manifold and discharges from the lower end of the latter. When hot water is used as the heating medium the same is admitted into the left hand manifold at the lower end thereof and passes thence through the several hollow shelves and then enters the right hand manifold and discharges at the upper end of the latter.

As the shelves expand and contract horizontally during changes in temperature, the connections between the same and the manifolds cause the latter to be deflected accordingly. The manifolds are free to follow this movement of the shelves, inasmuch as each manifold is only secured at one end and is free at its opposite end, the corresponding ends of both manifolds being one fixed and the other free. It follows from this construction, that the entire compensation for the expanding and contracting movement of the shelves at the extreme top or bottom of the row is provided by the free end of one manifold, because the corresponding end of the other manifold is fixed, but this compensation is gradually distributed between both manifolds in the same measure as the shelves are progressively nearer to the center of the manifolds, and midway of the length of the manifolds the lateral movement of the same under the thermal action of the shelves is equally effective on both manifolds. By thus permitting the manifolds to move and accommodate themselves to the changes in position of the shelves, the connections between the shelves and manifolds are not strained and the liability of leakage is avoided, thereby permitting the drier to operate more economically and with greater efficiency.

I claim as my invention:

1. A drier comprising a drying chamber, upright manifolds arranged within the

chamber and on opposite sides thereof, the manifold on one side of the chamber having its lower end mounted on the wall of the chamber and its upper end disconnected therefrom while the manifold on the other side of the chamber has its upper end mounted on the wall of the chamber and its lower end disconnected therefrom, a plurality of horizontal hollow shelves arranged in a vertical row in the chamber and connections between opposite ends of each shelf and said manifolds each connection comprising a nipple secured to one of the manifolds, a return bend pipe connected at one end with said shelf, and a union connecting the opposite end of said return bend pipe with said nipple.

2. A drier comprising a drying chamber, upright manifolds arranged within the chamber and on opposite sides thereof, the manifold on one side of the chamber having its lower end mounted on the wall of the chamber and its upper end disconnected therefrom while the manifold on the other side of the chamber has its upper end mounted on the wall of the chamber and its lower end disconnected therefrom, a plurality of horizontal hollow shelves arranged in a vertical row in the chamber and connections between opposite ends of each shelf and said manifolds, each connection comprising a nipple secured to one of the manifolds, a return bend pipe connected at one end with said shelf, a union connecting the opposite end of said return bend pipe with said nipple and two bushings arranged in the opposing ends of said nipple and return bend pipe and provided with cooperating concave and convex faces.

3. A drier comprising a drying chamber provided on one side of its top with an upper stuffing box and the opposite side of its bottom with a lower stuffing box, two upright tubular manifolds arranged on opposite sides of the drying chamber and within the same, one of said manifolds passing with its upper end through the upper stuffing box and being disconnected at its lower end from the adjacent wall of the chamber and the other manifold passing with its lower end through the lower stuffing box and being disconnected at its upper end from the adjacent wall of the chamber, and a plurality of hollow shelves arranged in a vertical row within said chamber and each connected at opposite ends with said manifolds.

Witness my hand this 30th day of September, 1909.

OLIVER S. SLEEPER.

Witnesses:

THEO. L. POPP,
ANNA HEIGIS.