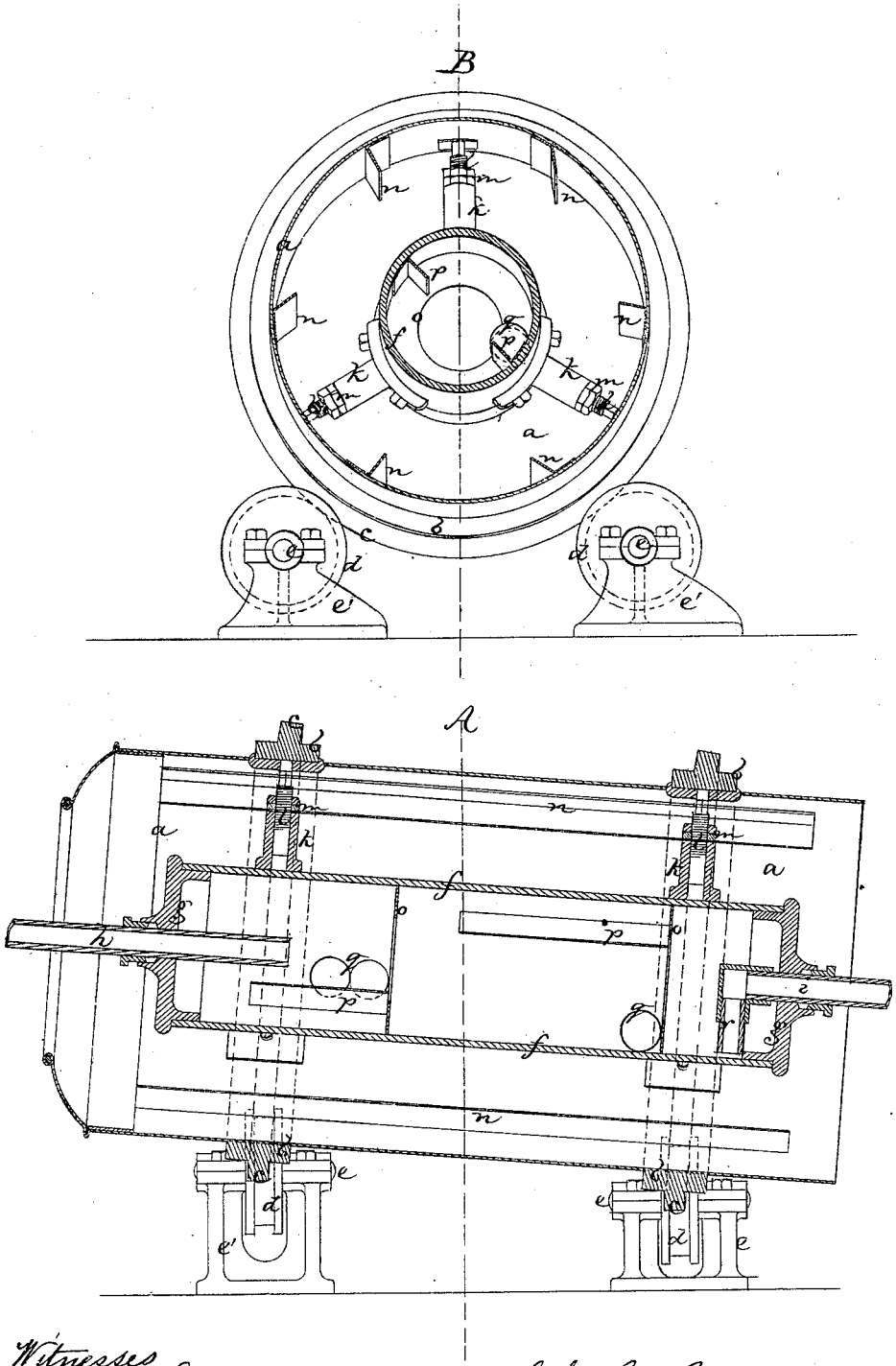
C. H. HERSEY.

DRIER.

No. 114,137. Patented Apr. 25, 1871.



Witnesses
S. W. Kidder
L. H. Latimer.

Chas. H. Hersey
by his Attys
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UNITED STATES PATENT OFFICE.

CHARLES H. HERSEY, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO HAWES & HERSEY, OF SAME PLACE.

IMPROVEMENT IN DRIERS.

Specification forming part of Letters Patent No. **114,137**, dated April 25, 1871.

To all whom it may concern:

Be it known that I, CHARLES H. HERSEY, of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improved Drying Apparatus; and I do hereby declare that the following, taken in connection with the drawing which accompanies and forms part of this specification, is a description of my invention sufficient to enable those skilled in the art to practice it.

My invention relates to the organization of a tubular rotary drying apparatus for drying sugar, salt, grain, and other fine substances.

In my construction I employ a hollow cylinder or tube, mounted in a somewhat inclined position upon friction-rollers, and so as to be capable of free rotation thereupon, this tube being the holder and conveyer, upon the inner surface of which the material is received, and through which it passes to be dried. Centrally within this tubular conveyer I place a heater-cylinder, held in position relatively and concentrically to the conveyer by suitable spokes, (which are preferably made adjustable to bring the heater to proper position relatively to the conveyer,) and having tight heads at its opposite ends, a steam-pipe connecting with one end and admitting steam from a suitable boiler into the heater-cylinder, and an outlet-pipe, permitting steam to pass from said cylinder.

Steam being supplied to the heater-cylinder, and the outer cylinder being put in rotation, the material to be dried is let into the highest and open induction end of the cylinder. Air passes freely through the cylinder, and, by contact with the heater-cylinder, such air is quickly heated thereby, and the sugar, salt, or other material has its moisture taken up by the dry and heated air passing through the cylinder and heated by contact with the heater-cylinder, while the contact of the material with the surface of the heater-cylinder warms it and assists it in giving off its moisture.

It is in a drier having a hollow and rotary conveyer cylinder or drum, with a centrally or concentrically located steam-drier cylinder, that my invention primarily consists, the combination of the rotary drum and a central and rotary steam-drier cylinder within the drum, (the two cylinders being connected and rotating as one,) the method of connecting the two cylinders, the arrangement of the take-up flanges within the drier-cylinder, the arrangement of rings and jarring-weights within the heater-cylinder, the arrangement of a pipe for expelling from the steam-cylinder the water of condensation, and the specific construction of the outer cylinder with reference to the provision for its rotation, constituting minor features of the invention.

The drawing represents, in longitudinal vertical section and in vertical cross-section, a drying apparatus embodying the invention. *a* denotes the conveyer-cylinder or open-ended drum, into which the material to be dried is fed, and through and by which it is conveyed for the drying process. Around the cylinder are encompassing-rings *b*, having peripheral treads *c*, each tread *c* being supported upon two friction wheels or rolls, *d*, turning on pins *e* mounted in stands *e'*, the stands at one end of the machine being higher than those at the opposite end, so that the drum is supported in an inclined position, as shown at A, to facilitate the progressive movement of the material through the drum. This drum is open at both ends, so that a current of air and the material to be dried can both pass freely through it, and centrally within it is placed the heater-cylinder or steam-heater *f*. The heater *f* is made with heads *g*, made steam-tight, except for entrance of a steam-pipe, *h*, into one end of the heater and for water-escape pipe *i* at the opposite end, these pipes being controlled by suitable valves and cocks. The heater-cylinder is connected with the main drum by a series of radial spokes, *k*, (each preferably made with provision for adjustment of its length by means of a screw, *l*, and nuts *m*,) to correctly locate the heater concentrically within the drum, and to tighten the parts so that there can be no relative movement.

Within the drum is a series of blades or buckets *n*, extending longitudinally through the drum, and by these buckets the material led into the induction end of the drum and falling to the bottom of the drum is taken up as they rotate, and carried around with them until each bucket reaches such position as to

cause the material to drop by gravity. To prevent the material from dropping only at one point of rotation, I apply the buckets at various angles, so that while one bucket or line of buckets causes the material to drop from it at one point, the angle of the next may cause the material to be carried a little farther on, or not quite so far on, and thus the material drops nearly all the way across the cylinder. As most of it drops it falls upon the heater-cylinder, and becomes heated and dries to some extent by such contact therewith. The heater-cylinder being kept charged with hot steam, the cylinder is heated, and the heat radiated from its outside warms the current of air passing through the drum, and this air absorbs the moisture of the material raised through it, so that the material emerges or is discharged from the eduction end of the conveyer or drum in a perfectly dry condition. As some of the material may have a tendency to adhere to the surface of the heater-cylinder, I place within said cylinder rings *o*, parallel with the heads, and between these rings are radial blades *p*; and in the spaces thus made I place heavy balls *q*, which, being taken up by the blades, drop to the bottom of the cylinder when the blades can no longer hold them, and by these falling balls the cylinder is constantly jarred, and the material is thereby dislodged from its outer surface.

I am aware that a rotary drier-drum has been made with provision for driving a current of heated air through the drum and the material to be dried, as is seen in United States Patent No. 90,549.

I am also aware that a rotary drier-drum or cylindrical chamber has been located within a stationary chambered cylinder, heated by steam or other suitable heating medium, as is seen in United States Patent No. 55,098.

My construction differs from these particularly in that I employ a rotary drum or open-ended conveyer-tube for passage of the material and the currents of air, in connection with a central and concentric heater-cylinder running through the drum, and equally heated at all points of its surface by the contact and pressure of the steam driven through it. This steam may be superheated, if desirable.

The water of condensation is expelled, by the pressure of the steam, through the pipe *i*, said pipe passing axially into the heater, and then bending and extending to the bottom of the heater, the cylinder rotating upon the axial portion of the pipe, so that the vertical leg *r* remains stationary. This pipe is connected with a steam-trap that prevents escape of steam from the heater.

At the induction end of the cylinder there may be a chute or hopper for guiding the material into the heater, and at the opposite end a suitable spout for conducting off the dried material.

I claim—

1. A rotary drier-drum open at its opposite ends, and having located centrally within it a steam-heated cylinder for heating the currents of air passing through the drum and the material falling upon the heater.

2. The rotary drum *a* and heater-cylinder *f*, connected together and held in relative position by the spokes *k*, substantially as shown and described.

3. The adjustable spokes *k*, in combination with the rotary drum and heater-cylinder.

4. The variously-inclined buckets *n*, in combination with the rotary drum and cylinder.

5. The pipe for freeing the heater-cylinder from the water of condensation, substantially as shown and described.

6. The rings *o* and flanges *p*, in combination with the heater-cylinder, and for raising the balls and letting them drop, substantially as described.

Executed March 11, 1871.

CHAS. H. HERSEY.

Witnesses:

M. W. FROTHINGHAM,

FRANCIS GOULD.