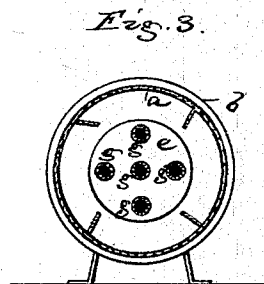
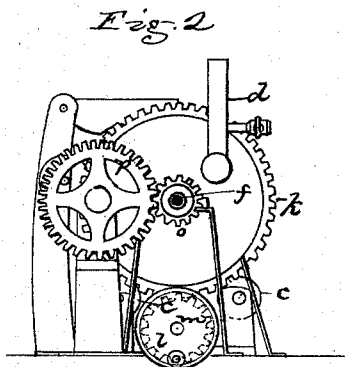
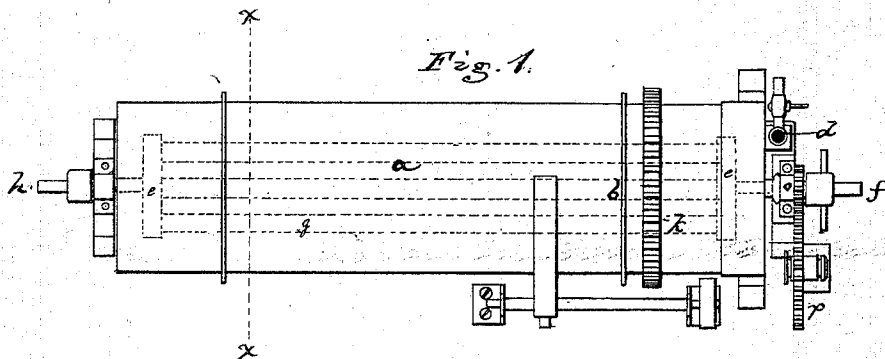


D. LEE.

Apparatus for Drying Sugar, Salt, &c.

No. 139,400.

Patented May 27, 1873.



Witnesses.
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DANIEL LEE, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN APPARATUS FOR DRYING SUGAR, SALT, &c.

Specification forming part of Letters Patent No. 139,400, dated May 27, 1873; application filed May 6, 1873.

To all whom it may concern:

Be it known that I, DANIEL LEE, of Boston, in the county of Suffolk and State of Massachusetts, have invented an Improved Machine for Drying Sugar, &c.; and I do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of my invention sufficient to enable those skilled in the art to practice it.

In rotary granulating and drying machines in which a long cylinder or drum is used it is customary sometimes to use a heater-cylinder and an open encompassing-cylinder, through which the material runs, both being connected to rotate as one, sometimes an outer stationary cylinder and an inner rotary one, and sometimes an inner stationary cylinder and an outer rotating one.

In my invention I use an outer or open cylinder for passage of the material to be dried and of the currents of air to absorb the moisture; and I make this cylinder rotary; but instead of an inner cylinder I use a series of steam-pipes, and instead of rotating them as a part of the drier-cylinder, I make them independently rotative, so that while the drier-cylinder is driven with a slow rotative motion the series of tubes may be driven with such speed as to keep the material from lodging upon the tubes, and to insure its more active movement through the drum and from place to place against the pipes and upon the surface of the drum, the speed of the tubes being graduated with reference to the rotation of the drum, as may be desirable, or according to the nature and condition of the material. My invention consists primarily in a rotary drying apparatus having such an organization, or an organization in which the drier-drum and the heater-tubes are made capable of relative rotative movement.

The drawing represents an apparatus embodying such an organization.

Figure 1 shows the apparatus in plan. Fig. 2 is an end view of it. Fig. 3 is a cross-section on the line *x x*.

a denotes the outer cylinder having rims *b* rotating on rolls *c*, as in some other driers. This cylinder is inclined, and is open at its lower end, and has a head at its upper end, the drum rotating with respect to such head. Air freely enters the open end of the cylinder

and passes off through the pipe *d*, its escape being urged by a steam jet or blast, or by other suitable means. Near the opposite ends of the cylinder are two steam-heads, *e*, and extending from head to head are a series of steam-pipes, *g*, while entering one head is a steam-inlet pipe, *f*, and opening from the other head is a steam-outlet pipe, *h*, the pipes *f h* forming the journals by which the heads and their pipes are mounted in suitable bearings in axial line with the axis of the drum. The extensions of the pipes run through suitable stuffing-boxes to connect with the main supply and escape pipes. The steam heads and pipes are independent of the drum, having no fixed connection thereto, and in fact no connection except that the drum turns in the head of the drum, and the steam-inlet pipe passes through said head. They can therefore rotate independently. The cylinder is shown as having a gear, *k*, the teeth of which mesh into a pinion, *l*, on a shaft, *m*, while the inlet-pipe *f* is shown as carrying a pinion, *o*, driven by a gear, *p*, or by any suitable connection. By these means the drum may be rotated slowly and the heads and pipes rotated at speed, and at any speed relatively to the speed of the drum.

Where an inner steam-cylinder is employed to effect the heating much difficulty is experienced on account of the impossibility of effecting a joint free from liability to leakage; and it is also difficult to free the cylinder from condense-water.

In my arrangement common boiler-tubes are used, and there is therefore no seam to leak; and as the lower steam-head is of greater diameter than the pipes it forms a well to receive the water of condensation, said water being readily drawn off by a suitable cock.

I claim—

1. In combination with the rotary drum *a*, the series of steam-pipes *f* connecting the two heads *e* having rotation independently of the rotation of the drum, substantially as described.

2. In combination with the heater-pipes *g*, the lower head *e* acting as a receiver of the condense-water, substantially as described.

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Witnesses:

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