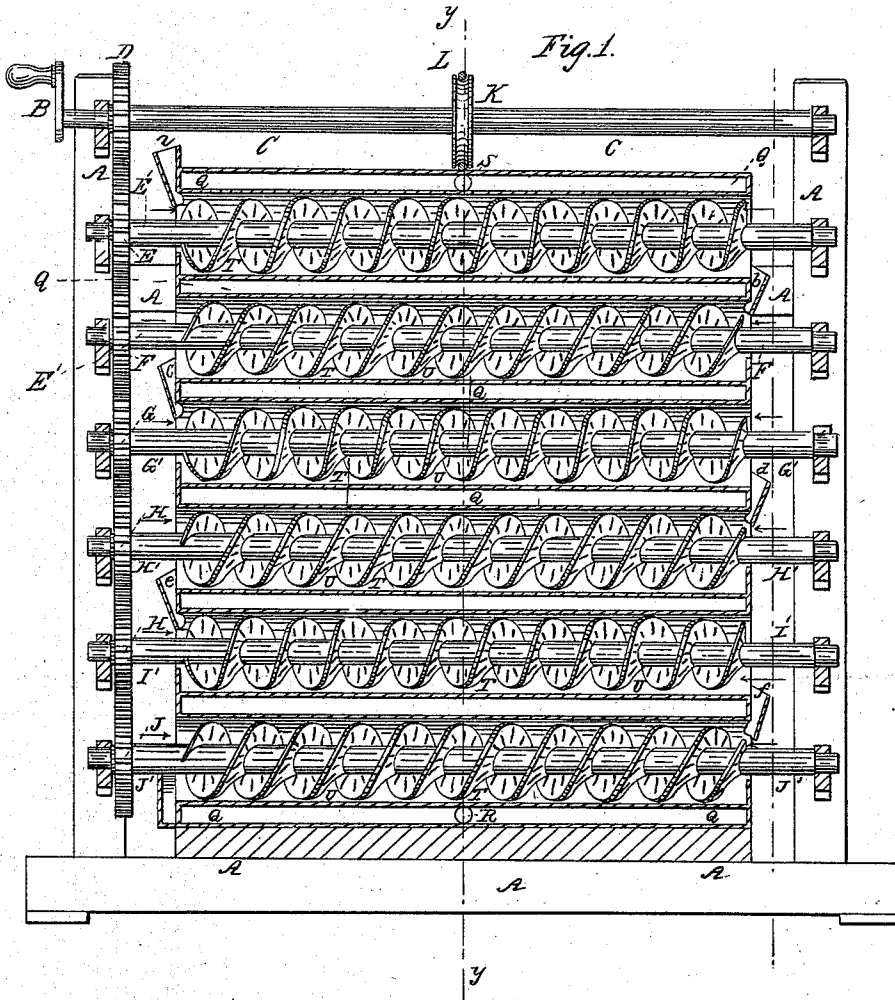


E. A. ABBOTT.

Grain Drier.

No. 87,613.

Patented March 9, 1869.



Witnesses:

Wm. Polkinhorn
Geo. Gale

Inventor:

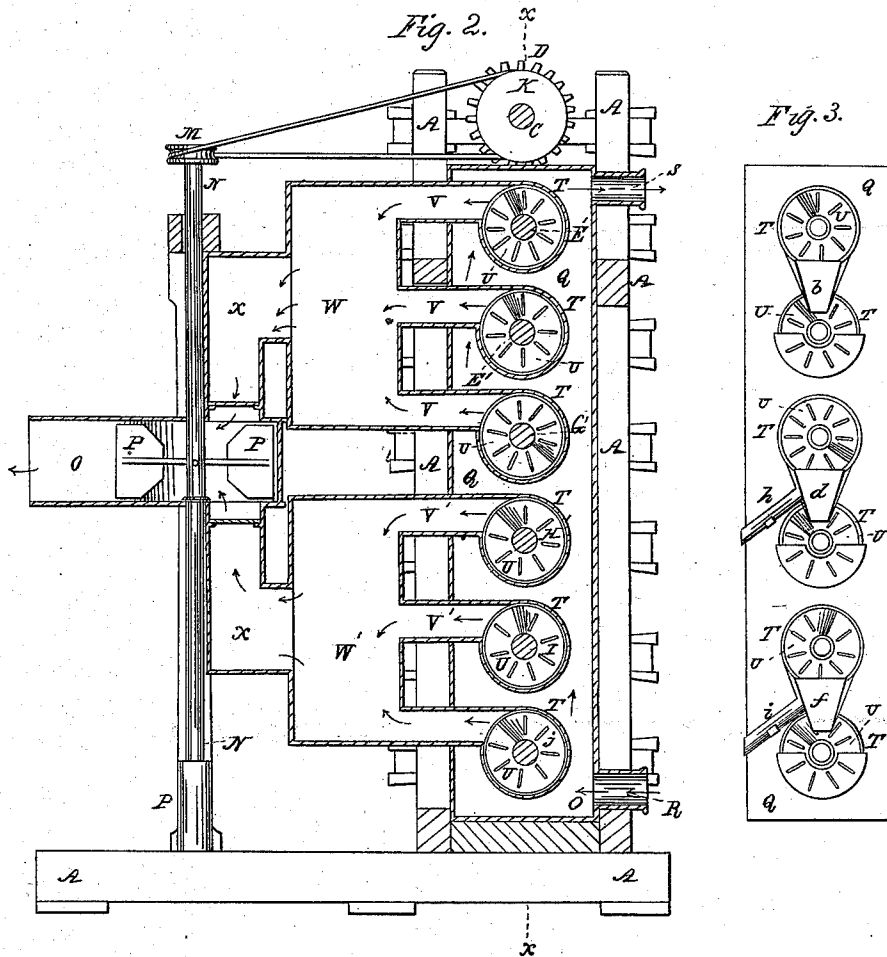
Edson A. Abbott
By his Attorney
Chas. F. Standbury

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United States Patent Office.

EDSON A. ABBOTT, OF BALTIMORE, MARYLAND.

Letters Patent No. 87,613, dated March 9, 1869.

IMPROVEMENT IN GRAIN-DRIERS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern :

Be it known that I, EDSON A. ABBOTT, of the city of Baltimore, in the State of Maryland, have invented certain new and useful "Improvements in Grain-Driers;" and I do hereby declare the following to be a full and correct description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal vertical section of the steam-chest, on line *x x* of fig. 2, the conveyer-shafts and gears being shown in view.

Figure 2 is a transverse vertical section of the apparatus, on line *y y* of fig. 1.

Figure 3 is an elevation of the end of the steam-chest, the plane being indicated by line *z z* of fig. 1.

The same part is marked by the same letter of reference wherever it occurs.

The nature of the invention consists in the construction of an apparatus, in the manner hereinafter described, for the drying of damp grain, by subjecting it, while passing through metallic tubes, or flues, to the combined influence of dry heat derived from steam and currents of hot or cold air passing continually over and among it, as hereinafter specified.

To enable others skilled in the art to make and use my improved grain-drier, I will proceed to describe its construction and operation, referring to the accompanying drawings by the letters of reference marked thereon.

The various parts of the apparatus are supported by a stout frame, A, in which the journals of the several shafts are hung.

B marks a winch, which indicates the point of application of the driving-power, at the end of the upper shaft C.

On this shaft is the gear-wheel D, which is the upper one of a series of gears, E F G H I J, all of equal size, and attached respectively to the shafts E', F', G', H', I', and J', which are driven by them, each shaft revolving in a direction opposite to that of the shaft above or below it.

On the middle of shaft C is attached the grooved pulley K, which, by means of cord L, drives a smaller grooved pulley, M, (see fig. 2,) on the upper end of fan-shaft N, which, passing through fan-box O, turns in a step, P', fixed to the base of the apparatus.

Attached to shaft N, is the fan P, which revolves horizontally in the fan-box O.

Q marks a large rectangular steam-chest, having the inlet-pipe R, and the outlet-pipe S, for the entrance and escape of steam.

Through this chest pass the metallic flues T, which are open at both ends, but do not communicate with the interior of the steam-chest.

The shafts E', F', G', H', I', and J', having the spiral slotted conveyer-blades U upon them, are hung in the centre of the flues T, and rotate in them.

The flues communicate with each other, by means of the spouts *b c d e f*, the upper flue being fed with grain through spout *a*, and the lowermost one being discharged through spout *g*.

Sliding troughs, *h i*, may be so arranged as to cut off communication between any two flues, when desired, and effect a delivery of the grain at any point that may be preferred.

The conveyer-flights U are perforated with small openings, as shown, to allow of the passage of air through them, and to facilitate the passage of the air-currents through the flues.

Air-passages, V V V', V' V' V', passing through the shell of the steam-chest, lead from the upper side of the middle of the flues T, to the trunks W W', which communicate respectively, by the air-passages X and X', with the upper and lower openings of the fan-box O.

The whole apparatus may be enclosed in a chamber, like the air-chamber of a hot-air furnace, which, by confining the heat radiated by the steam-chest, would retard the condensation of the steam, and raise the temperature of the air supplied to the flues T.

Cocks are provided, for drawing off the water of condensation, gates, for cleaning the interior of the apparatus, and air and steam-valves, for the regulation of pressure and temperature.

The operation is as follows:

The steam-chest Q is supplied with steam, either direct from a boiler, or from the exhaust of an engine, which enters at the inlet R, and escapes through outlet-pipe S. Its course is marked by the blue arrows, fig. 2. The metallic flues T are thus kept at a temperature sufficiently high to drive the moisture out of the grain, without danger of scorching or killing it.

Motion being imparted to the shafts by the driving-power, the damp grain is introduced into the apparatus through the spout *a*, and is carried through the upper flue by the action of the spiral conveyer-flights U. At the end of the first flue it falls into the spout *b*, which delivers it to the second flue, through which it is carried in a direction opposite to that in which it moved in the first flue. At the end of the second flue it falls into spout *c*, which delivers it to the third flue, and thus the operation is continued till the grain, unless sooner delivered, emerges from the lowest spout *g*.

It may be drawn off, however, at any point desired, by the sliding spouts *h i*, as before mentioned.

During its whole course it is continually stirred and turned, as well as driven forward, by the conveyer-flights U.

While the grain is thus passing through the flues T, the fan P, which is an exhaust or suction-fan, is rapidly rotated in its box, and keeps up a brisk current of air in the direction indicated by the red arrows in figs. 1 and 2, viz, in at both ends of the flues T, and out through passages V V', W W', X X', and box O, into the open air, carrying with it the moisture driven out of the grain by the heat imparted to it in its passage through the flues.

This blast, whether hot or cold, tends to lower the temperature of the grain, heated by contact with the metallic flues, by reason of the rapid evaporation which it causes, so that the grain at its delivery is at quite a moderate temperature.

As different lots of damp grain contain different amounts of moisture, some are more readily dried than others, and need not be passed through so many flues. These may be discharged by means of a sliding spout, at the end of any flue of the series, according to the judgment of the operator.

Having thus fully described my invention,

What I claim, and desire to secure by Letters Patent, is—

1. The combination and arrangement of the steam-chest Q, flues T, conveyers U, and suction-fan P, substantially in the manner and for the purpose described.

2. The apparatus, substantially as described, whereby damp grain is subjected to the combined and simul-

taneous action of heat derived from steam, and of hot or cold currents of air, for the purpose at once of expelling and carrying off the superabundant moisture, in the manner set forth.

3. The perforated conveyer-flights U, constructed as and for the purpose specified.

The above specification of my said invention signed and witnessed at Washington, this 10th day of December, A. D, 1868.

EDSON A. ABBOTT.

Witnesses:

E. J. SMITH,

CHAS. F. STANSBURY.