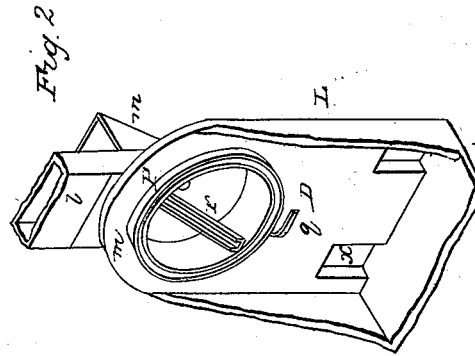
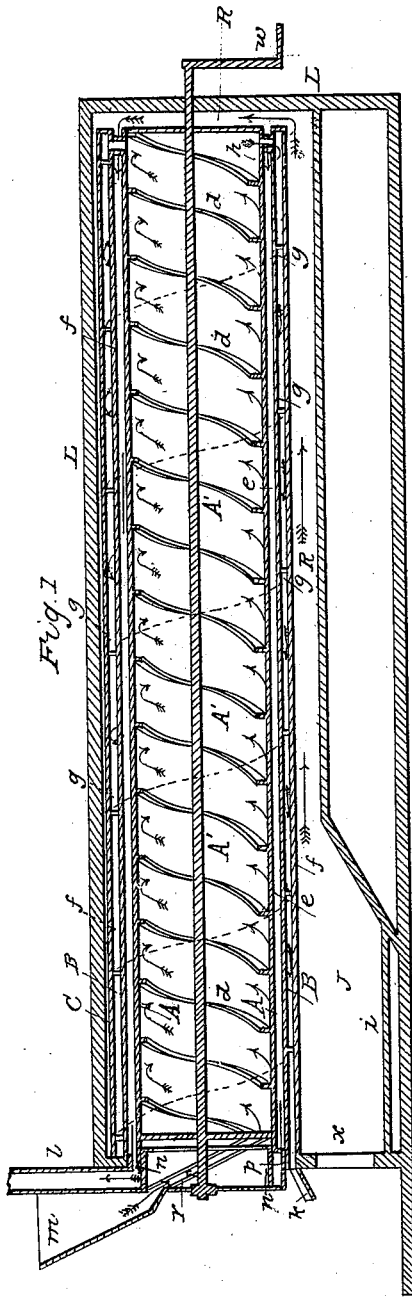


S. HOWARD.

Grain Drier.

No. 4,777.

Patented Sept. 26, 1846.



UNITED STATES PATENT OFFICE.

SEBRE HOWARD, OF ADRIAN, MICHIGAN.

KILN-DRYING GRAIN, &c.

Specification of Letters Patent No. 4,777, dated September 26, 1846.

To all whom it may concern:

Be it known that I, SEBRE HOWARD, of Adrian, in the county of Lenawee and State of Michigan, have invented a new and Improved Kiln-Drying Apparatus, which I denominate "Howard's Rotary Cylindrical Grain-Drier;" and I do hereby declare the following to be a full and exact description of the construction and operation thereof, reference being had to the accompanying drawings, making a part of this specification.

My rotary cylindrical grain drier is composed of three metallic cylindrical casings of different sizes, combined concentrically the one within another, forming annular spaces between the central, and the interior and exterior casings. The concentric combined casings are placed within a heating chamber, and suspended on a horizontal shaft passing through the center of the inner casing, on which they revolve.

In the accompanying drawings Figure 1, is a vertical longitudinal section through the center of my kiln drying apparatus; Fig. 2, is a perspective elevation of the interior side of the head or front end of the heating chamber, detached from the other parts of the same.

Similar letters refer to corresponding parts in both figures.

A, is the interior, B, is the central, and C, is the exterior concentric casing. *e*, is the annular space between the casings A, and B, and *f*, is the annular space between the casings B & C. R, is the chamber inclosing the combined concentric casings; the inclosing wall L, of the chamber R, may be composed of brick or other suitable material. *t*, is the horizontal shaft passing through the center of the combined concentric casings. *v*, *v*, are radial arms by which it is secured to the front end of the same. *v'*, is a head which closes up the rear end of the inner concentric casing A. The shaft *t*, has its bearings in the head D, and rear end of the heating chamber R; at its rear end a crank, *w*, or a pulley or cog wheel, is attached for the purpose of communicating motion to the combined concentric casings. On the rear side of the head D, of the chamber R, circular projecting flanges *n*, and *p*, are secured concentric with each other. The inner circular flange *n*, passes a few inches within the front end of the inner concentric

casing A, fitting accurately to the same. The exterior flange *p*, fits accurately to the central concentric casing B, and passes a few inches within the same. The annular space between the circular flanges *n*, and *p*, communicates with the chimney *l*, and connects the annular space *e*, with the same. J, is a furnace placed at the front end of the chamber R, underneath the combined concentric casings, constructed in any well known or usual manner. *i*, are the grate bars. *x*, are the furnace doors. The heat of the furnace, and gaseous products of combustion, first act upon the exterior surface of the outer concentric casing C, (as it is revolved), from front to rear; at the rear end, they enter the annular space *e*, and are carried forward through the same to the chimney *l*, acting upon the exterior surface of the casing A, and the interior surface of the casing B.

The grain (or other substance) to be kiln dried, is placed in a receptacle or hopper *m*, attached to the front head D, of the chamber R, and passes through a spout *r*, into the heating chamber A' within the interior of the inner casing A; here it is acted upon by the heat occasioned by the passage of the hot air and gases from the furnace through the annular flue space *e*, to the chimney *l*, and is gradually carried from the front to the rear end of the circular heating chamber (A') by the rotary action of the continuous spiral thread *d*, projecting from its interior surface. The grain being carried to the rear end of the chamber A, against the head *v'*, which closes up the same, falls through connecting tubes *h*, *h*, into the annular space *f*, between the concentric casings B and C. In the annular space *f*, a spiral thread *g*, is placed, winding around in the same from rear to front in a reversed position to that in the chamber A', which carries the grain back again to the front end of the concentric casings by the rotary action of the same; arriving at which, a hook *q*, attached to the front end of the chamber R, and extending into the annular space *f*, takes the grain from the spiral thread *g*, and forces it into the discharge spout *k*.

The grain during its passage through the annular space *f*, is acted upon by heat on both its inclosing surfaces at the same time; the casing C, being acted upon directly by the heat of the furnace, and the casing B, by

the hot air and gaseous products of combustion in their passage from the furnace through the annular flue space *e*, to the chimney.

5 It will clearly be perceived as a very valuable feature in my kiln drying apparatus, that the heating surfaces over which the grain passes are regularly and constantly increasing in temperature from the point
10 where the grain enters the circular chamber *A'*, to that where it is discharged out of the annular space *f*; this feature, combined with the constantly progressive rotary motion, causes every particle of grain to be equally
15 operated on by heat, without danger of injury from scorching—if proper attention be paid to the furnace. The red arrows in Fig. 1, represent the course of the wheat from the receptacle *m*, through the chamber *A'*
20 and annular space *f*, to the discharge spout *K*. The black arrows, represent the course of the hot air and gaseous products of combustion from the furnace to the chimney.

I design using my rotary cylindrical-grain
25 drier, not only for kiln drying grain of all kinds, but also for drying malt, salt, and every other substance it can be used for, and for the roasting of coffee.

30 Having thus fully described the construction and operation of my rotary cylindrical

grain drier, what I claim therein as new and desire to secure by Letters Patent, is—

1. The uniting the cylindrical casings *A*, *B*, and *C*, with each other and combining them with the furnace *J*, in such a manner
35 as to form a circular heating or drying chamber *A'*, within the inner casing *A*; an annular space or drying chamber *f*, connected with the same, between the outer casing *C*, and central casing *B*; and an annular
40 flue space *e*, between the central casing *B*, and inner casing *A*, substantially as herein set forth.

2. I also claim the giving the grain, or other substance acted upon, a constantly
45 progressive rotary movement from the front to the rear end of the circular drying chamber *A*; conducting it into the annular space or drying chamber *f*, and returning the same by a reversed movement to its front
50 end, and discharging the kiln dried grain at the spout *k*; by the action of the projecting spiral thread *d*, connecting pipes *h*, *h*, and spiral thread *g*, combined and operating
55 substantially in the manner and for the purpose herein set forth.

SEBRE HOWARD.

Witnesses:

JNO. EDDS,

Z. C. ROBBINS.