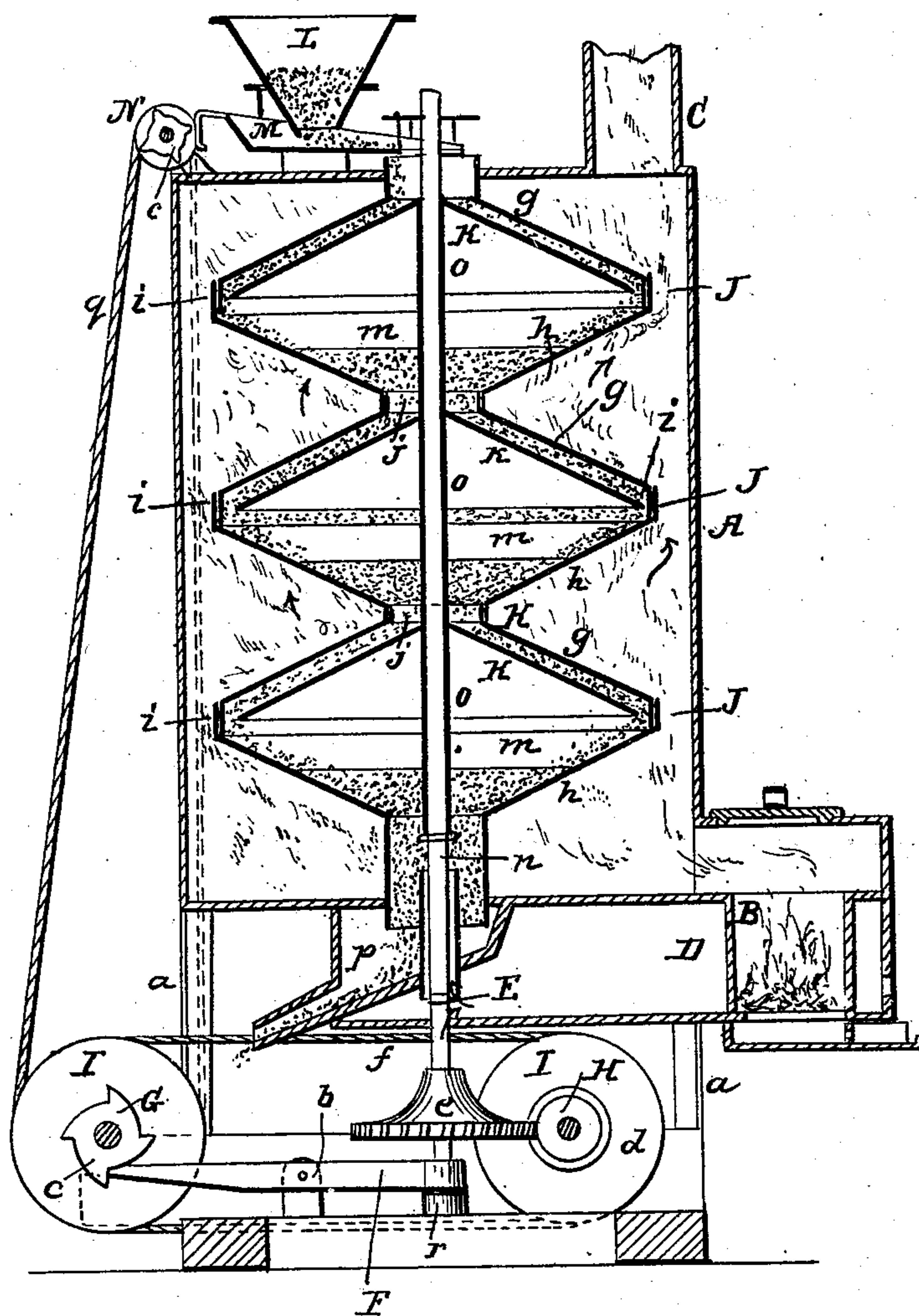


C. CUSTER.

Grain Drier.

No. 18,137.

Patented Sept. 8, 1857.





# UNITED STATES PATENT OFFICE.

CHRISTIAN CUSTER, OF PHILADELPHIA, PENNSYLVANIA.

MACHINE FOR DRYING GRAIN, &c.

Specification of Letters Patent No. 18,137, dated September 8, 1857.

*To all whom it may concern:*

Be it known that I, C. CUSTER, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and Improved Kiln or Device for Drying Grain and Meal; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawing, making a part of this specification, said drawing being a vertical central section of my improvement.

The object of this invention is to obtain a drying kiln of very compact form, simple in construction efficient in operation, and one that will not be liable to fire the building in which it is placed.

The invention consists in having a rotating and vertically reciprocating drying chamber constructed in a novel way so that a large heating surface is obtained within a small space and the grain as it passes through said chamber properly spread and turned so as to be thoroughly dried when it passes or escapes from it.

The drying chamber is placed within a drum connected with a furnace so that said chamber will be heated externally by the products of combustion that escapes from the furnace and the chamber heated internally by a draft of heated air which passes from a hot air chamber surrounding the furnace and into the lower end of the drying chamber. By this means the object above alluded to is attained as will be hereinafter fully shown and described.

To enable those skilled in the art to fully understand and construct my invention I will proceed to describe it.

A represents a stationary cylinder or drum to the lower part of which and at one side a furnace B is attached, the fire chamber of the furnace projecting below the bottom of the drum as plainly shown in the drawing.

C is a smoke pipe attached to the upper end of the drum and communicating with it.

The body or fire chamber of the furnace is placed within a chamber D which extends underneath the drum A a short distance beyond its center. The drum A is supported at a suitable height by legs (a).

Within the drum A a vertical shaft E is placed, said shaft passing entirely through the drum at its center, the lower end of the shaft being stepped in the inner end of a lever F, which has its fulcrum at (b).

G, H, are two shafts each of which has a cone of pulleys I on it. On the shaft G a tappet wheel (c) is placed which acts upon the outer end of the lever F, and on the shaft H a screw (d) is placed which screw gears into a worm wheel (e) on the lower part of the shaft E. A band (f) passes around the two cone pulleys I. I.

On the shaft E the drying chamber is placed. This chamber is formed of a series of double conical vessels or pans J, formed each of two parts (g) (h). The upper parts (g) are placed upright on the shaft, the lower parts (h) being inverted. A rim (i) is formed on the edge of each part, the rim on the part (g) fitting within the rims of the parts (h) as plainly shown in the drawing. The upper ends or apexes of the parts (g) are also provided with rims (j) over which, rims (k) at the lower ends of the parts (h) immediately above them fit. The several vessels or pans J, communicate with each other and within each chamber a conical guide plate K is placed. The surfaces of these plates K are parallel with the upper parts (g) of the chambers J, a space being allowed between them. The lower parts (h) of the vessels or pans J are secured to the shaft E by means of tubes or collars (l) which are connected to the parts (h) by arms (m) the tubes or collars being at the center of the parts and the tube or collar of the lower vessel or pan rests on a hub or boss (n) on the shaft. The conical plates K are also provided with tubes (o) through which the shaft E passes, the tubes (l) (o) resting upon each other alternately. The orifice of the lower vessel or pan J passes within a spout (p) which projects from the hot air chamber D and L is a hopper placed on the upper end of the drum, said hopper having a shoe M underneath it which shoe has a shake motion given it by means of a tappet N, which is placed on a shaft O, said shaft being rotated by a belt (q) from the cone of pulleys on the shaft G.

The operation is as follows: Motion is given the shaft G in any proper manner and the shaft E is rotated by the screw (d) and worm wheel (e). The vessels or pans J are consequently rotated and the grain or meal is shaken by the tappet N from the shoe M, the grain passing into the upper vessel or pan J and falling upon the uppermost plate K and is conveyed by it to the upper edges of the lower part (h) of the vessel or



pan the grain passing through the orifice at the lower end of said part and down upon the plate K of the vessel or pan below. The grain thus passes successively through all  
 5 the vessels or pans of the drying chamber, and while thus passing them they are rotating and also rising and falling, the latter motion being given by the lever F acted upon by the tappet (c). By means of these  
 10 two motions of the drying chamber the grain is made to pass successively through the several vessels or pans of the drying chamber in a thin layer or sheet, and the grain is also turned as it passes through the  
 15 drying chamber. The spreading of the grain into a thin layer is due to the centrifugal force generated by the rotation of the drying chamber, while the turning of the grain and the falling of the same within the chamber  
 20 is due to its own gravity and to the vertical reciprocating movement of the chamber assisted also by a slight concussion produced at the termination of each downward movement of the shaft E in consequence of the  
 25 inner end of the lever F striking upon a block or anvil (r).

The drying chamber is heated externally by the products of combustion which escape from the furnace B and pass up through  
 30 the drum A, and into the smoke pipe C, while the interior of the chamber is heated by hot air from the chamber D the heated air passing up through the opening at the bottom of the lower vessel or pan J, as  
 35 shown by the black arrows, and in passing

through the chamber it carries off all dampness and the grain is discharged from the spout (p) in a cool state and with a perfect or natural flavor. The several parts may be made of sheet or cast iron. By this construction and arrangement of parts as  
 40 shown, the drying chamber is provided with a great area of heating surface in a very compact form and the chamber is heated in the most economical manner no heat being  
 45 lost and the whole device is rendered very compact and simple in construction.

I am aware that kilns or devices provided with drying cylinders or chambers heated artificially or by stoves have been arranged  
 50 in various ways and therefore I do not claim separately or independent of their construction and arrangement the parts herein shown and described; but,

Having thus described my invention, what  
 55 I claim as new and desire to secure by Letters Patent, is,

The rotating and vertically reciprocating drying chamber, formed of the series of vessels or pans J, and guide plates K, placed on  
 60 the shaft E and constructed and arranged as shown, in combination with the furnace B, drum A and hot air chamber D, the above parts being arranged relatively with each other as and for the purpose set forth.

CHRISTIAN CUSTER.

Witnesses:

B. B. STIMBLE,  
 GEO. W. WILLIAMS.