

No. 631,298.

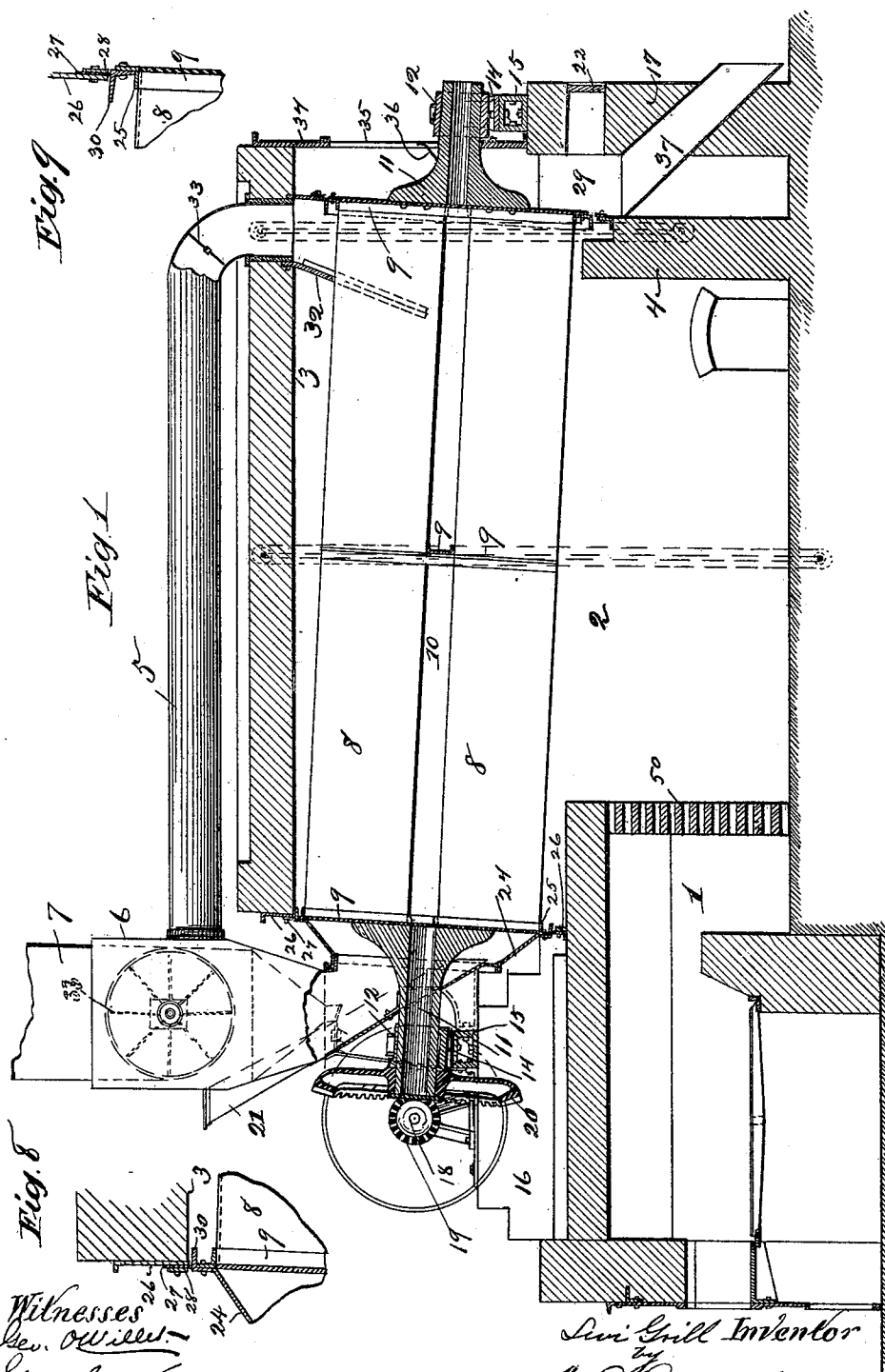
Patented Aug. 22, 1899,

L. GRILL.
ROTARY DRIER.

(Application filed July 2, 1898.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses
Rev. O. W. Allen
Geo. S. Kain

L. Grill Inventor
Atty. W. H. Homan Attorney

No. 631,298.

Patented Aug. 22, 1899.

L. GRILL.
ROTARY DRIER.

(Application filed July 2, 1898.)

(No Model.)

4 Sheets—Sheet 2.

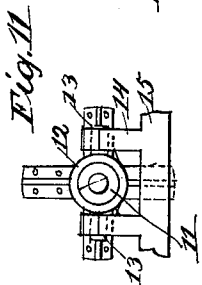


Fig. 11

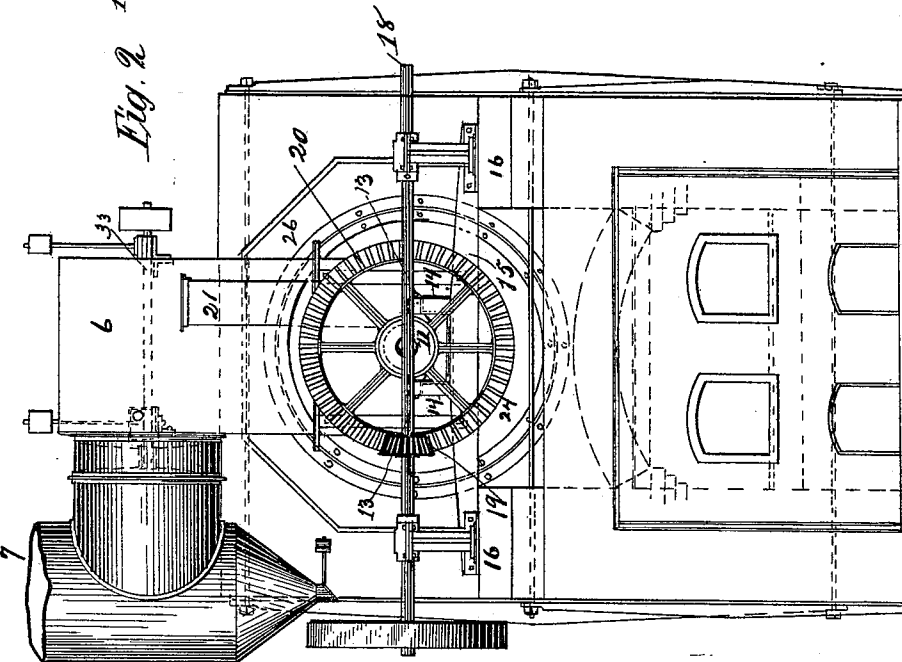


Fig. 2

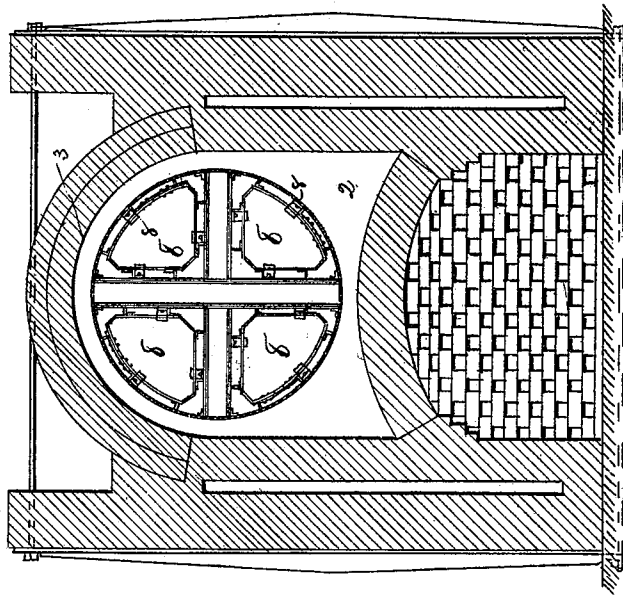


Fig. 3

Witnesses
Geo. O'Willet
Geo. S. Kani

Inventor
L. Grill
Wm. M. Moore
Attorney

No. 631,298.

Patented Aug. 22, 1899.

L. GRILL.
ROTARY DRIER.

(Application filed July 2, 1898.)

(No Model.)

4 Sheets—Sheet 3.

Fig. 4

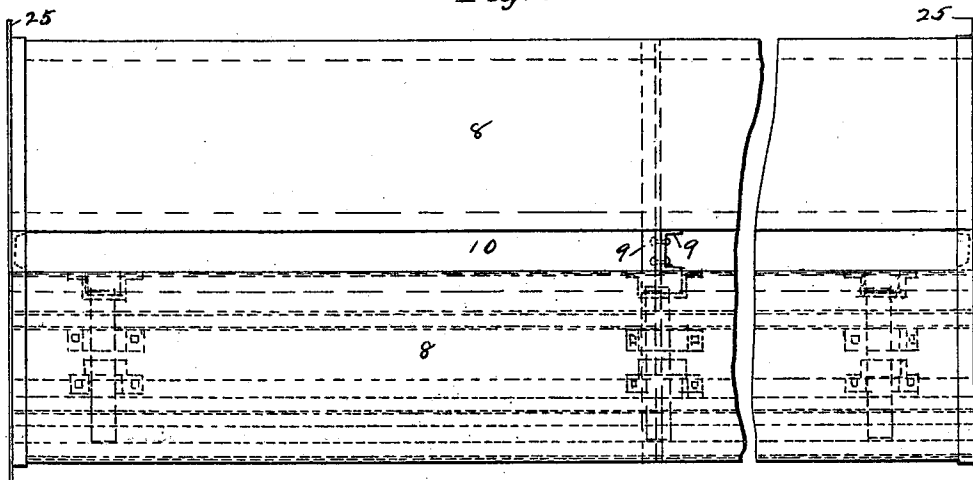


Fig. 5

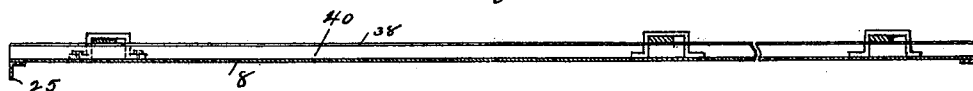
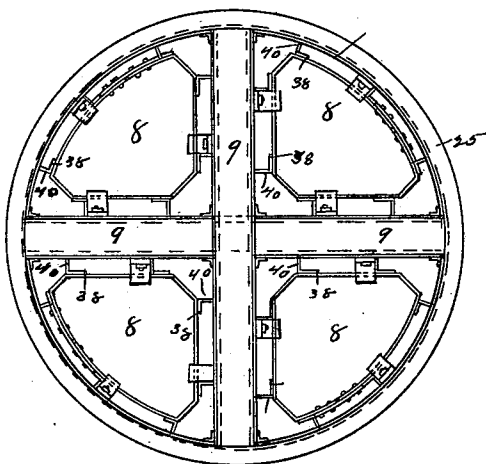


Fig. 6



Witnesses
Geo. O. Willitt.
Geo. B. Linn

Inventor
L. Grill
By Wm. M. Monro
Attorney

No. 631,298.

Patented Aug. 22, 1899.

L. GRILL.
ROTARY DRIER.

(Application filed July 2, 1898.)

(No Model.)

4 Sheets—Sheet 4.

Fig. 7.

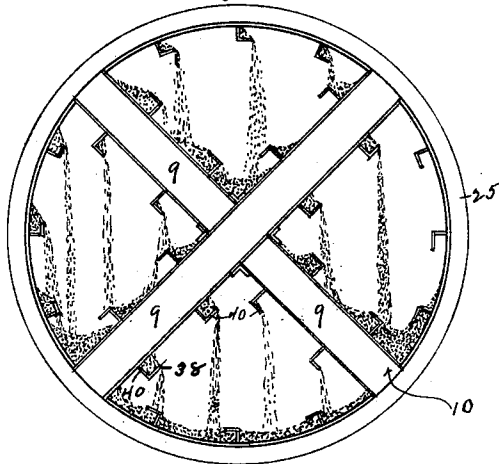
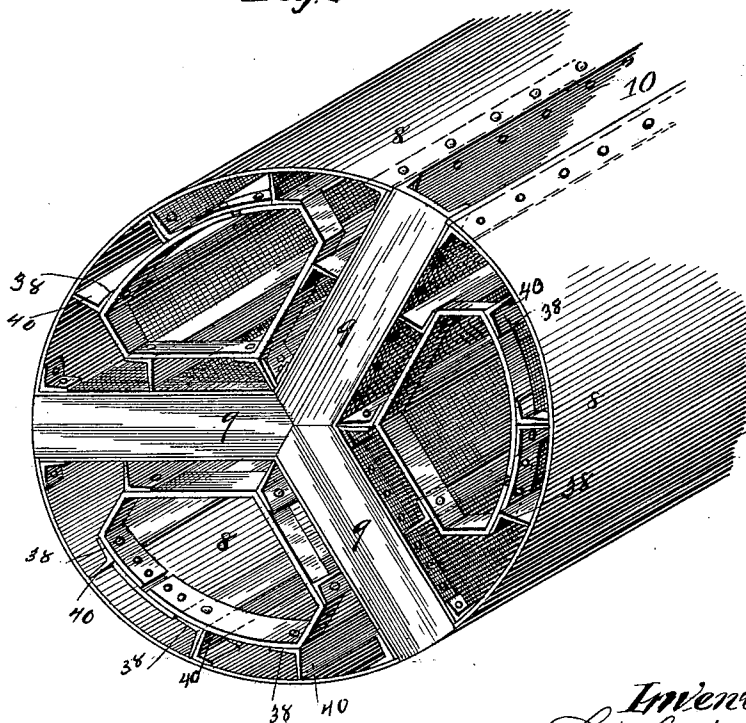


Fig. 10



Witnesses
Geo. O'Neill
Geo. S. Kain

Inventor
L. Grill
By O. M. O'Connor
Attorney

UNITED STATES PATENT OFFICE.

LEVI GRILL, OF CLEVELAND, OHIO, ASSIGNOR OF ONE-HALF TO C. O. BARTLETT & CO., OF SAME PLACE.

ROTARY DRIER.

SPECIFICATION forming part of Letters Patent No. 631,298, dated August 22, 1899.

Application filed July 2, 1898. Serial No. 685,019. (No model.)

To all whom it may concern:

Be it known that I, LEVI GRILL, a citizen of the United States of America, and a resident of Cleveland, county of Cuyahoga, State of Ohio, have invented certain new and useful Improvements in Rotary Driers, of which the following is a specification.

My invention relates to mechanical driers, and has especial reference to means for uniformly distributing the material to be dried upon surfaces exposed to the action of heating agents, and is also designed to provide the maximum amount of heating-surface whereby the effect desired can be quickly accomplished.

My invention is exemplified in the general features of construction and in the combination and arrangement of parts, as hereinafter described, shown in the accompanying drawings, and specifically pointed out in the claims.

In the accompanying drawings, Figure 1 is a longitudinal central section of a furnace and heating-chamber and includes a similar view of my drying apparatus. Fig. 2 is a front elevation of the device. Fig. 3 is a transverse section of the same. Fig. 4 is a side view of the drier proper or drying-compartments somewhat enlarged. Fig. 5 is a longitudinal section of the same. Fig. 6 is an end view of the drier. Fig. 7 is a transverse section of drying-chambers, showing mode of distributing the material therein. Figs. 8 and 9 are enlarged sectional views of details of asbestos joints for the drier. Fig. 10 is a view in perspective of a smaller form of the device, showing three compartments. Fig. 11 shows a detail of bearings.

In the figures, 1 is a furnace of any desirable type, but shown as adapted to the use of coal as a fuel. Any kind of fuel, however, which may prove suitable can be employed.

2 is the heating-chamber (into which the furnace opens) and is arched above at 3 to inclose the drying apparatus.

The heating-chamber is provided with the rear wall 4 and with a return-flue 5 for the escape of the products of combustion after having traversed the surfaces of the drying apparatus, whence they pass through the

breeching 6 and into the outer air through the stack 7.

The drying apparatus consists of a multiple number of elongated compartments 8, formed of sheet metal and placed about a common axis. They are secured to and connected by channel-bars 9, which transversely cross the axis and which separate the chambers to form passages 10 for the circulation of the products of combustion. In Fig. 1 these channel-bars are seen at the extremities and center of the drying-chambers. The axis of this collection of compartments or drier proper is seen to be inclined from the front of the heating-chamber 2 to the rear, the open extremities projecting outside of the chamber-walls. Trunnions 11 are secured to the crossings of the channel-bars at either extremity of the drier and are mounted upon bearings 12, which are pivoted upon wrists 13 on either side upon bearing-blocks 14, arranged so as to give free movement to the trunnions and self-adjustment to the bearings to avoid danger of binding. The trunnions are long enough to move in their bearings longitudinally as the drier expands from the effects of heat. Yokes 15 support the bearings and are in turn mounted upon vertical extensions 16 of the side walls of the furnace in the front of the drier and upon the low transverse wall 17 in the rear, which is placed parallel to the rear wall 4.

The driving mechanism is simple and is seen to consist of a transverse shaft 18 and pinion 19, which engages the driving-gear 20 upon the extremity of the trunnion.

21 is a chute through which the material is fed to the drier, and it passes through the lower portion of the breeching. Through the breeching the moisture passes out of the drying-compartments, a free circulation of air through the compartments being maintained by means of a register 22 in an opening in the outer wall 17. A fan 33 (shown in dotted lines) insures a constant and equable draft through the furnace, and thereby a uniform circulation of air through the drier.

The drier at its forward extremity is provided with a funnel-shaped hood 24, into which extends the lower portion of the breeching and spout, thus forming a comparatively

tight joint. This hood is riveted upon the flanged ring 25, which is secured about the extremity of the drier.

The annular opening in the end of the heating-chamber is closed by means of a plate 26, upon the edge of which is clamped the asbestos ring 27 by means of a flat ring 28. The asbestos engages the flange 30 of the funnel 24, thus presenting a surface to the asbestos large enough to provide for movements of the drier as it expands and contracts under the influence of the furnace.

The construction at the outer extremity of the drier and heating-chamber is exactly the same with the exception of the omission of the funnel.

At 32 is seen a deflecting-plate in the crown of the arch of the heating-chamber, adapted to retain the heated air in the upper part thereof and insure equal heating of all parts of the chamber.

As described, none of the products of combustion pass through the compartments of the drier; but the asbestos rings and covering-plates prevent the entrance of any particle of gas or flame therein, and in this manner the device is suitable for drying certain materials which would be injured by contact therewith. When, however, it is possible to assist the drying process by repassing the products of combustion or heating agents directly through the compartments, the device can be altered to produce this effect by removing the rear plate 26 and closing the damper 33 in the pipe. The products of combustion will then enter the chamber 29 formed between the parallel walls 4 and 17 and will return through the compartments into the breeching. The register 22 for cold air must then be closed. It will be seen that this chamber is formed by placing the plate 34 upon the low wall parallel to the inner wall, so as to close the rear end of the chamber 29. A large opening in this plate is then closed by means of sheet metal at 35, which can be removed for access to the chamber. An inclined plate 36 serves to keep dust from the trunnion-bearings. It is apparent that this narrow chamber 29 serves to prevent the escape of dust from the rear end of the chamber when the asbestos packing and plate are employed to cut off this chamber from the main portion and serves as a continuation of the heating-chamber when the asbestos and partition-plate are removed. A perforated wall 50 is placed at the rear of the furnace, through which all the products of combustion will pass to the heating-chamber. This wall soon becomes white hot and consumes all smoke and gas before it enters the chamber, thus providing a pure heating agent, which is a necessity in case the agent passes through the compartments.

37 is a chute employed to remove the dried material from the compartments, the natural inclination of the drier being sufficient to constantly feed downward the materials from the upper extremity, where they enter charged

with moisture, until they are cast out into the chute.

In detail the construction of the compartments of the drier will be seen from Figs. 4, 5, and 6. It will be observed from these figures that the sheet-metal compartments are somewhat triangular in shape and are riveted on two sides to the channel-bars, which support them. A cross-shaped opening 10 then remains for free circulation of the heating agents between the compartments, and the amount of heating-surface is greatly increased. In a drier of four compartments this surface would be doubled, and in one of three compartments it would be half again as great as in a cylinder of the same internal capacity. To increase the heating effect of the compartments, the drying material is lifted as the compartments rotate about their axis and thrown down again repeatedly through the heated air in the form of a spray and spread thinly over the surfaces of the compartments, thus exposing all particles to the influence of the heat. To accomplish this result, blades 40 are shown secured closely to the surfaces of the compartments and flanged at 38 to pick up the material and throw it down again in the form of dust in gradual quantities. The blades extend from end to end of the compartments, and their mode of operation will be clearly seen in Fig. 7. The compartments are supplied with an equal amount of the wet material in turn as they rotate on their axis by means of the chute, and in this manner the balance of the entire group is maintained.

I do not claim as my invention the exact means for attaching the blades to the compartment-surfaces, since it is immaterial in what manner they are attached so that they effect a constant redistribution of the material and spread it evenly over the surfaces of the compartment. Neither do I claim the number of compartments employed, since they will vary in number according to the size of the drier, nor do I claim the exact detail construction of any one part. These things are not of the spirit of my invention.

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

1. In a mechanical drier, the combination with a heating-chamber of rotary drying-chambers, within said heating-chamber, the said drying-chambers, being segmental portions of a cylinder, open at either end, and separated from each other by communicating radial passages, for hot air, supports connecting the said segments together at either end about a common axis, and a trunnion secured to each support in line with said cylinder-axis, substantially as described.

2. In a mechanical drier, the combination with a heating-chamber of rotating drying-chambers within said heating-chamber, the said drying-chambers being segmental portions of a cylinder arranged about a common axis and separated by radial passages com-

municating at the axial line, and each segment being provided with means for lifting and scattering the contents, substantially as described.

5 3. In a mechanical drier, drying-chambers, open at either extremity and secured by a common support at either end about a common axis the said chambers being separated by communicating radial passages substantially as described.

10 4. In a mechanical drier, drying-chambers, open at either extremity and secured about a common axis, the said chambers being segmental portions of a cylinder, separated by radial longitudinal passages communicating at the axial point, substantially as described.

15 5. In a mechanical drier, the combination with a furnace, a drying-chamber communicating therewith, a pipe for the escape of the

products of combustion leading from the rear 20 of the chamber, and a deflecting-plate adapted to retain the heated air in the upper part of the heating-chamber, of a multiple number of drying-chambers located in said furnace open at either end, and forming segmental 25 portions of a cylinder, the said chambers being separated longitudinally by axially-communicating passages between them and mounted upon pivots situated in the axis of the cylinder by means of supports at either 30 extremity, substantially as described.

Signed by me at Cleveland, Ohio, this 10th day of June, 1898.

LEVI GRILL.

Witnesses:

WM. M. MONROE,
GEO. S. KAIN.