

No. 753,624.

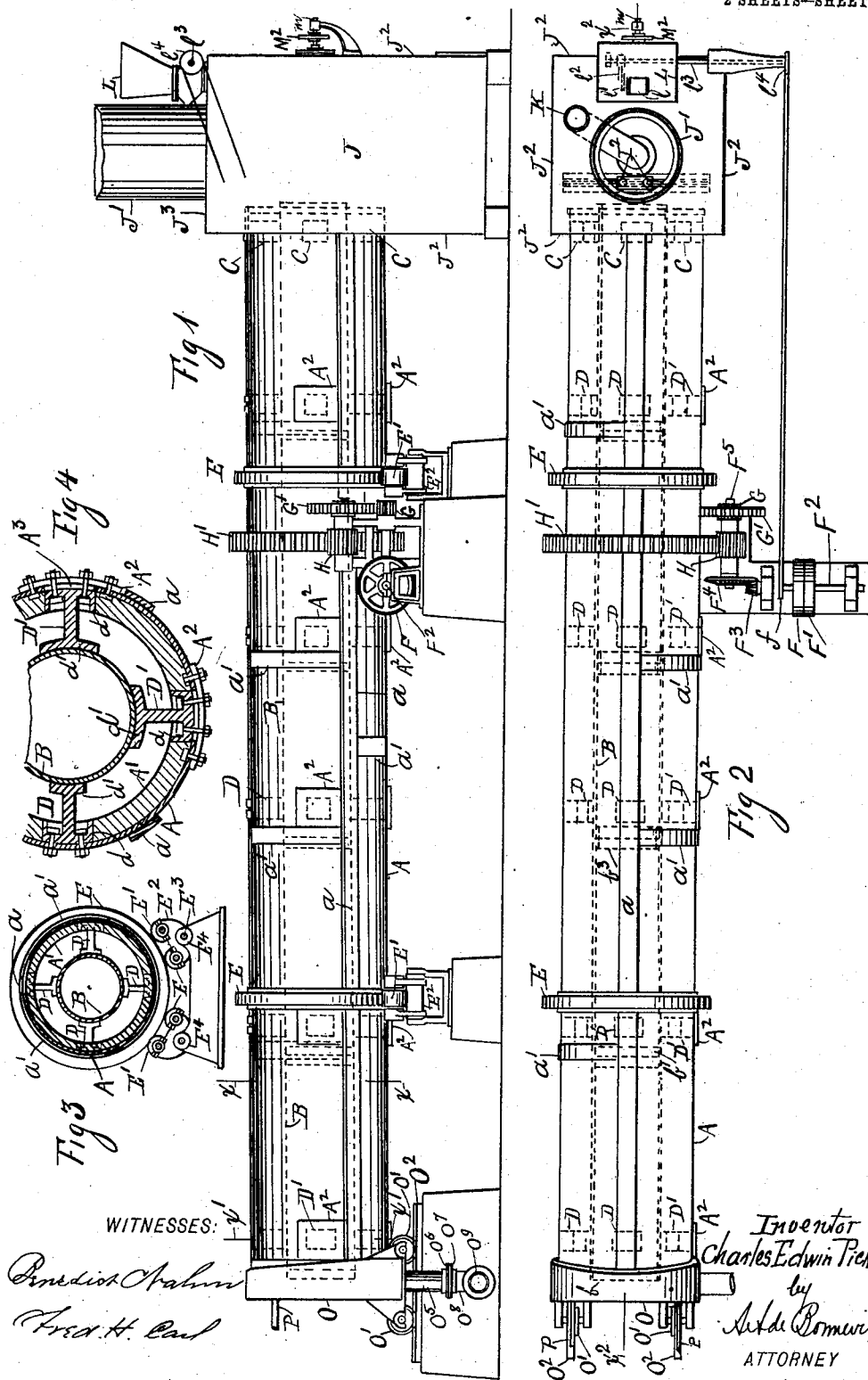
PATENTED MAR. 1, 1904.

C. E. PICKETT.  
DRYING AND CALCINING KILN.

APPLICATION FILED SEPT. 18, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



WITNESSES:

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*Fred H. Paul*

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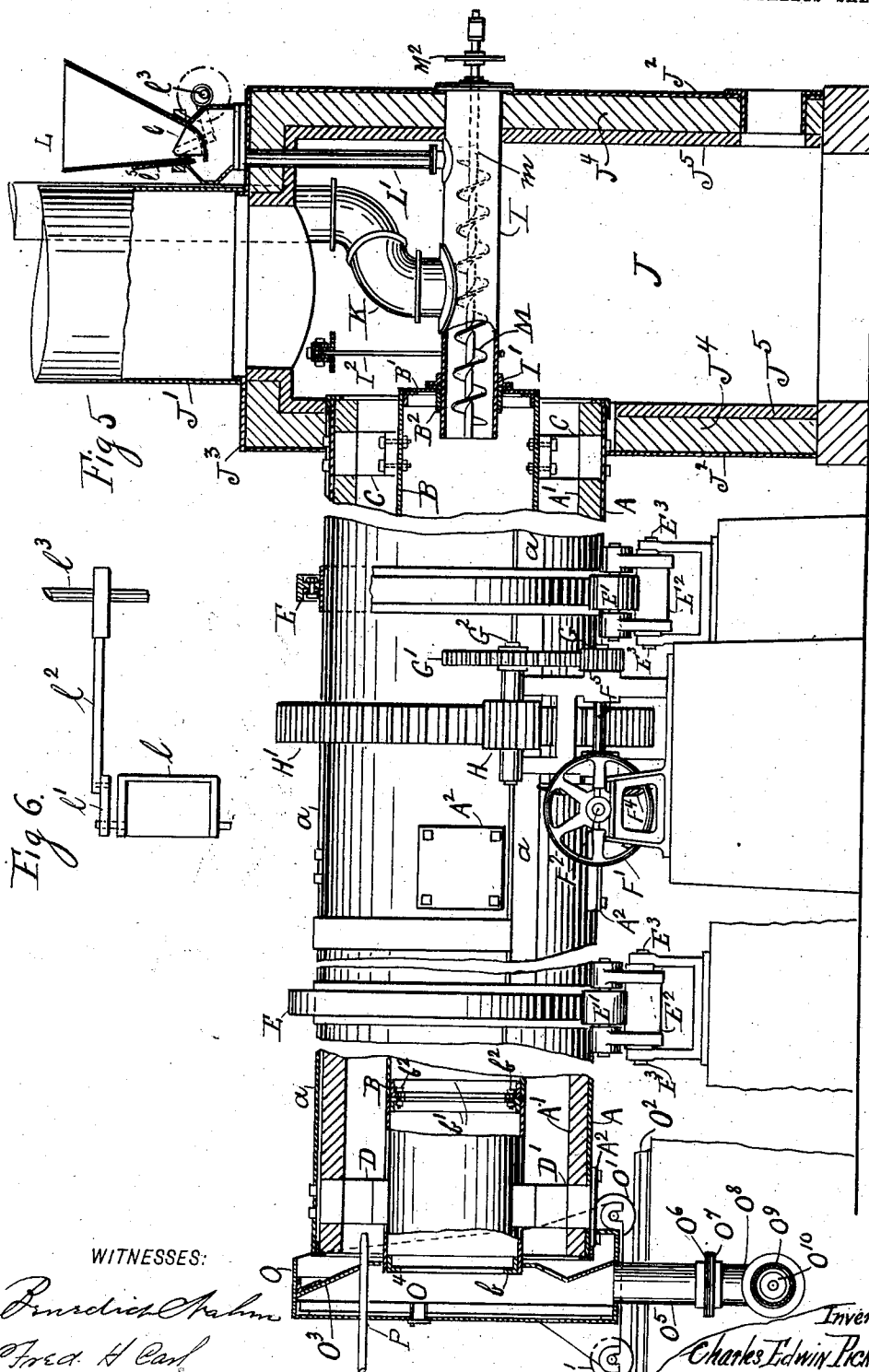
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WITNESSES:

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## UNITED STATES PATENT OFFICE.

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## DRYING AND CALCINING KILN.

SPECIFICATION forming part of Letters Patent No. 753,624, dated March 1, 1904.

Application filed September 18, 1903. Serial No. 173,660. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES EDWIN PICKETT, a citizen of the United States, and a resident of Bayonne, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Drying and Calcining Kilns, of which the following is a specification.

This invention relates to drying and calcining kilns, and has for its object a rotary kiln in which the material to be treated and the means for drying and calcining the same are introduced into different chambers, thereby avoiding the mixture of the products of combustion and gases of the fuel with the material to be treated.

My kiln is particularly adapted for drying and calcining borate of lime, although it may be employed for other substances.

My invention is characterized by a kiln composed of an outer and inner cylinder, obtaining thereby a chamber with the interior of the inner cylinder and a second chamber with the annular space between the cylinders. By introducing the material to be handled into the interior of the inner cylinder and heat into the annular chamber between the cylinders means are provided by which the temperature of the material to be handled is easily controlled.

Referring to the drawings, Figure 1 represents an elevation of the kiln with its appurtenances. Fig. 2 shows a top view of Fig. 1. Fig. 3 is a partial section of Fig. 1 on the line *x x*. Fig. 4 represents an enlarged section of Fig. 1 on the line *x' x'*. Fig. 5 shows enlarged fragmentary section of Fig. 2 on the line *x'' x''*. Fig. 6 represents an enlarged plan view of hopper-valve and appurtenances.

The kiln is comprised of the outer cylinder A, having the fire-brick lining A', on the inside of which there is supported the inner cylinder B by means of the brackets C, which form rigid connections between the cylinders, at one end thereof, and the guide-lugs DD', which support the inner cylinder, being only bolted, respectively, to the outer cylinder A and to bonnets A'', constituting combined guides and supports for the inner cylinder, allowing the cylinders to expand and contract when subjected to various degrees of temperature. Bear-

ing-rings E are fastened around the outer cylinder A and are supported in rollers E', carried in frames E'', which latter are pivoted by means of the pins E'', supported in bearings E''.

Tight and loose pulleys F F' are carried on a driving-shaft F'', which latter carries a bevel-pinion F'', that meshes with a bevel-gear F'', supported on a shaft F''. The latter shaft carries a pinion G, which meshes with a spur-gear G', and on the shaft G' of the spur-gear G' there is secured the pinion H, that meshes with the spur-gear H', which latter is secured to the outer cylinder A.

The cylinders A and B are inclined and at their elevated ends enter a smoke-box J, from which extends the chimney J'. The said box J has the iron walls J'' and the cover J'', brick backing J'', and fire-brick lining J''. In the box J there is supported the casing I, which extends through a bearing B'', carried on the head B' of the inner cylinder B, and an angular ring I', carried on the casing I, bears against the said bearing B''. A vapor-escape pipe K extends from the casing I to the outside of the chamber J.

A hopper L is located on top of the box J, and its outlet-pipe L' is connected to the casing I. A hanger I'' flexibly supports the casing I. On the inside of the casing I there is located the screw conveyer M, having a shaft *m*, on which is secured a pulley M'' for driving the same.

At the lower end of the cylinders is located a movable head O, which is supported on a truck, with the truck-wheels O' arranged on tracks O''. A partition O'' in the said head O forms a chamber O'' therein and from the bottom of the said chamber there extends the pipe O'' with flange O'', which latter fits over a flange O'', carried on a pipe O'', that connects with a horizontal casing O'', having a screw conveyer O''. Oil-burners P extend through the head O and into the annular space or chamber between the two cylinders A and B.

Referring to the guide-lugs D and D', the latter are located in pairs between the two cylinders and the former are bolted directly to the shell of the outer cylinder A, while each of the latter is secured to a bonnet A'', which is bolted over an opening A'' in the said shell,

the opening being large enough to allow the head  $d$  of the guide-lug to pass through, the foot  $d'$  being made sufficiently long to prevent it dropping through. This construction is  
 5 advantageous when for any reason the free end of the inner cylinder is jammed between the lugs  $D D'$ , as by loosening the bonnets  $A^3$  the said lugs  $D'$  can be easily loosened from both of the cylinders.

10 The hopper  $L$  has a valve  $l$ , which is actuated by an arm  $l'$ , connected to an arm  $l''$  of an eccentric carried on the shaft  $F^3$ . The latter is driven by means of the pulley  $l'$ , belted with the pulley  $f$  on the shaft  $F^2$ . A gate  $l^5$   
 15 controls the opening from the hopper.

The outer cylinder  $A$  has the longitudinal straps  $a$  for its longitudinal seams and the straps  $a'$  for its cross-seams.

The inner cylinder  $B$  is composed of sections  
 20 joined by the angular flanges  $b'$  and  $b''$ , which latter are joined by the bolts  $b^2$  and the internal straps  $b^3$ . The flanges  $b'$ , with their bolts  $b^2$ , allow the easy removal of the end section of the inner cylinder  $B$ .

25 To operate my invention, the head  $P$ , with its burners, is placed in position, the shaft  $F^2$  being driven from a suitable source of power. The material is introduced into the hopper  $L$ , and the valve  $l$  allows it to drop through the  
 30 pipe  $L'$  into the casing  $I$  in the requisite quantity. The conveyer  $M$  conducts the material through the casing  $I$  and into the inner cylinder  $B$ , which latter turning and being inclined conducts it to its discharging end. The material then drops into the chamber  $O^4$  of the  
 35 head  $O$ , where it is led through the piping  $O^5$   $O^8$  into the casing  $O^9$  and to the conveyer  $O^{10}$ , the latter carrying it to any desired point. The heat from burners  $P$  dries the material  
 40 as it enters the inner cylinder  $B$  and calcines it before leaving the same, the flanges  $b$  and  $b'$ , preventing a too rapid travel through the kiln. The gases and vapors generated by heating the material pass up the vapor-pipe  
 45  $K$ , and the gases and products of combustion from the fuel pass up the chimney  $J'$ , thereby preventing the deterioration of the material by the latter.

Having described my invention, I claim—  
 50 1. In a kiln, the combination of an outer cylinder and an inner cylinder, a smoke-box at one end of the cylinders, a chimney extending from the said box, a conveyer leading to the inside of the inner cylinder, a hopper with piping  
 55 leading to the said conveyer, a casing for the conveyer and a vapor-escape pipe leading from

the casing, means to rotate the conveyer, means to rotate the cylinders, and means to heat the annular space between the cylinders.

2. In a rotary kiln, the combination of an  
 60 outer cylinder and an inner cylinder, brackets to clamp the cylinders together at one end, combined guides and supports secured to the outer cylinder to support the inner cylinder  
 65 therein, allowing the cylinders to expand and contract, a movable head at the discharge end of the kiln, trucks for the said head, oil-burners passing through the head into the space  
 70 between the cylinders, means to rotate the cylinders, means to introduce material into the inner cylinder in specified quantities, means to discharge the products of combustion, and  
 75 independent means to discharge the vapor and gases generated from the heating of the material, so as to separate the vapor and gases from the said material, and the gases from the products of combustion.

3. In a rotary drying-kiln, the combination of an outer cylinder, and an inner cylinder  
 80 therein, flanges on the inner cylinder to secure sections thereof together, and an internal flange at the discharge end of the inner cylinder, brackets securing the two cylinders together at the inlet ends thereof, combined  
 85 guides and supports fastened to the outer cylinder supporting the inner cylinder, said combined guides and supports fastened to a bonnet detachably secured to the outer cylinder, for supporting the inner cylinder, means to introduce a material into the inner cylinder, means  
 90 to heat the chamber between the two cylinders, means to lead off the products of combustion, means to lead off the gases generated when heating the material.

4. In a rotary drying-kiln, the combination  
 95 of an outer cylinder and an inner cylinder therein, a conveyer connected to the inlet end of the inner cylinder, a casing for the said conveyer, a hopper arranged to discharge into the said casing, an opening in the hopper, a  
 100 gate for the said opening, a valve in the bottom of the hopper, means to actuate the valve, means to rotate the cylinders, and means to heat the space between the cylinders.

Signed at Bayonne, in the county of Hudson and State of New Jersey, this 1st day of  
 105 September, A. D. 1903.

CHARLES EDWIN PICKETT.

Witnesses:

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 E. W. HARDING.