No. 821,355. PATENTED MAY 22, 1906.

O. GERLACH.

ROTARY KILN.

APPLICATION FILED MAY 18, 1904.

2 SHEETS—SHEET 1.

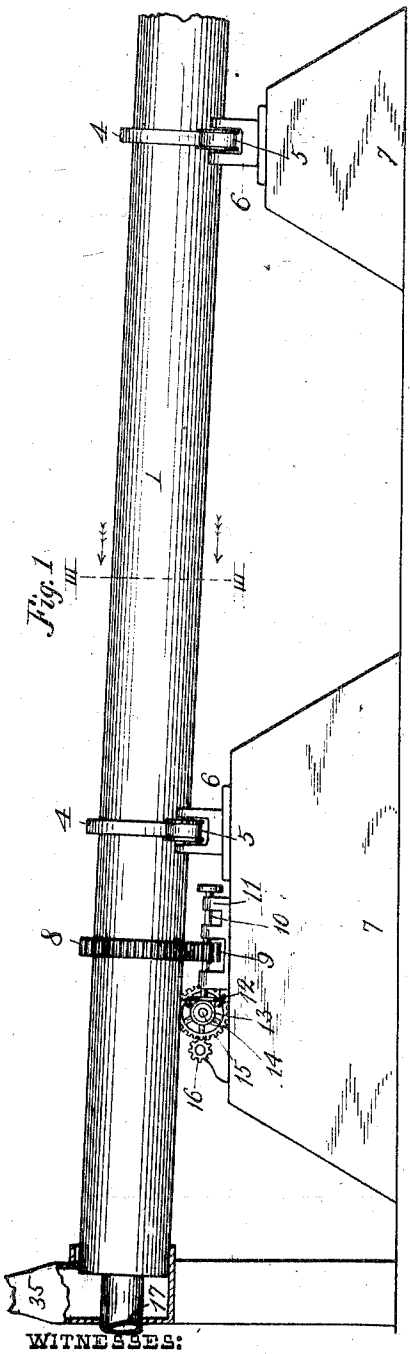


Fig. 1

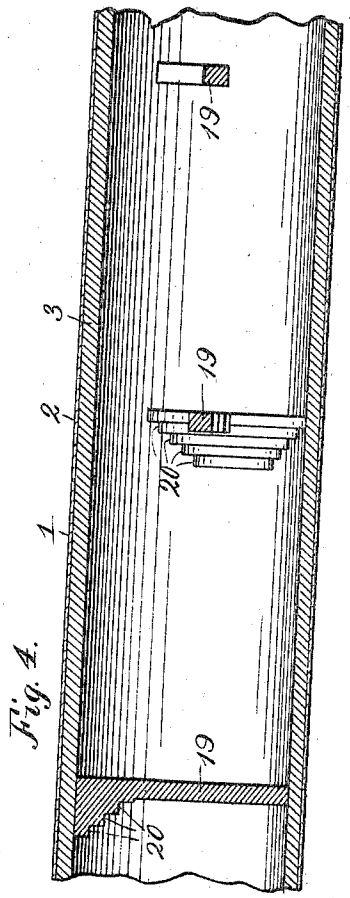


Fig. 4.

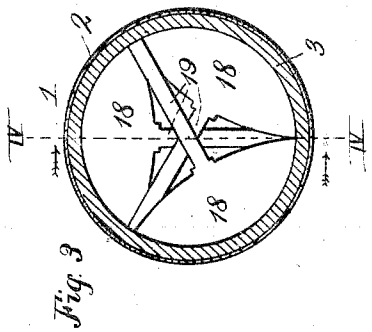


Fig. 3

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2 SHEETS—SHEET 2.

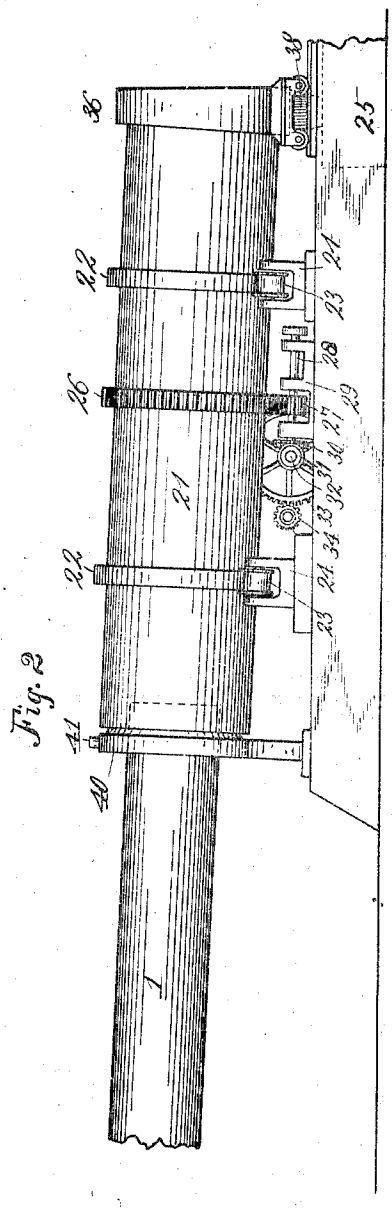


Fig. 2

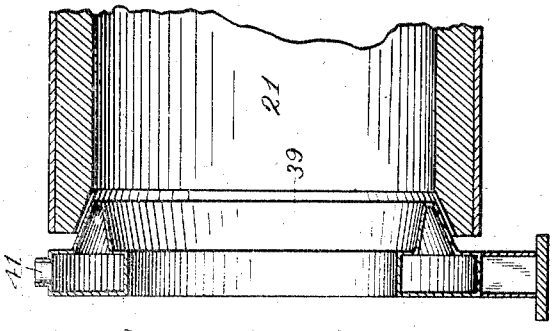


Fig. 4

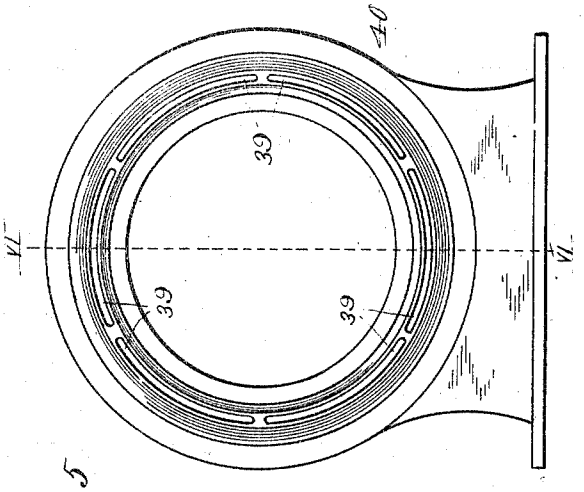


Fig. 5

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OSCAR GERLACH, OF IOLA, KANSAS.

ROTARY KILN.

No. 821,955. Specification of Letters Patent. Patented May 22, 1906.

Application filed May 18, 1904. Serial No. 208,634.

To all whom it may concern:

Be it known that I, OSCAR GERLACH, a citizen of the German Empire, residing at Iola, in the county of Allen and State of Kansas, have invented certain new and useful Improvements in Rotary Kilns, of which the following is a specification.

My invention relates to improvements in rotary kilns for drying, decomposing, and calcining cement raw material, ores, &c.; and my object is to accomplish these results expeditiously and with the greatest economy in fuel.

The invention consists in two communicating cylinders mounted to rotate independently of each other at variable speed in order to regulate the output of the apparatus and control the passage of heat therethrough and means for retarding the passage of heat from one cylinder into the other.

In the process of calcining the cement raw material the latter passes through three stages—viz., drying, decomposing, and calcining. The first two steps are best accomplished by agitating the material and thoroughly exposing it to a comparatively low heat—for instance, 1,300° Fahrenheit. The last step is accomplished by subjecting the decomposed material to intense heat. In ordinary apparatus this process takes place in one cylinder, with the result that the material is subjected to too intense heat during the first two steps of the process. When the material is thus prepared in one cylinder, the product is obtained at great cost of fuel, as the heat leaves the cylinder at a high deg ee. With my apparatus the finishing step is accomplished in one cylinder with heat at a high degree, which passes into the communicating cylinder, where it is nearly all utilized in drying and decomposing the material before finally escaping into the chimney.

In order that the invention may be fully understood, reference will now be made to the accompanying drawings, in which—

Figure 1 represents a broken side elevation of the apparatus. Fig. 2 is a continuation of the same. Fig. 3 is a transverse section of the drying and decomposing cylinder, taken on line III III of Fig. 1. Fig. 4 is a longitudinal section of the same, taken on line IV IV of Fig. 3. Fig. 5 is a detail front elevation of an annular casing and nozzle forming part of the invention. Fig. 6 is a vertical section of the same, taken on line VI VI of Fig. 5.

In carrying out the invention I employ a long drying and decomposing cylinder 1, comprising an outer metallic shell 2, lined with fire-brick 3. Said cylinder is provided near its opposite ends with annular bands 4, mounted upon flanged rollers 5, journaled in brackets 6, resting on foundations 7. Cylinder 1 is driven by a rigidly-secured cog-rim 8, meshing with a pinion 9, rigidly mounted upon shaft 10, journaled in bearings 11 and provided at one end with a rigidly-mounted bevel-wheel 12, meshing with a bevel-wheel 13, mounted upon a shaft 14, provided with a rigidly-mounted cog-wheel 15, which meshes with and is driven by a pinion 16. Cylinder 1 is arranged at an inclination, as shown, so that the material introduced through feed-opening 17 will travel toward the depressed end of said cylinder when the latter is rotated. The material is retarded and agitated in its passage through cylinder 1 by three sets of segmental deflecting-walls 18, communicating with the interior surface of wall 3 and arranged at an angle of one hundred and twenty degrees to each other, as shown in Fig. 3. Said walls are held from collapsing when in an elevated position by supporting-columns 19, extending from the central portion thereof to the opposite side of wall 3, as shown in Fig. 3. The material is divided by the column and is also separated by being carried up and discharged from the step-shaped sides 20 of the segmental walls, it being thoroughly exposed to the action of the heat in its fall from said step-shaped portions, which latter also reinforce the segmental walls, so the latter will better withstand the heat to which they are subjected. After the material has been thoroughly dried and decomposed in cylinder 1 it is discharged from the depressed end of the latter into a communicating cylinder 21, of larger diameter, but much shorter in length than cylinder 1 in order to receive the discharge end of the latter. Cylinder 21 is preferably arranged at the same inclination as cylinder 1. (See Fig. 2.) Cylinder 21, like cylinder 1, is provided near its opposite ends with bands 22, mounted upon flanged rollers 23, journaled in brackets 24, resting upon a foundation 25. It is also provided with a rigidly-mounted cog-rim 26, meshing with a pinion 27, mounted upon a shaft 28, journaled in bearings 29 and provided at one end with a bevel-wheel 30, meshing with a bevel-wheel 31, mounted upon a

shaft 32, provided with a cog-wheel 33, driven by a pinion 34. By thus independently mounting and driving the cylinders the latter may be rotated at variable speeds, and thus regulate the travel of the material therethrough, controlling the escape of the products of combustion after its tortuous passage through cylinder 1 to a chimney 35, communicating with the elevated end of cylinder 1.

The decomposed material is calcined in its passage through cylinder 21 by flame and intense heat introduced into the depressed end of said cylinder from a fuel-chamber 36 and is finally discharged into a clinker-pit through spout 38.

The heat is prevented from pursuing a straight course through the upper portion of cylinder 1 by the deflecting-walls 18, which cause it to pass through the material falling before it, so that nearly all of said heat will be utilized before it escapes from the cylinder.

The flame is prevented from partly escaping through the annular joint between the communicating ends of the cylinders by an air-blast discharged therein from an annular nozzle 39, communicating with an annular casing 40, provided with an inlet-pipe 41, communicating with a fan or blower, (not shown,) which supplies air to the nozzle at sufficient pressure to repel the flame at this point.

Cylinder 21 and fuel-chamber 36 are of ordinary construction, and the latter may be arranged to burn oil, gas, or powdered coal injected in the usual manner.

While I have shown and described cylinder 1 as being provided with three sets of segmental deflecting-walls, the shape and number of the latter of course may be changed without departing from the spirit or scope of the appended claims, and I reserve the right to make such other changes as properly fall within the scope of said claims.

When a roasting or drying apparatus is constructed with my improvements, provision is made for employing two independently-mounted and two independently-driven cylinders so arranged relatively to each other that the material which passes through the primary cylinder on dropping therefrom is received directly within the second cylinder, and at the same time provision is made for preventing the escape of any of the heated gases or products of combustion at the adjacent ends without requiring that the cylinders shall be fitted tightly to each other and without requiring the presence of a supplemental structure to encompass the adjacent ends.

Serious trouble and inconvenience are met if furnace-cylinders are fitted together in such a way as to have a tight joint, due to the expansion and contraction of adjacent parts and to the unevenness of expansion and contraction of the parts at the end of one cylinder in comparison with the expansion and contraction at the end of the other. When a mechanism is constructed in such way as to embody my improvements, the cylinders can be thus brought close together or even overlapped—that is, have the end of one inserted into the end of the other—without the necessity of a tight joint, for I provide means for preventing the escape of any of the highly-heated air, gases, or products of combustion at the region of the joint. In the construction shown the devices at 39 and 40 for delivering the blast of air or similar agent constitute the means referred to for thus overcoming the disadvantages incident to having the cylinders brought together without a tight joint.

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

1. In a rotary kiln, two communicating cylinders suitably mounted one of which is provided with a furnace, and a blast arranged at the communicating ends of the cylinders for checking the flame from the furnace at the joint between the said communicating ends.

2. In a rotary kiln, two communicating cylinders independently mounted and arranged in axial alinement, one cylinder being larger in diameter than the other to receive the discharge end of the latter, a furnace communicating with one end of the large cylinder, and an annular nozzle communicating with the opposite end of said large cylinder and a blast.

3. In a rotary kiln, two communicating cylinders suitably mounted one of which is provided with a furnace, an annular nozzle arranged at the communicating ends of the cylinders, and an annular casing with which the nozzle communicates.

4. In a rotary kiln, a cylinder rotatably mounted, deflecting-walls suitably arranged in said cylinder, and supporting-walls suitably arranged in said cylinder, and supporting-columns interposed between the deflecting-walls and the wall of the cylinder.

5. In a rotary kiln, a cylinder rotatably mounted, and deflecting-walls suitably arranged in said cylinder and having steps at one side.

6. In a kiln or furnace two rotating cylinders in alinement having the delivery end of one cylinder arranged relatively to the second cylinder to deliver material directly from the rotary part of one to the rotary part of the other without either contacting with the other, and means for preventing the escape of air or products of combustion at the place where their ends are adjacent, substantially as set forth.

7. In a kiln or furnace two cylinders in alinement independently mounted and independently driven, one having its delivery end adjacent to the receiving end of the other and

arranged to deliver material directly from the first to the second, and each being out of contact with the other, and means for preventing the escape of air or products of combustion at the place where their ends are adjacent, substantially as set forth.

8. In a rotary kiln, a rotary cylinder having a furnace at or communicating with one end thereof and having at the other a central or axial discharge for the products of combustion from the said furnace, and means for delivering streams or a current of air or equivalent agents at the interior peripheral part of said cylinder at the end opposite to the furnace to prevent or check the escape of products of combustion from said peripheral part, substantially as set forth.

9. In a rotary kiln, rotating communicating cylinders, one having its end inserted into the other without contacting therewith and means for preventing the escape of air or products of combustion at the place where they overlap, substantially as set forth.

In testimony whereof I affix my signature in the presence of two witnesses.

OSCAR GERLACH.

Witnesses:
J. A. WHEELER,
A. V. LEMASTERS.