

No. 815,705.

PATENTED MAR. 20, 1906.

H. HITZEL.
ROTARY CEMENT KILN.
APPLICATION FILED OCT. 31, 1904.

3 SHEETS—SHEET 1.

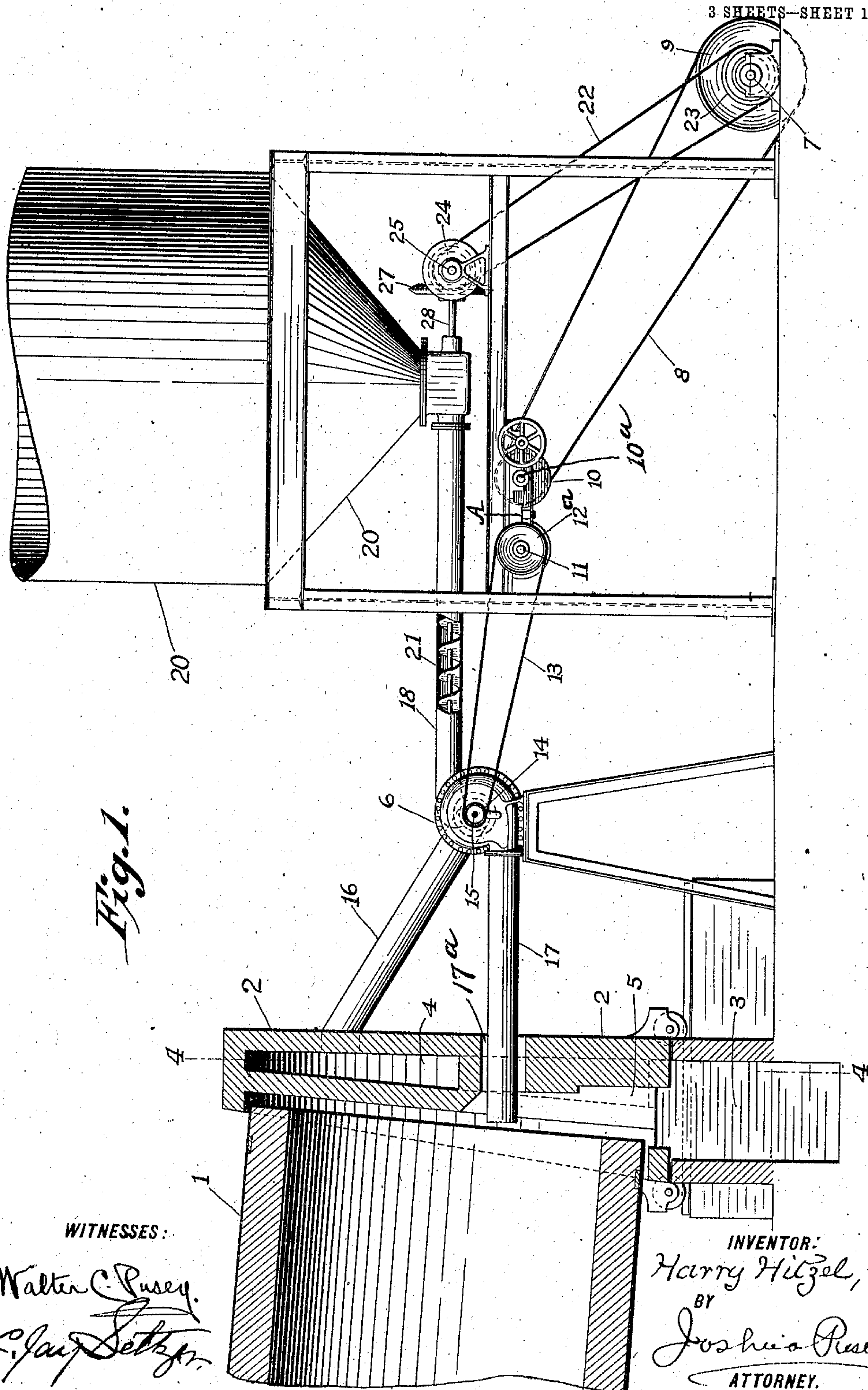


Fig. 1.

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C. J. Setzer.

INVENTOR:

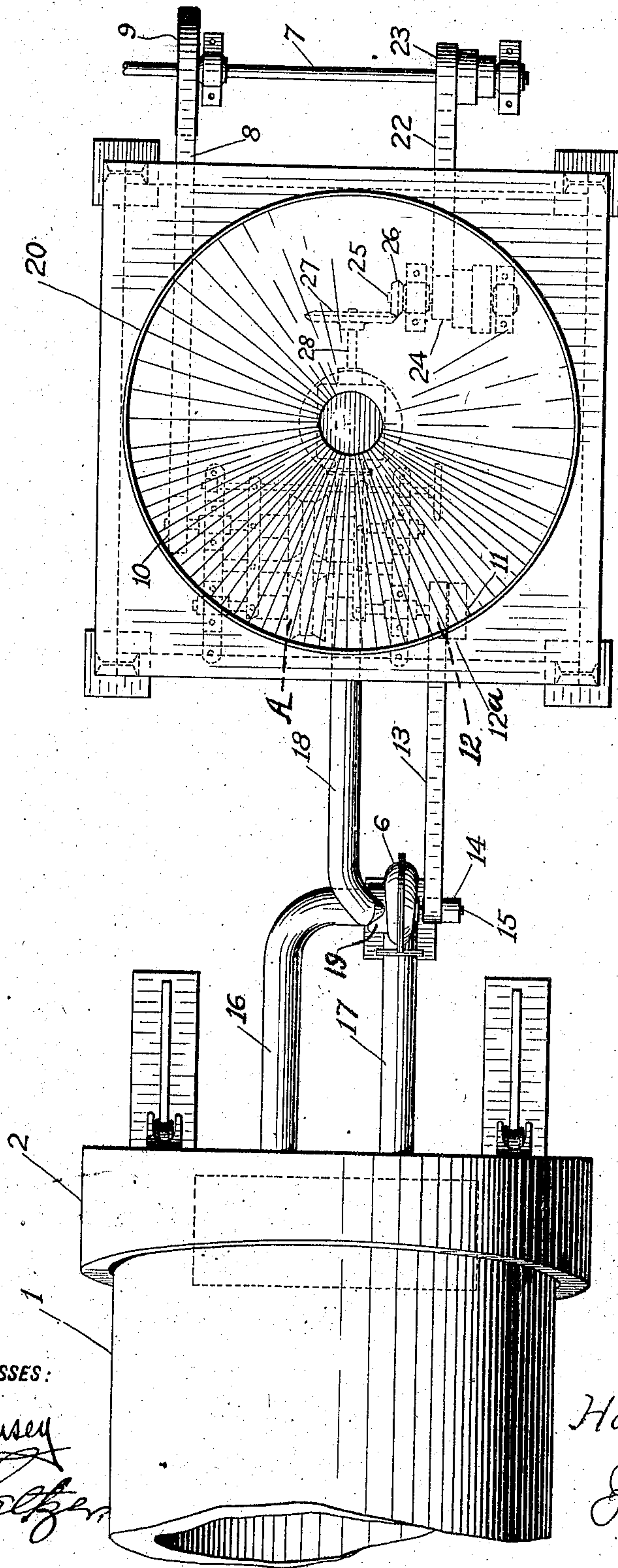
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3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

Fig. 4.

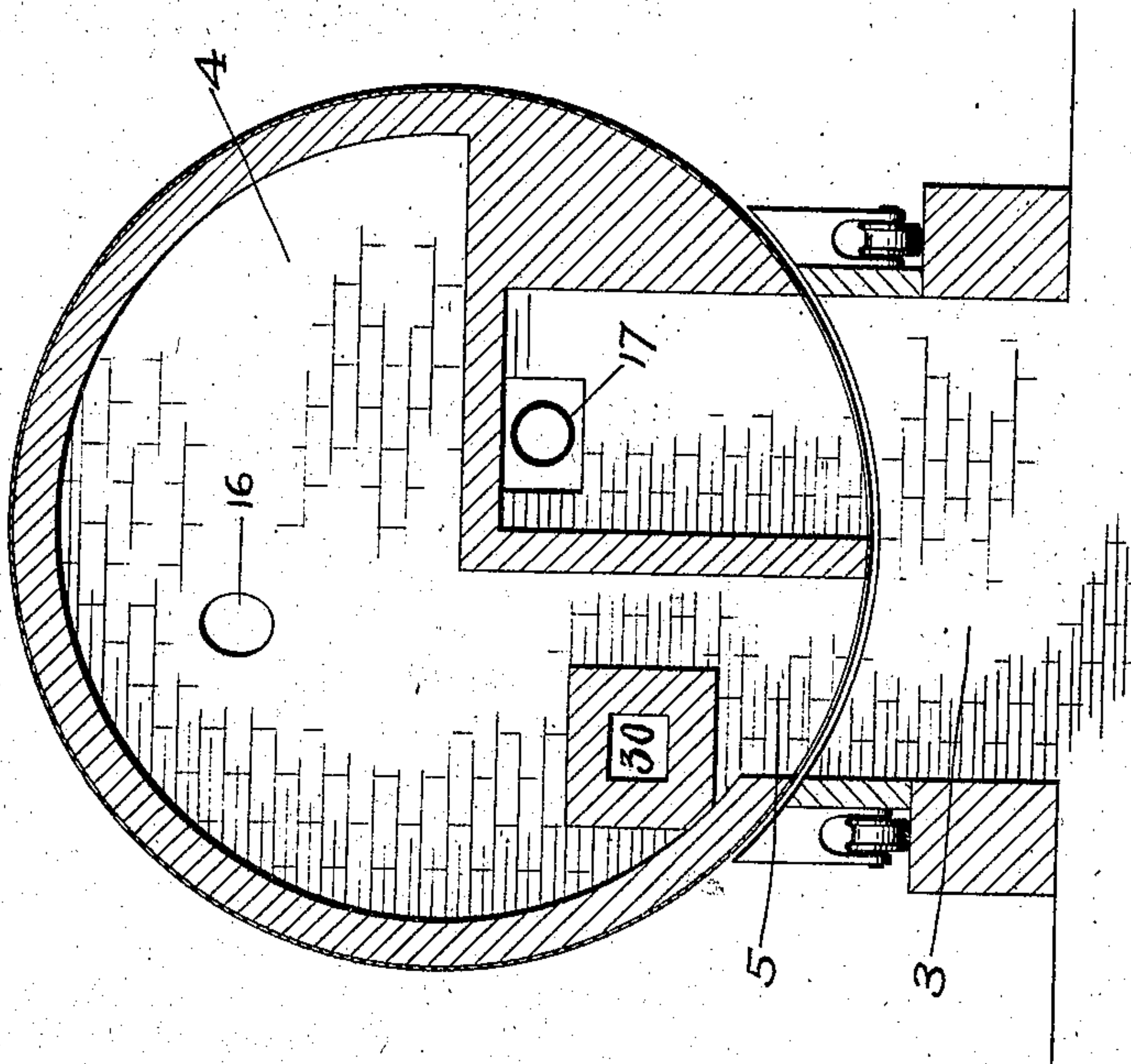
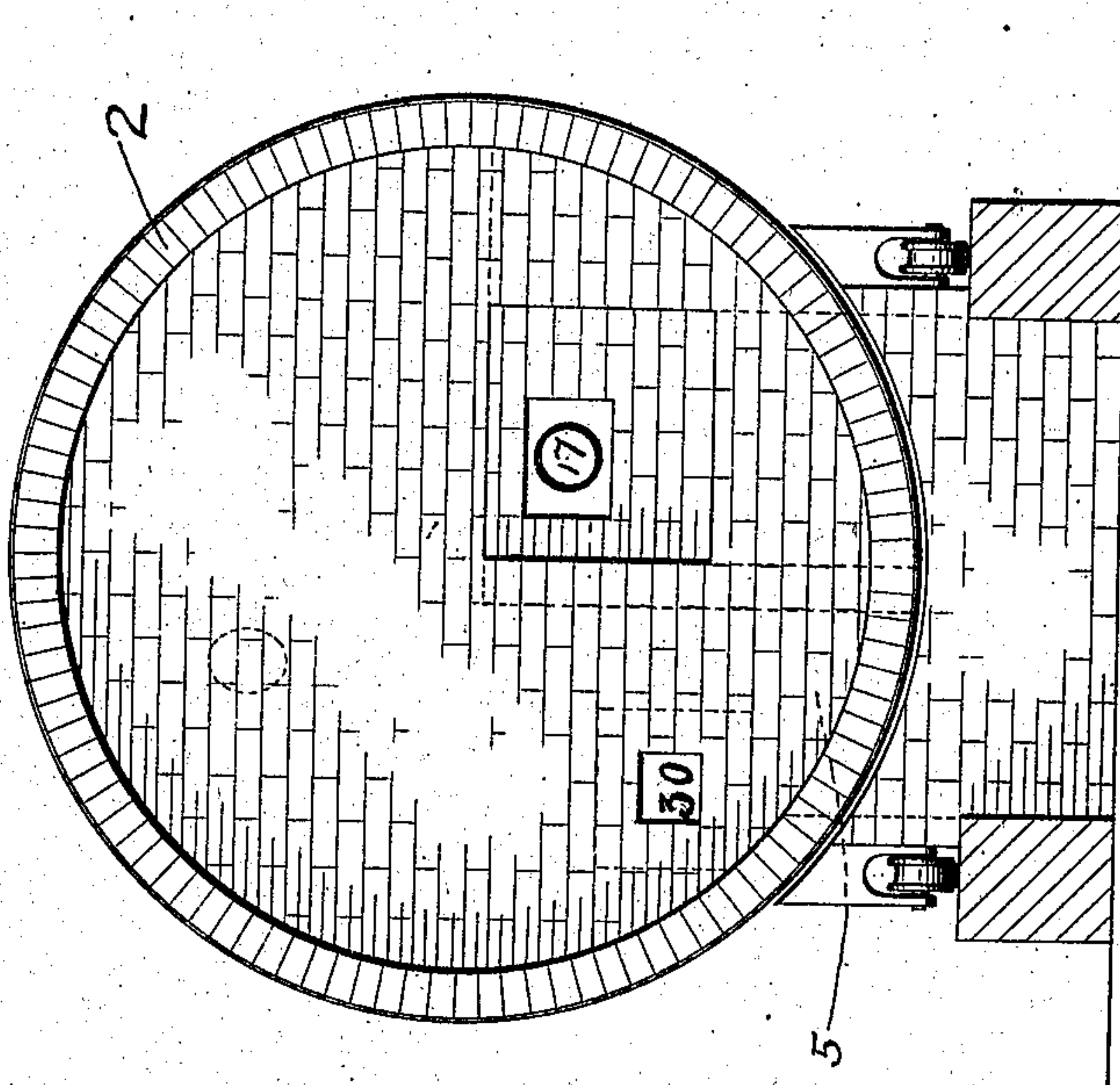


Fig. 3.



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UNITED STATES PATENT OFFICE.

HARRY HITZEL, OF ALPHA, NEW JERSEY, ASSIGNOR TO ALPHA PORTLAND CEMENT COMPANY, OF ALPHA, NEW JERSEY, A CORPORATION OF NEW JERSEY.

ROTARY CEMENT-KILN.

No. 815,705.

Specification of Letters Patent.

Patented March 20, 1906.

Application filed October 31, 1904. Serial No. 230,774.

To all whom it may concern:

Be it known that I, HARRY HITZEL, a citizen of the United States, residing at Alpha, in the county of Warren and State of New Jersey, have invented certain new and useful Improvements in Rotary Cement-Kilns, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, of which—

10 Figure 1 is a side elevation, partly in section, of an apparatus for burning cement having my invention embodied therein. Fig. 2 is a plan view. Fig. 3 is an end elevation of the kiln or furnace looking at the hood end thereof. Fig. 4 is a full section on line *x x*, Fig. 1.

15 This invention relates more especially to apparatus for injecting finely-pulverized carbonaceous fuel into rotary cement-kilns by means of a current of air; and its object is to economize the cost of burning the cement by injecting the fuel into the kiln by means of hot air with which the fuel is commingled in a suitable blower used to force the hot air and
25 fuel into the kiln.

To this end the invention consists in the combination, with the kiln, of a rotary blower, an inlet-pipe leading from a source of supply of hot air into the blower, means for feeding
30 into the latter a uniform quantity of carbonaceous fuel in finely-powdered form, and an outlet-pipe from said blower for the hot air and fuel, which pipe leads into the kiln.

The invention further consists of certain
35 details of construction and combinations hereinafter described and particularly pointed out.

Referring now to the accompanying drawings, which illustrate a particular form of the invention which I have found to operate very
40 successfully in actual practice, 1 is a rotary kiln or furnace, the lower end portion from which the calcined clinker escapes only being shown.

45 2 is the stationary (that is, non-rotatable) hood adjacent to the end of the kiln and usually built up of suitable brick. 3 is the pit, usually termed the "clinker-pit," into which the hot cement-clinker falls as it leaves the
50 kiln. I make this hood with a chamber 4, that preferably communicates by a vertical pas-

sage-way 5 with the clinker-pit, through which passage-way hot air from the clinker-pit enters the chamber 4.

6, Figs. 1 and 2, is an ordinary rotary
55 blower, driven from a suitable source of power. In this instance said blower is driven from a shaft 7 through a belt 8 passing around a pulley 9 on said shaft, and around a pulley 10 on a shaft 10^a. 11 is a shaft parallel with
60 shaft 10^a, on which is a tight pulley 12, (also a loose pulley 12^a), around which passes a belt 13, which also passes around a pulley 14 on the shaft 15 of the blower. The shafts 10^a and 11 are connected by a well-known device
65 A (indicated by dotted lines in Fig. 2) for varying the speed of the shaft 11, and consequently that of the blower, or any known means may be employed for changing the speed of rotation of the blower-shaft, as may
70 be required.

Leading from the interior of the before-mentioned chamber 4 into the central portion (that is, the suction part) of the blower is a pipe 16, and from the peripheral part of
75 the blower-casing (that is, the pressure part) a pipe 17 leads through an opening 17^a, through the hood 2, into the kiln 1. This pipe, which, however, may be concentric with the kiln, is preferably, as shown, directed a short
80 distance to one side and below the axis of the kiln, so as to direct the flame against the material within the kiln. Also leading into the central (suction) part of the blower-casing is a pipe 18, that in this instance enters a side
85 extension 19 of said casing, into which pipe opens the lower tapering end of a hopper 20, containing the pulverized fuel. Within said box and extending through the pipe 18 is a screw conveyer 21, Fig. 1, that is suitably
90 driven from the aforesaid shaft 7—in this instance, through the medium of a belt 22, passing around a cone-pulley 23 on said shaft and round a cone-pulley 24 on a shaft 25, having a bevel-gear 26, that engages a bevel-gear 27 on
95 the shaft 28 of the conveyer 21.

30, Figs. 3 and 4, denotes the usual "peep-hole" in the hood for observing the interior of the kiln. This hole is, however, sometimes omitted.

Having described the construction of my invention, I now proceed to describe the op-

eration thereof, as follows: The air in the clinker-pit 3 is highly heated by the clinker discharged thereinto from the kiln 1. This heated air is drawn into the hood-chamber 4 by way of passage 5 and by the suction induced by the blower through the pipe 16 into the blower, while at the same time a continuous uniform quantity of the finely-divided fuel from the hopper 20 is fed forward in pipe 18 by the screw conveyer and descends into the inlet-pipe 16. The air from the clinker-pit enters the hood-chamber 4 in a heated condition, but is therein superheated by the intense heat from the interior of the kiln, which heats the interior face of the hood, and hence the air in chamber 4. The finely-pulverized fuel entering the pipe 16 is sucked with the highly-heated air into the blower. Here being agitated by the rotary blower each particle of fuel is brought into contact with the air, and a thorough mixture of the air and fuel results of comparatively high temperature, which temperature may be caused to approach the ignition-point of the mixture as nearly as safety will permit; also, any particles of the fuel that may not have been pulverized finely enough will be disintegrated by the action within the blower of the rapidly-rotating blades thereof. This thorough mixture of the highly-heated air and pulverized fuel is ejected from the blower by way of the exit-pipe 17 and is injected into the kiln, in which it is ignited in the usual well-known way.

It has been found in the practical use of the described apparatus that there is a very considerable saving in the cost of burning of the cement as compared with the cost of burning the same when a current of cold air is used for injecting the fuel into the kiln, for the reason that the high temperature within the latter necessary to properly burn the cement is more easily and economically maintained by the use of my invention.

By suitably shifting the belt 22 on the cone-pulleys 23 and 24 the speed of rotation of the screw conveyer 21 may be varied, and consequently the quantity of fuel fed to the blower; also, by means of the variable-speed regulator A the quantity of hot air drawn into the blower and forced into the kiln may be varied as desired. Thus the relative quantities in the current of fuel and air caused to enter the kiln may be adjusted as circumstances shall require, and by suitable adjustments of speed the quantity of air mixed with the fuel within the blower may be made to approximate the entire amount necessary to support combustion within the kiln, if desired.

Having described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination with the rotary kiln, the clinker-pit, the hood having the chamber communicating with said clinker-pit, the blower, the pipe leading from said hood-chamber into said blower, the exit-pipe leading from the blower through said hood into the kiln, and means for supplying a continuous uniform quantity of pulverized fuel into said blower, substantially as set forth.

2. The combination with the rotary kiln, the clinker-pit, the hood having the chamber communicating with said clinker-pit, the blower, the pipe leading from said hood-chamber into said blower, the exit-pipe leading from the blower through said hood into the kiln, and means for supplying a continuous, uniform quantity of pulverized fuel into said first-mentioned pipe, substantially as set forth.

3. The combination with the rotary kiln, of the hood having the air-chamber therein, the blower, the pipe leading from said hood-chamber into said blower, the exit-pipe leading from the blower through said hood into the kiln, and means for supplying a uniform, continuous quantity of pulverized fuel into said blower, substantially as set forth.

4. The combination with the rotary kiln, of the hood having the air-chamber therein, the blower; the pipe leading from said hood-chamber into said blower, the exit-pipe leading from the blower through said hood into the kiln, the pipe communicating with said blower and with a source of fuel-supply, the rotary screw conveyer within the last-mentioned pipe, together with means for regulating the speed of said screw conveyer, and means for regulating the speed of said blower, substantially as set forth.

5. The combination with the rotary kiln, of the hood having the air-chamber therein, the blower, the pipe leading from said hood-chamber into said blower, the exit-pipe leading from said blower through said hood into the kiln, means for supplying a uniform continuous quantity of pulverized fuel into said blower, together with means for regulating the speed of said blower, and means for varying the quantity of pulverized fuel supplied to the latter, substantially as set forth.

In testimony whereof I have hereunto affixed my signature this 23d day of September, A. D. 1904.

HARRY HITZEL.

Witnesses:

ARNOLD FREDERICK GERSTEN,
ARNOLD FREDERICK SINCLAIR.