

R. BUDER.
LIMEKILN.

APPLICATION FILED AUG. 9, 1907.

931,180.

Patented Aug. 17, 1909.

4 SHEETS—SHEET 1.

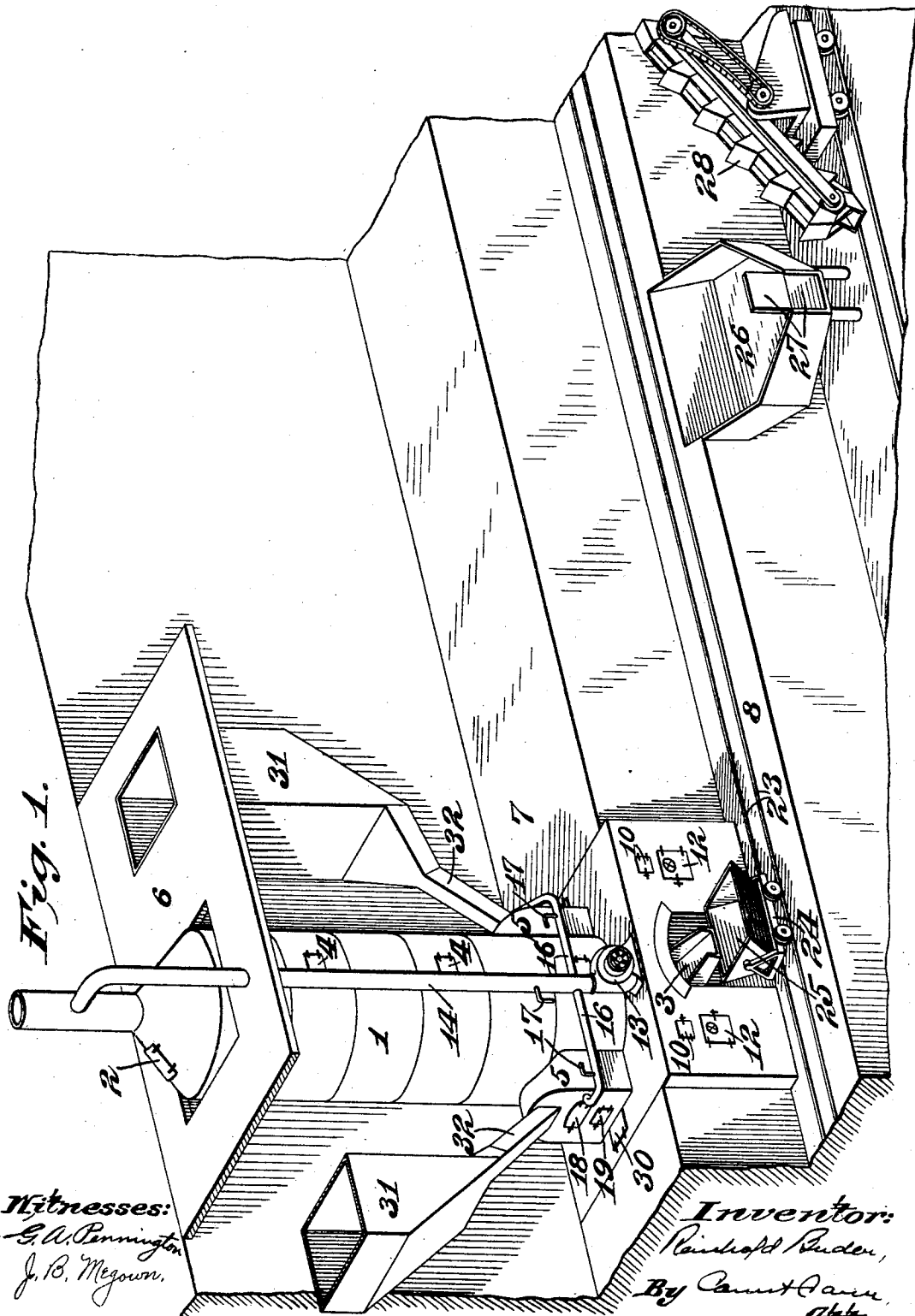


Fig. 1.

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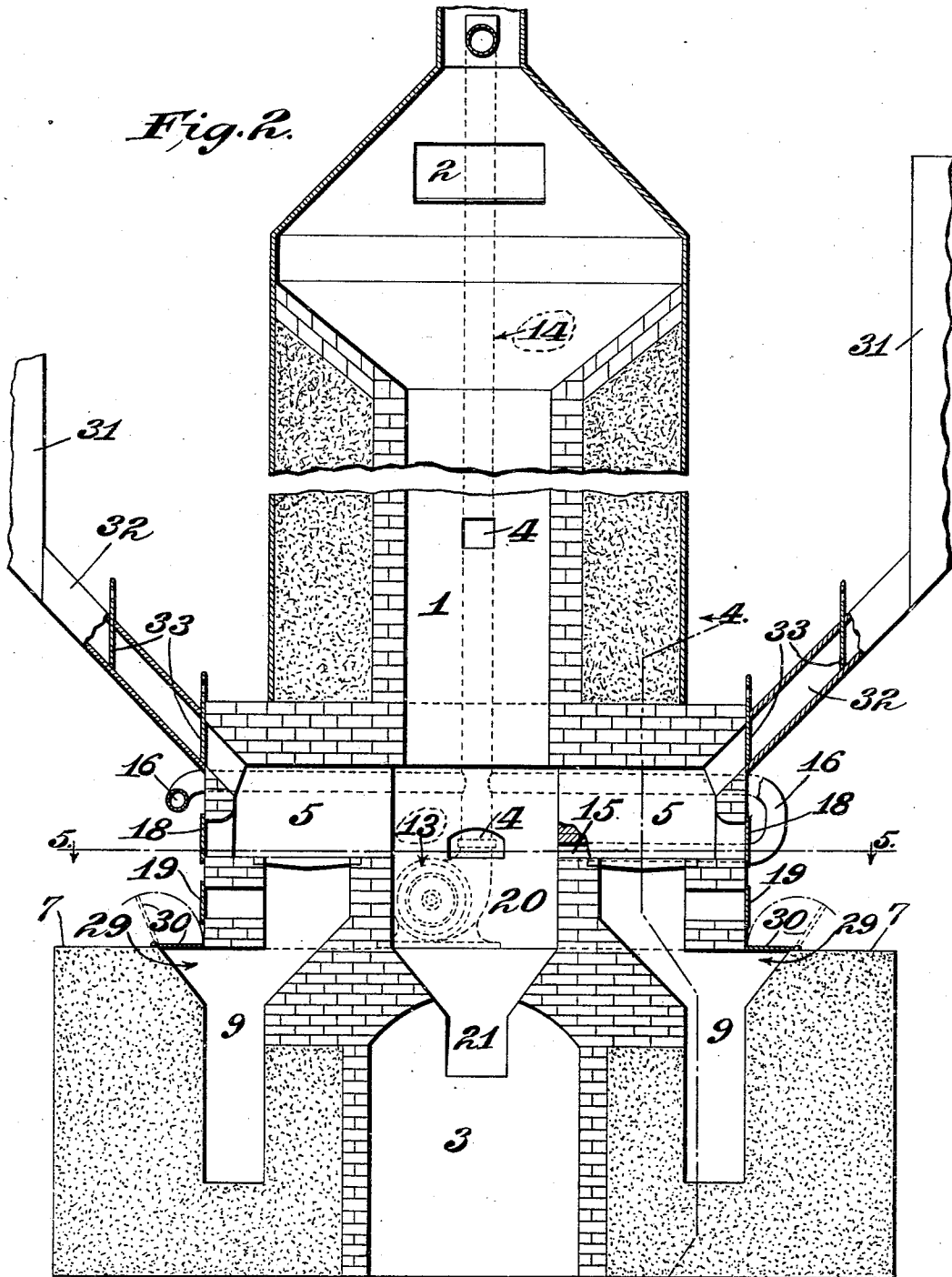
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4 SHEETS—SHEET 2.



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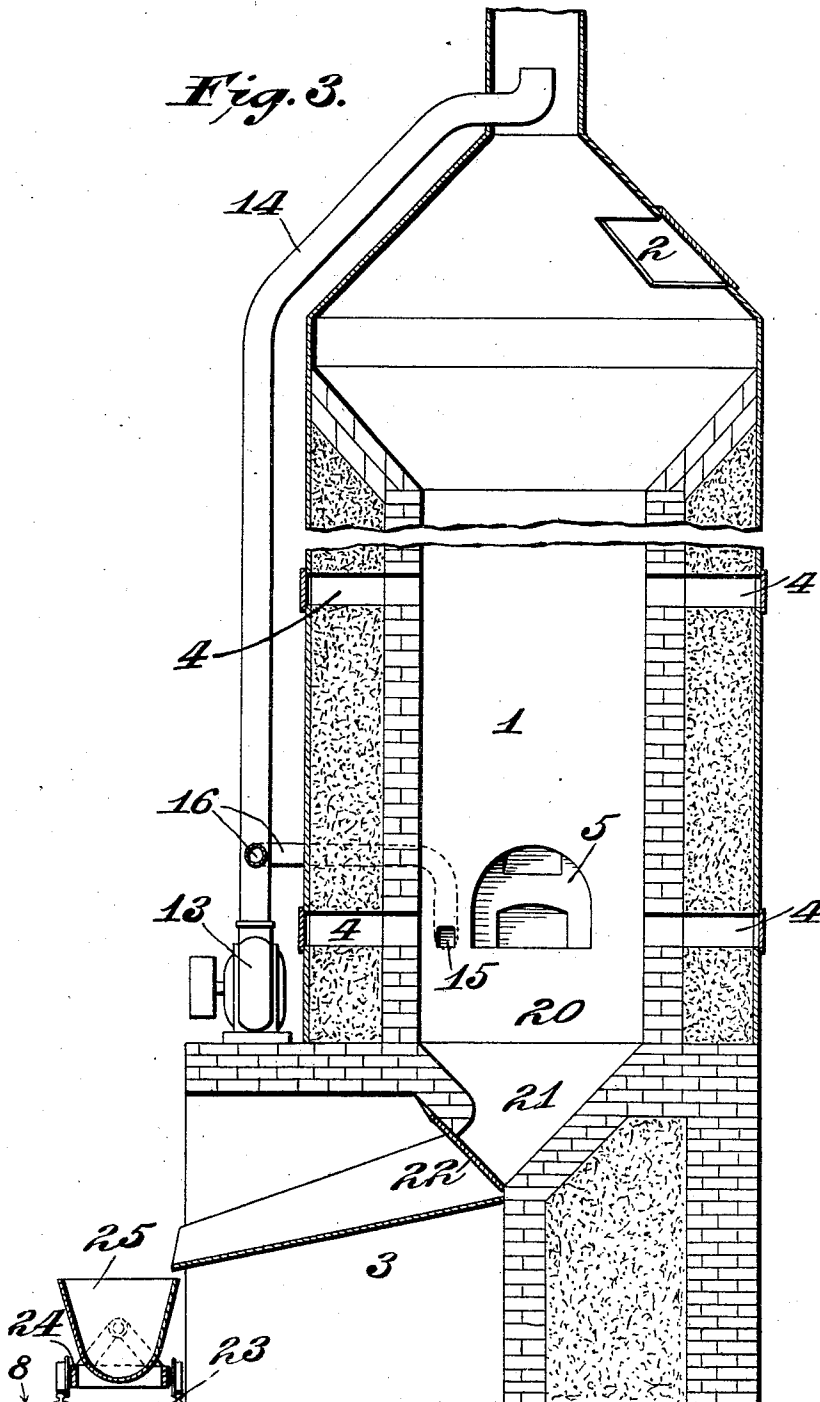
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4 SHEETS—SHEET 3.



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Fig. 4.

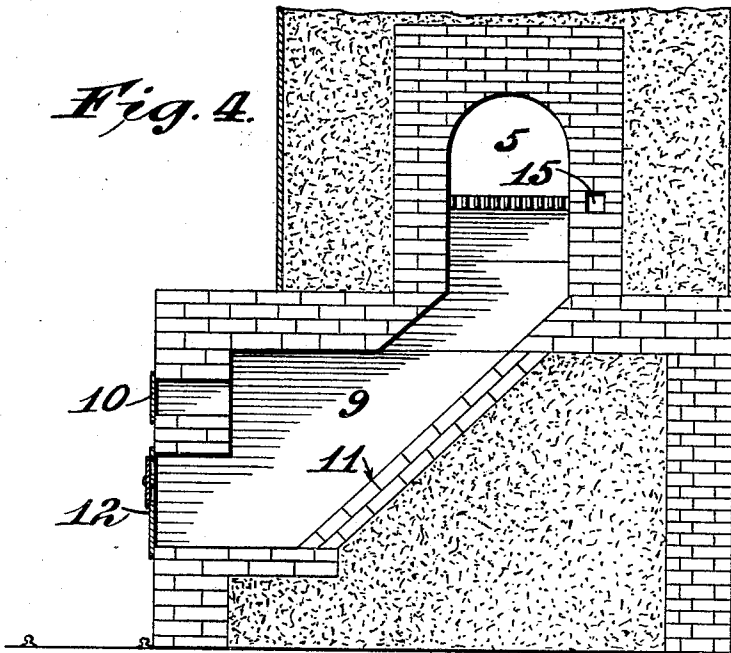
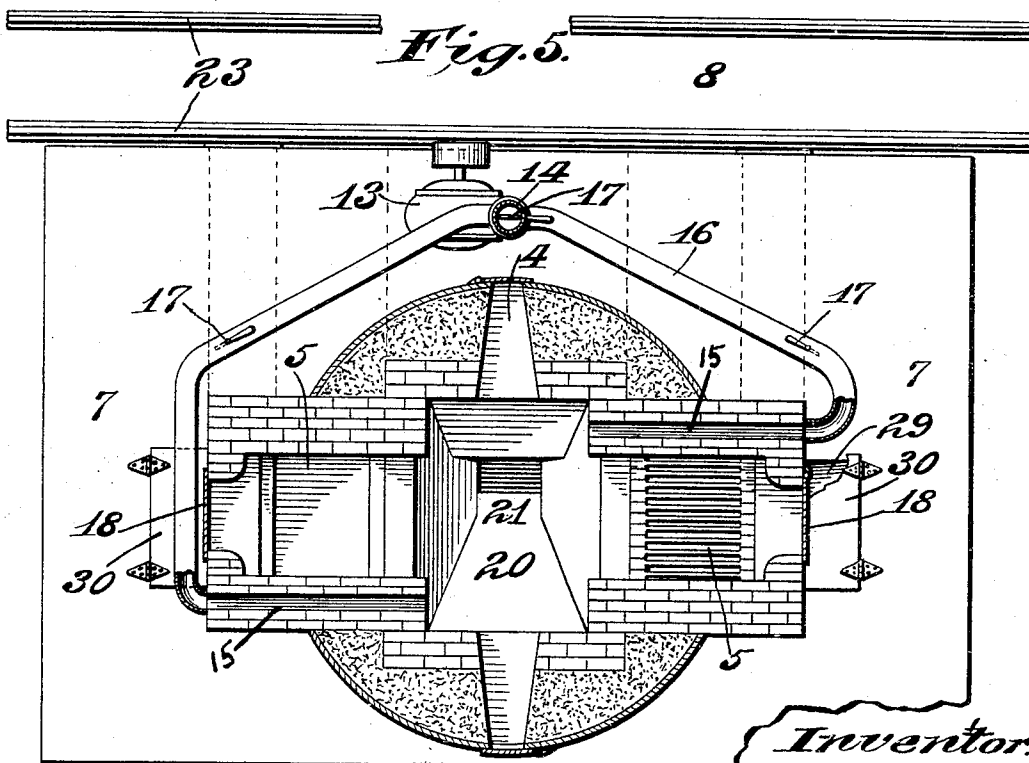


Fig. 5.



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UNITED STATES PATENT OFFICE.

REINHOLD BUDER, OF GRAY SUMMIT, MISSOURI.

LIMEKILN.

No. 931,180.

Specification of Letters Patent.

Patented Aug. 17, 1909.

Application filed August 9, 1907. Serial No. 387,858.

To all whom it may concern:

Be it known that I, REINHOLD BUDER, a citizen of the United States, and a resident of Gray Summit, county of Franklin, State of Missouri, have invented a new and useful Improvement in Limekilns, of which the following is a specification.

My invention relates to lime kilns. With lime kilns of the type commonly used at present almost the entire combustion is effected in the furnace and in the region immediately adjacent thereto. Besides, in such kilns, there is a tendency for the draft to follow definite channels of limited sectional area. In case of a round kiln, the drafts are usually confined to a course of limited area directly above each furnace. In a square kiln, the drafts are usually located at the corners of the kiln on account of the limestone packing more loosely at the corners than elsewhere. On account of the draft being restricted to a limited course, the heat in the lower portion of that course is intense, while the heat at a short distance laterally therefrom is considerably less. On account of such unequal distribution of the heat, the portions of the limestone adjacent to the furnace and in the direct course of the draft are fully burned before the calcination of the limestone at the same level but outside of the draft is completed; and in order to fully burn the limestone which lies outside of the direct course of the draft, it has been necessary to continue the burning a considerable time after the calcination process is completed with respect to the portions of the limestone in the direct draft. It follows from these facts that the unequal burning of the limestone at different portions of the kiln either decreases the number of "draws" that may be made therefrom in a given time, or else, increases the loss due to the insufficient burning of the limestone.

The principal object of the present invention is to overcome the defects above recited, and to secure a comparatively uniform distribution of the heat so as to burn all portions of the limestone at a given level uniformly.

Another object is to utilize the gases generated by the fuel that drops into the ash-pit.

To these ends, the invention consists principally in means whereby the draft is given a whirling movement in its lower course.

It also consists in providing a square kiln

with substantially horizontal passageways so located and arranged as to produce a draft in a horizontal direction along the side of the kiln from a point adjacent to the furnace.

It also consists in providing a kiln with means for producing a suction upwardly through the ashpit and furnace.

It also consists in means for increasing the range of combustion.

It also consists in an economical arrangement for handling lime.

It also consists in the arrangements and combinations of parts hereinafter described and claimed.

In the accompanying drawings, which form part of this specification, and wherein like symbols refer to like parts wherever they occur, Figure 1 is a perspective view of a lime kiln embodying my invention in connection with a system of handling lime; Fig. 2 is a vertical sectional view of the lime kiln; Fig. 3 is a similar view taken at right angles to the section of Fig. 2; Fig. 4 is a section on the line 4—4 of Fig. 2; Fig. 5 is a section on the line 5—5 of Fig. 2.

In its general features, my lime kiln is of the usual type, that is, it comprises a main stack 1 having an opening 2 near the top to admit the limestone, an opening 3 near the bottom for the delivery of lime, peep holes 4 at various elevations to permit the inspection of the contents of the stack, and furnaces 5 opening into the lower portion of the stack. It is also provided with a platform 6 near the top of the stack for the workmen to use in charging the stack, and a similar platform 7 for use in firing the furnaces, and a floor 8 below the delivery opening of the stack. Below each of the furnaces is an ashpit 9 having draft regulating doors 10 and an outlet chute 11 closed by a door or gate 12.

In order to lengthen the effective range of action of the products of combustion, the draft is increased by a suction apparatus. This suction apparatus comprises a fan or blower 13 of any suitable type whose outlet side is connected to a flue 14 which opens upwardly in the interior of the stack near the top thereof and thus creates an induced suction upwardly through the furnaces.

Preferably my kiln is of square cross section and has a furnace on each of two opposite sides. In the wall of the kiln at the side of each furnace is a substantially hori-

zontal passageway 15, which communicates through a branch flue 16 with the main flue on the delivery side of the blower 13. The passageway opens into the kiln near the corner thereof in a tangential direction, that is, in a direction substantially parallel to the adjacent side. As stated above, the draft in a square kiln is usually located at the corner thereof on account of the limestone packing more loosely at the corners. By my arrangement, the incoming blast from the delivery side of the blower enters the kiln near the corner and in a horizontal direction, whereby it gives the draft a rotary or vortical motion which carries it against the limestone at the sides of the kiln. These draft passageways 15 on opposite sides of the kiln are arranged diametrically opposite so as to cooperate with each other in producing a vortical motion of the draft; and in consequence of this vortical motion, the draft reaches portions of the limestone that would otherwise not be reached. Both the main flue 14 and the branch flue 16 are provided with dampers 17 for regulating the draft therein.

The furnace doors 18 fit tight, and the ashpit is provided with openings which have tight fitting doors 19. In the operation of the kiln, there is a suction upwardly through the ashpit and the furnaces, and this suction draws up and carries off the gases generated by the waste coal or fuel that drops into the ashpit. Some of these gases are products of combustion and serve to dilute the draft, while some of the gases are consumable and constitute fuel. All of such gases, however, serve to dilute the oxygen necessary for combustion and thereby lengthen the range of action of the flames. The oxygen needed for the combustion of unconsumed gases is supplied through the horizontal passageways.

The course of the draft causes it to act directly upon all portions of the limestone in the lower portion of the kiln above the lime-pit or furnaces; and by reason of the dilution of the draft with inconsumable gases from the ashpit, the intensity of the combustion is decreased and the range of effective operation thereof is increased. Consequently, all of the limestone in the lower portion of the kiln is burned with substantial uniformity, so that the "draws" may be made more frequently and more lime may be drawn each time than would be practicable with kilns of the type now used.

The portion of the kiln below the level of the furnaces, which is commonly called the lime-pit 20, terminates in a discharge chute 21 which is controlled by a manually operable gate 22. Below the end of said chute is a railway or track 23 upon which runs a wheeled truck 24 which carries a tiltable metallic hopper 25. Preferably, the kilns are

arranged in a series with the track extending past all of the kilns at such a level that the hopper car thereon just clears the lower ends of the discharge chutes. This hopper car receives the lime directly from the discharge chutes and delivers it into a cooling chamber or inclined bin 26 located at a lower level. The lower end of this bin has a gate 27 through which the lime slides. A suitable elevator or loading device 28 is located conveniently to said gate to load the lime directly onto railway cars for transportation.

The firing floor or platform is provided with an opening 29 in front of each furnace, which opening communicates with the ashpit and is covered by a trap door 30. By this arrangement, the clinkers removed from the furnaces will fall directly into the ashpit and the work of the fireman will be ameliorated.

The kiln is provided with a fuel bin 31 accessible from the charging floor and provided with a feed chute 32 arranged to deliver fuel into the furnaces. The chute is provided with gates 33 arranged at definite distances apart to constitute a measuring apparatus for determining the proper charge of fuel.

Obviously, the construction hereinbefore described admits of considerable modification without departing from my invention and I do not wish to be restricted to such construction.

What I claim as my invention and desire to secure by Letters Patent is:

1. A lime kiln comprising a stack and a furnace therefor, said stack having a transversely arranged passageway opening into it tangentially at the side of the furnace and independent thereof.

2. A lime kiln comprising a stack and a furnace therefor, said stack having a substantially horizontal passageway opening into it tangentially at the side of the furnace and independent thereof.

3. A lime kiln comprising a stack and a furnace therefor, said stack having a substantially horizontal passageway opening into it tangentially, and means for forcing a draft through said passageway.

4. A lime kiln comprising a stack of polygonal section and a furnace located at one side thereof, said stack having a transverse passageway opening into it through said side in a direction substantially parallel to the adjacent side, and means for forcing a draft through said passageway.

5. A lime kiln comprising a stack of polygonal section and a furnace located at one side thereof, said stack having a transverse passageway opening into it tangentially at the side of said furnace.

6. A lime kiln comprising a stack of polygonal section, and furnaces on each of two opposite sides thereof, said stack having a transverse passageway at the side of each

furnace opening into the stack tangentially, said passageways being diagonally opposite each other.

7. A lime kiln comprising a stack, a furnace therefor, an ashpit having draft regulating openings, and a blower having its outlet flue opening upwardly in the top portion of said stack.

8. A lime kiln comprising a stack, a furnace therefor, an ashpit having draft regulating openings, and a blower, the outlet flue of said blower terminating in the upper portion of said stack and having a branch opening tangentially through the wall of the stack at the side of the furnace.

9. A lime kiln comprising a stack, furnaces on opposite sides thereof, ashpits below said furnaces provided with draft-regulating openings, and a blower, said blower having an outlet flue opening into the top of said stack and branch flues opening transversely into the stack at diagonally opposite points adjacent to the respective furnaces.

10. A lime kiln comprising a stack, a furnace therefor, a firing floor and an ashpit, said firing floor having an opening therein in front of the furnaces and communicating with said ashpit, and a cover for said opening.

11. A lime kiln comprising a stack of polygonal section, furnaces on diametric sides thereof, and a passageway to one side of but not opening into said furnaces and opening into corners of the stack tangentially, said passageways being diagonally opposite each other.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses this 6th day of August, 1907, at St. Louis, Missouri.

REINHOLD BUDER.

Witnesses:

G. A. PENNINGTON,
J. B. MEGOWN.