

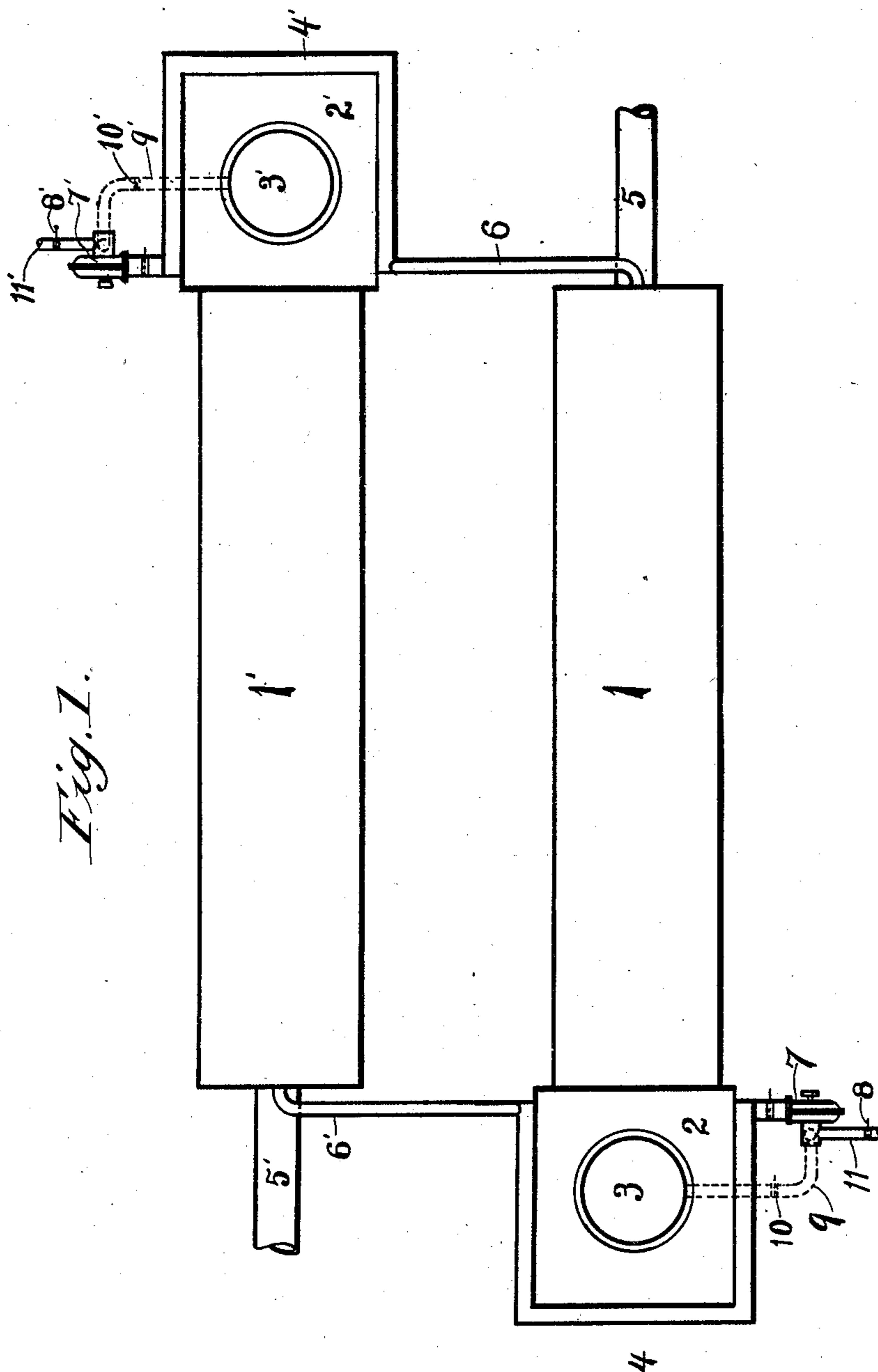
No. 788,503.

PATENTED APR. 25, 1905.

C. ELLIS.
CEMENT KILN.

APPLICATION FILED FEB. 17, 1905.

2 SHEETS—SHEET 1.



WITNESSES:
Harold E. Dixon
A. M. Senior

INVENTOR
Carlton Ellis

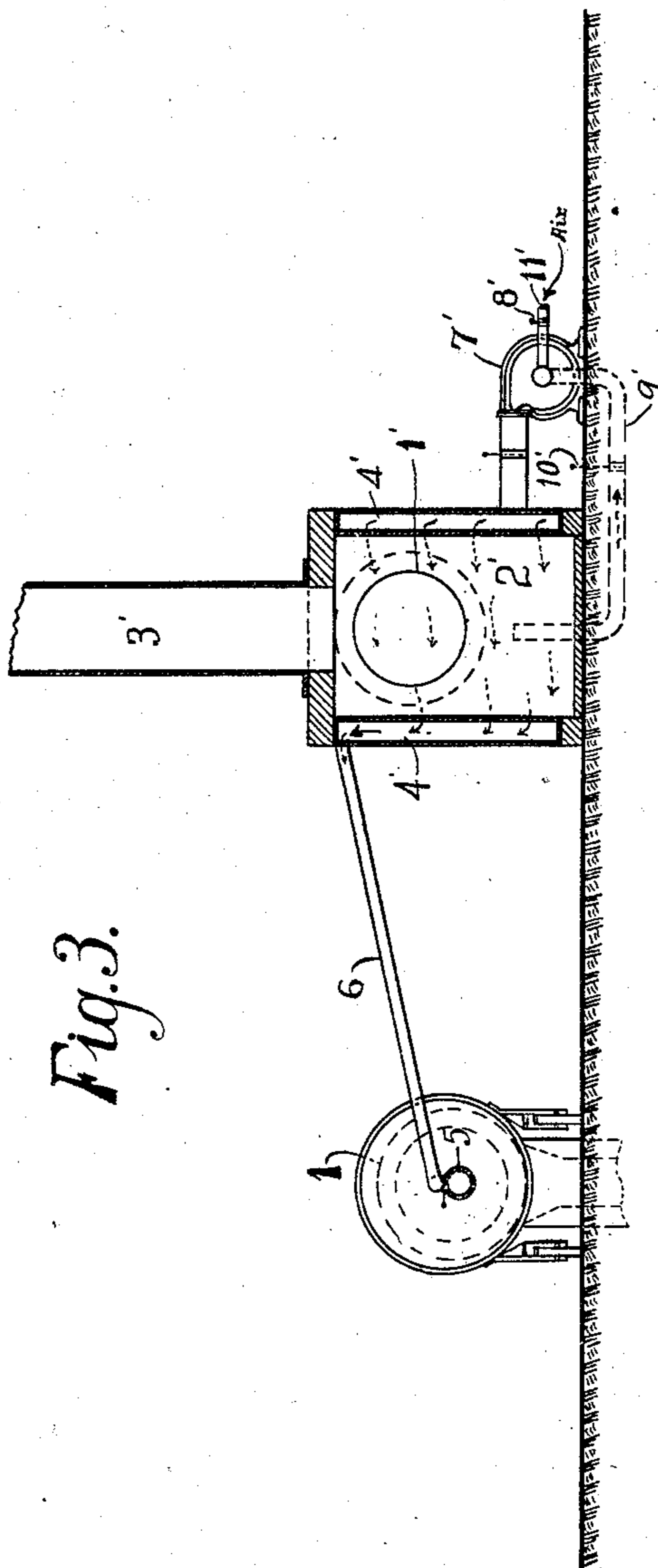
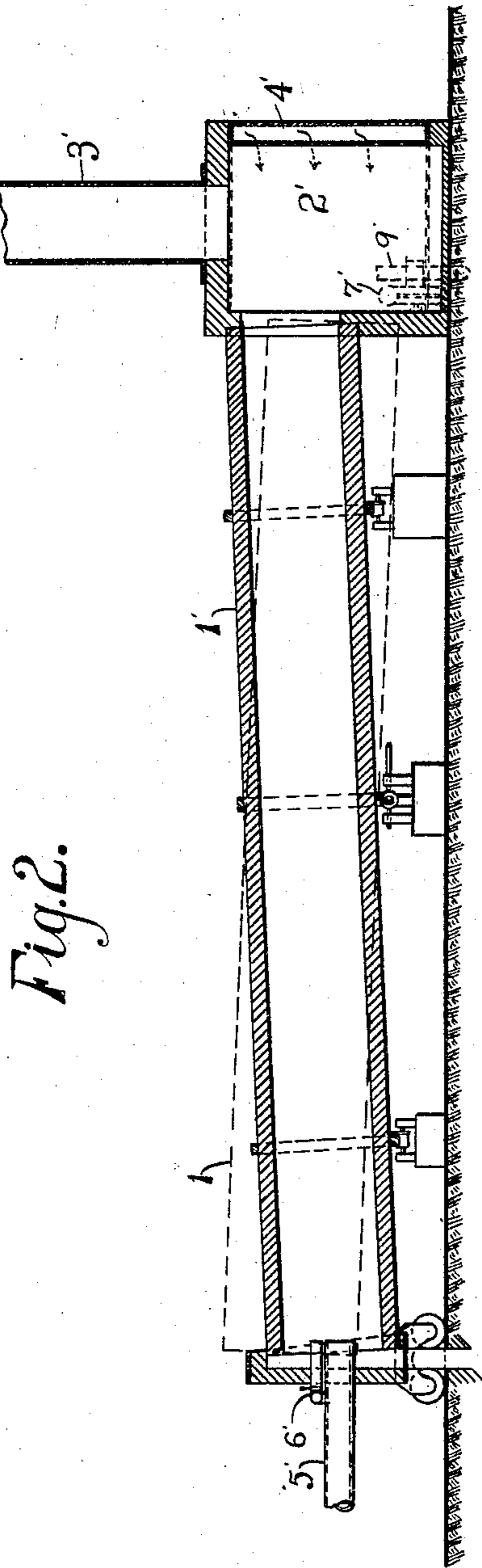
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WITNESSES:

Harmon E. Dixon.

A. M. Senior.

INVENTOR

Carlton Ellis

UNITED STATES PATENT OFFICE.

CARLETON ELLIS, OF NEW YORK, N. Y., ASSIGNOR TO ELDRED PROCESS COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

CEMENT-KILN.

SPECIFICATION forming part of Letters Patent No. 788,503, dated April 25, 1905.

Application filed February 17, 1905. Serial No. 246,045.

To all whom it may concern:

Be it known that I, CARLETON ELLIS, a citizen of the United States, and a resident of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Cement-Kilns, of which the following is a specification.

This invention relates to apparatus for the burning of cement, and especially to the use in this operation of the waste heat now carried away in the products of combustion.

As is well known, the rotary kiln for the burning of Portland cement is a highly-inefficient apparatus from the standpoint of fuel consumption. It must necessarily be of large diameter to secure the rapid and intense combustion required for the clinking of cement. On that account a great volume of highly-heated gases is carried up the stack, and most of the heat from the coal consumed goes to waste in this manner. It is variously estimated that from seventy to ninety per cent. of the total heat energy of the coal is lost in this manner.

It is the object of this invention to set forth an arrangement of kilns and apparatus designed to recover the heat ordinarily lost in the above manner. For this purpose the apparatus shown in the accompanying drawings discloses a mode of application of the idea involved in this invention and illustrates an adaptation which I regard as one of the best of the forms in which my invention may be embodied.

In the accompanying drawings, Figure 1 illustrates diagrammatically a plan of two cement-kilns 1 and 1'. Fig. 2 is a vertical longitudinal section of kiln 1', taken through the center of the kiln. Fig. 3 comprises a vertical cross-section of kiln 1', taken through the center of stack, and an end elevation of kiln 1.

The kilns 1 and 1' are arranged to feed the cement material in opposite directions, the fuel being applied in kiln 1 through supply-pipe 5 at a point opposite to the stack on kiln 1' and in kiln 1' through supply-pipe 5' at a point opposite to the stack on kiln 1.

2 and 2' are housings surrounding the kilns at the stack end of 1 and 1', respectively.

3 and 3' are the stacks through which the products of combustion are discharged into the air.

The housings 2 and 2' are ordinarily constructed of brick. Around these housings are built walls or outer housings, forming a partitioned space 4 and 4'. The walls inclosing the space 4 and 4' are tightly closed and made as far as possible impervious to the passage of gases.

5 and 5', as above mentioned, represent the fuel-feed pipes, through which powdered or gaseous fuel may be discharged or fed into the kilns 1 and 1', respectively. The pipes 6 and 6' lead from passages 4 and 4' to the feed end of the kilns 1 and 1'.

The fan-blowers 7 and 7' are arranged to force a gas-draft carrying oxygen for supporting combustion through the preheating-passages 4 and 4' and to deliver this draft-current through 6 and 6' to the fuel-feed ends of the kilns 1 and 1', respectively. The air or oxygen required for this purpose may be taken in through the air-inlets 11 and 11'. An adjustment of the amount of air required for this purpose may be made by means of the gates 8 and 8'. A connection from the fans to the stacks 3 and 3' may be made by means of the pipes 9 and 9', fitted with adjusting-gates 10 and 10' to enable the dilution of the air by products of combustion whenever the fuel requirements are such that this is found to be necessary, although the use of the products of combustion in this manner is not claimed as a part of the present invention.

My method of operation is as follows: Powdered fuel is introduced into the pipes 5 and 5' by compressed air in the usual manner, or if a gas-producer is used this may be supplied from any suitable gas-producing appliance situated near the kilns and delivering the gas into the kiln through the aforesaid fuel-passages. The fan 7 and 7' being in operation and the gates 8 and 8' opened to admit the necessary air, it will be seen that this air can pass only through the spaces between the partitions formed by the housings aforesaid and that it thereby comes in contact with the highly-heated walls of the inner housings 2

and 2', which are kept heated to a high temperature through contact on the opposite side with the products of combustion from the kilns. The air traverses this regenerative
5 passage and departs through the air-pipes 6 and 6', discharging into the kilns and mingling with the fuel supplied by pipes 5 and 5'.

I do not limit myself to any precise construction of the recuperators used in preheating this air-supply, as any form of passage
10 permitting air to travel freely and to come in contact with walls heated by products of combustion passing on the opposite side may be used for this purpose.

15 The drawings show connections only for two kilns; but it is obvious that a battery of kilns may easily be constructed to avail of the heat-conserving means hereinbefore described, in which case it is evident that the
20 kilns should be arranged in alternate position as regards the direction of feed in order that the stack of one kiln may be in proximity to the clinkering or fuel-feed end of an adjacent kiln.

25 What I claim is—

1. The combination, in apparatus for burning cement, of a pair of long, rotary kilns so inclined that the material passing through

one of said kilns travels in a direction approximately opposite to that of the flow of material in the other kiln, at the stack end of each
30 kiln a continuous heat-recuperator, means for passing air through said recuperator, and means for conveying the air, preheated by its passage through the recuperator of one kiln,
35 into the juxtaposed fuel-feeding end of the other kiln.

2. The combination, in apparatus for burning cement, of a pair of long, rotary kilns so inclined that the material passing through
40 one of said kilns travels in a direction approximately opposite to that of the flow of material in the other kiln, at the stack end of each kiln a heat-regenerator, means for passing air
45 through said regenerator and means for conveying the air, preheated by its passage through the regenerator of one kiln, into the juxtaposed fuel-feeding end of the other kiln.

Signed at New York city, in the county of New York and State of New York, this 15th
50 day of February, A. D. 1905.

CARLETON ELLIS.

Witnesses:

A. M. SENIOR,
WARREN E. DIXON.