

No. 850,750.

PATENTED APR. 16, 1907.

W. H. HARDING.
CEMENT KILN.

APPLICATION FILED FEB. 1, 1907.

Fig. 1.

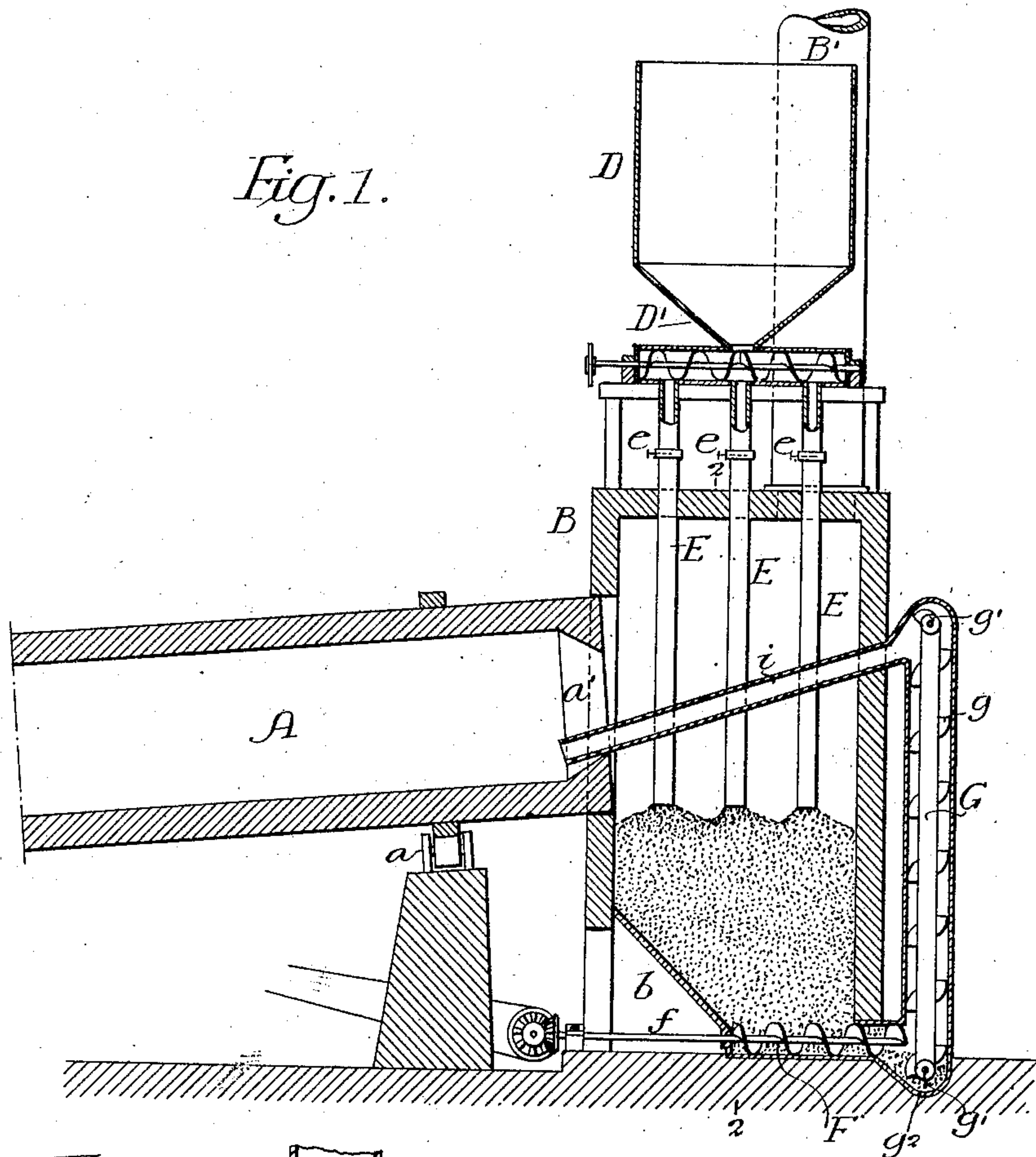
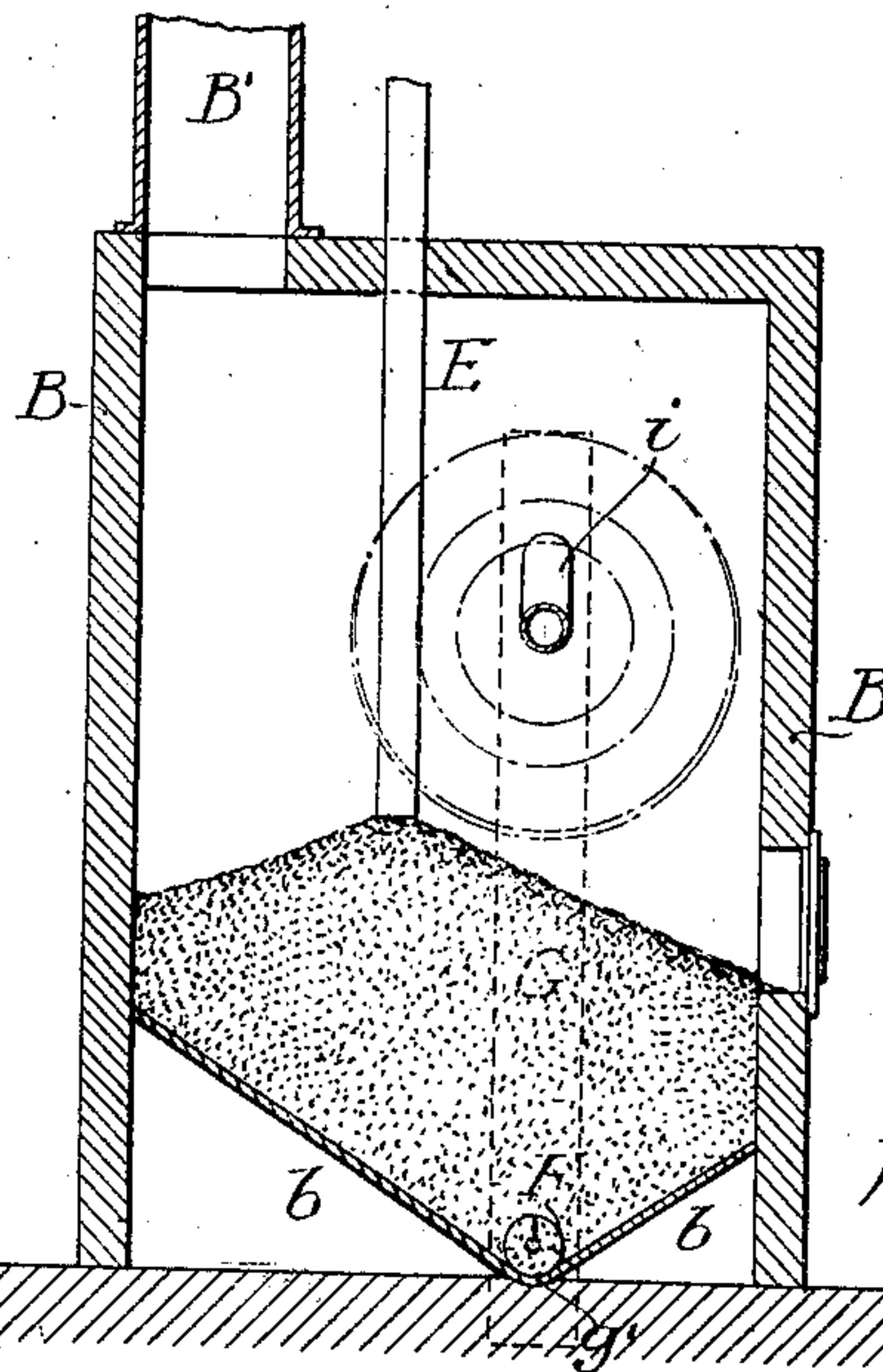


Fig. 2.



Witnesses:
Will A. Burrows
Augustus B. Capper

Inventor
William H. Harding.
by His Attorneys,
Howson & Howson

UNITED STATES PATENT OFFICE.

WILLIAM H. HARDING, OF PHILADELPHIA, PENNSYLVANIA.

CEMENT-KILN.

No. 850,750.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLIAM H. HARDING, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain improvements in Cement-Kilns, of which the following is a specification.

My invention relates to certain improvements in cement-kilns of the rotary type in which there is a rotating cylindrical shell, a front hood through which the fuel is introduced, and a rear hood or combustion-chamber through which the products of combustion must pass from the cylindrical kiln to the stack.

The main object of my invention is to utilize to a certain extent the waste heat which passes from the rotary kiln.

A further object is to preheat the cement material to a certain extent before it is admitted to the cylindrical kiln, the preheating driving off a certain portion of the carbonic-acid gas.

These objects I attain in the following manner, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical sectional view of the rear end of the kiln structure, illustrating my invention; and Fig. 2 is a section on the line 2 2, Fig. 1.

A is the rear end of a rotary kiln, supported on rollers *a* in the usual manner.

B is the rear hood or combustion-chamber, and B' is the stack.

D is the bin for the cement material.

D' is a conveyer, in the present instance shown as a screw conveyer, the blades of which are arranged right and left, so as to feed in both directions from a central point.

E is a series of tubes which extend from the conveyer D' into the combustion-chamber, preferably to a point below the opening *a'* of the rotary kiln A. These tubes are preferably provided with valves *e* to regulate the flow of material therethrough.

It will be noticed in referring to the drawings that there is a considerable space between the lower edge of the rotary kiln A and the bottom of the rear hood or combustion-chamber, so that a large quantity of material can be stored within this space; but it will be understood that this space may be increased by making a pit under the combustion-chamber to any depth desired. I preferably make the bottom of the pit thus formed inclined, as at *b*, and place a screw conveyer F in the bottom of the pit, so as to convey ma-

terial in an even stream therefrom. The shaft *f* of this screw conveyer is geared to any suitable driving mechanism.

At the rear of the combustion-chamber B is an endless-chain bucket elevator G, having pockets *g*, the chain passing around wheels *g'*. The conveyer F feeds the material into the boot *g''* of this elevator, and the buckets take up the material and discharge it onto an inclined chute or tube *i*, which extends through the combustion-chamber B into the feed end of the rotary kiln A. The material may be fed by gravity through this tube, as shown in the drawings, or a screw conveyer may be used to positively feed the material through said tube, depending altogether upon the inclination of the tube.

While I have shown three vertical tubes E extending from the bin to the pit in the bottom of the combustion-chamber, it will be understood that one or more tubes may be used and that other means may be provided for feeding the material to the tubes than that shown in the drawings and that other forms of elevators may be used without departing from the essential feature of the invention.

The operation is as follows: The material is fed to the bin D and from the bin is conveyed to one or more of the tubes E, and as these tubes are subjected to the direct action of the products of combustion as they pass from the end of the rotary kiln they become highly heated, and consequently the material passing through the tubes is heated to a certain degree. As the material accumulates in the bottom of the combustion-chamber B it is heated to a further degree by the action of the waste products of combustion playing in the combustion-chamber. Consequently a certain proportion of the carbonic-acid gas is driven off the cement material before it enters the rotary kiln. This material remains in the heated condition while in the bottom of the combustion-chamber and is elevated and introduced into the rotary kiln in given quantities. By this means I properly prepare the material for its introduction into the rotary kiln, and also a certain proportion of the carbonic-acid gas is driven off before the material enters the rotary kiln.

I claim—

1. The combination of a kiln, a combustion-chamber at the rear of the kiln having a space below the mouth of the kiln and out-

of the path of the products of combustion, means for supplying material to the space, and means for removing the material from the space and introducing it into the kiln, substantially as described.

2. The combination of a kiln, a combustion-chamber at the rear of the kiln having a storage-space below the mouth of the kiln and out of the path of the products of combustion, means for supplying material to the space across the path of the products of combustion, and means for removing the material from the storage-space and introducing it into the kiln, substantially as described.

3. The combination of a kiln, a combustion-chamber at the rear of the kiln having a storage-space below the mouth of the kiln and out of the path of the products of combustion, one or more tubes extending through the upper portion of the combustion-chamber in the path of the products of combustion, means for feeding material through the tubes, said tubes discharging material into the storage-space in the combustion-chamber, and means for removing material from the storage-space and introducing it into the kiln, substantially as described.

4. The combination of a kiln, a combustion-chamber at the rear of the kiln, a storage-space in the combustion-chamber below the mouth of the kiln, a stack communicating with the combustion-chamber at one side of the longitudinal line of the kiln, one or more tubes in the upper portion of the combustion-chamber extending across the path of the products of combustion passing from the kiln to the stack, said tubes discharging material into the storage-space in the lower portion of the combustion-cham-

ber, and means for removing material from the storage-space and delivering it to the kiln, substantially as described.

5. The combination of a rotary kiln, a combustion-chamber at the rear of the kiln and having a storage-space below the mouth of the kiln out of the path of the products of combustion, a stack communicating with the combustion-chamber, a bin, a screw conveyer, a tube leading from the screw conveyer into the combustion-chamber and across the path of the products of combustion, a screw conveyer in the bottom of the storage-space in the combustion-chamber, a bucket elevator into which the last-mentioned screw conveyer feeds material, and a tube leading from the upper end of the elevator into the rotary kiln, substantially as described.

6. The combination of a rotary kiln, a combustion-chamber at the rear of the said kiln having a storage-space below the mouth of the rotary kiln and out of the path of the products of combustion, a bin for the material, a series of tubes leading from the bin into the combustion-chamber to a point below the opening in the rotary kiln so that the tubes are heated by the products of combustion in their passage to the stack, a conveyer for removing material from the bottom of the storage-space and delivering it into the mouth of the rotary kiln, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM H. HARDING.

Witnesses:

VERA THALEG,
GEO. A. CHRIST.