June 19, 1923. 1,459,627

A. HIORTH

PROCESS AND APPARATUS FOR PERFORMING THERMIC PROCESSES OF ANY KIND

Filed Oct. 8, 1920

Fig. 1.

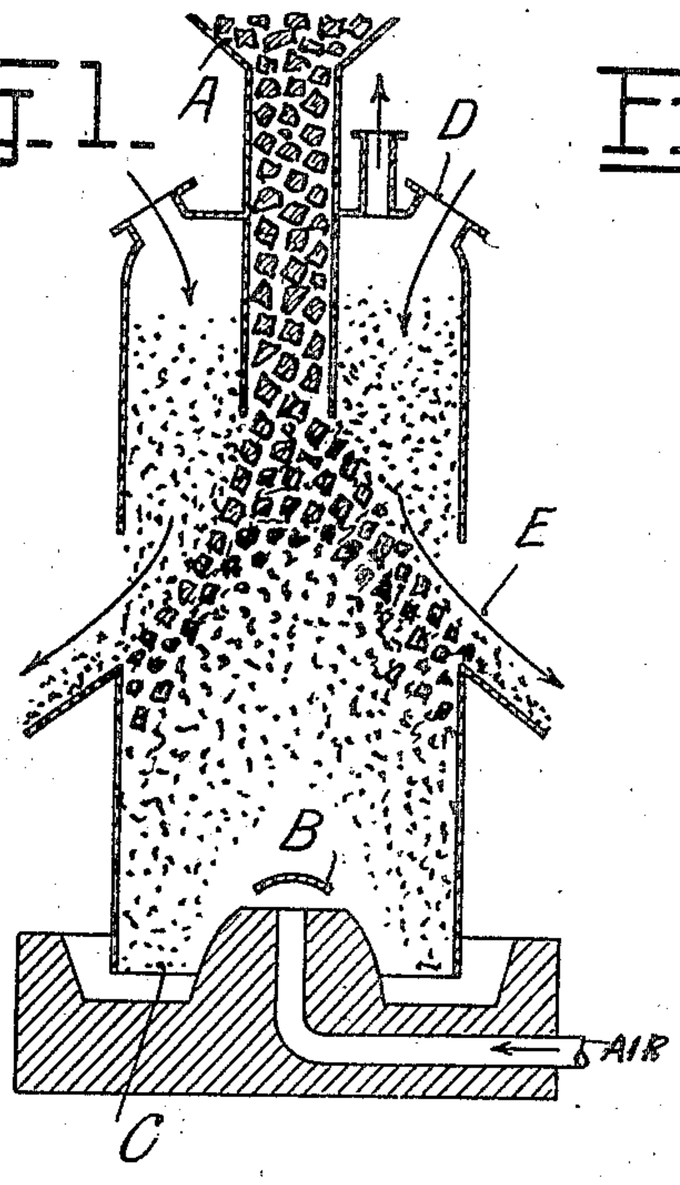


Fig. 2.

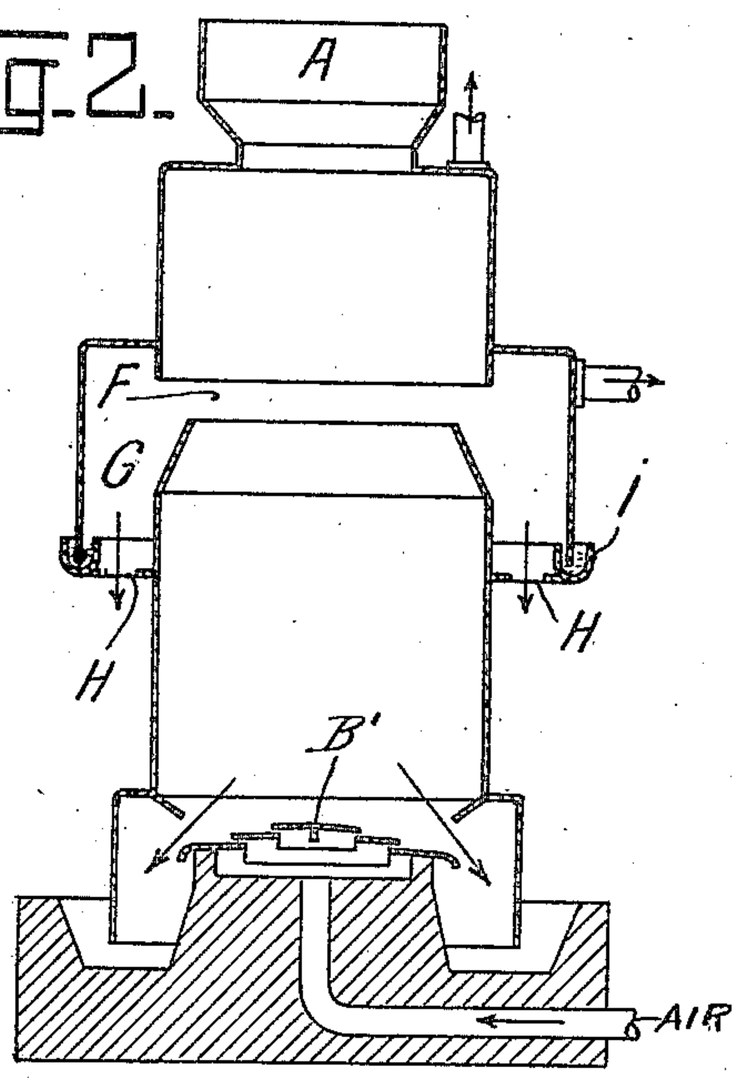


Fig. 3.

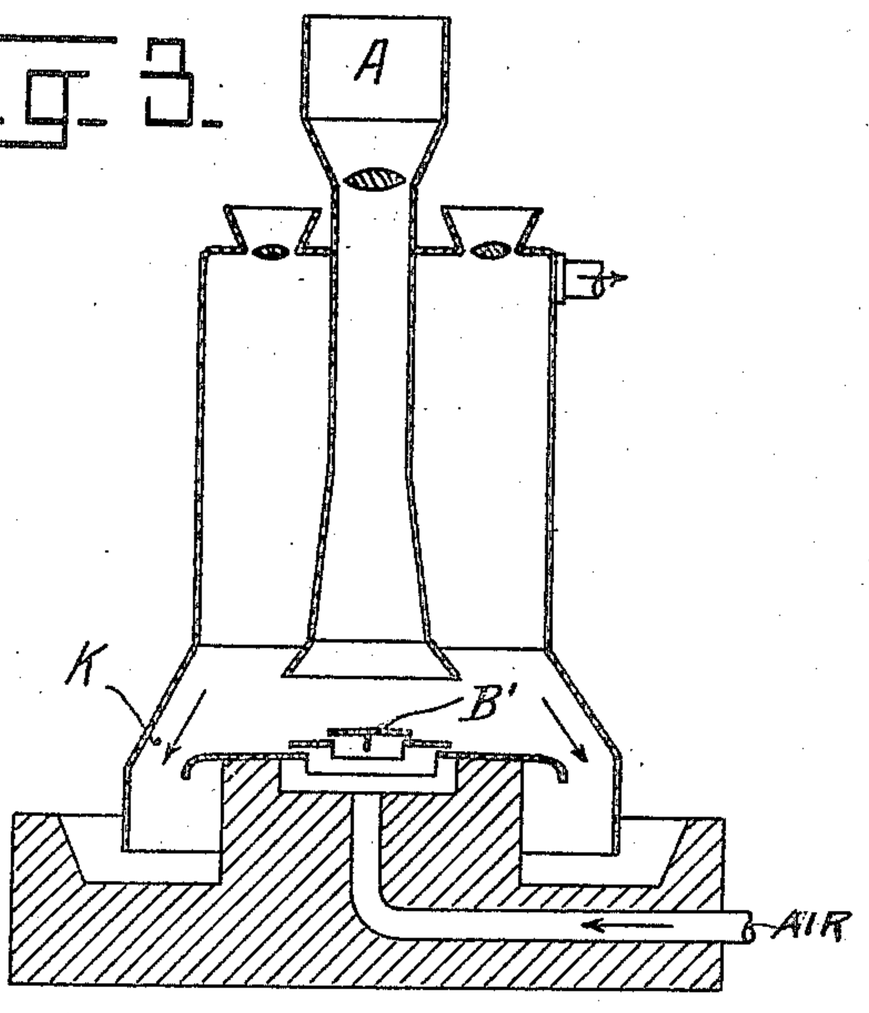
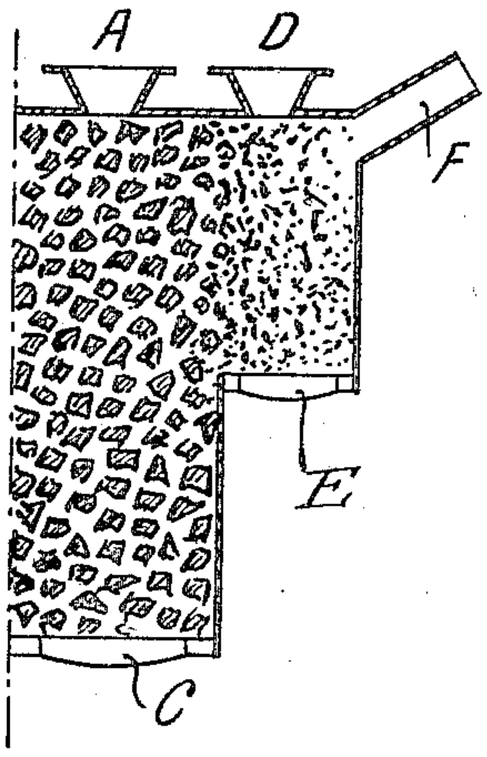


Fig. 4.



Inventor.
Albert Hiorth.
By Henry Orth & Co
Atty.

Patented June 19, 1923. 1,459,627

UNITED STATES PATENT OFFICE.

ALBERT HIORTH, OF ASKER, NEAR CHRISTIANIA, NORWAY.

PROCESS AND APPARATUS FOR PERFORMING THERMIC PROCESSES OF ANY KIND.

Application filed October 8, 1920. Serial No. 415,649.

To all whom it may concern:

Be it known that I, ALBERT HIORTH, a subject of the King of Norway, residing at Asker, near Christiania, Norway, have invented certain new and useful Improvements in Processes and Apparatus for Performing Thermic Processes of Any Kind; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

My invention relates to means for performing thermic processes of any kind especially such process in which materials in form of powder and of small or large pieces are treated at a not very high temperature in a reducing or neutral atmosphere or where gases are treated which under catalytic action combine with each other or with solid materials present. The new process may be carried out by means of so-called "producers" (furnaces of the gas-generator type) and my invention comprises arrangements of these furnaces by which they are made suitable for the carrying out the process. The process may also find suitable use in the dry distillation of materials more or less hydrous.

The invention is suitably carried out in a producer by introducing coal or carbonaceous material at the top; this material sinks evenly through a current of air coming from the lower part of the furnace and causes a combustion which is regulated in such way, that gas is produced in the upper zones. In order to carry out the invention, openings are arranged through which the raw material in question (solid or gaseous) is introduced or a resulting product is taken out at suitable places, so that the product does not descend into the zone of the furnace where the highest temperature prevails. Usually for this purpose, the openings generally at hand in the kind of furnaces in question can be made use of.

Referring to the drawings in which like parts are similarly designated—

Figure 1 is a vertical sectional view of a producer in which the process is carried out.

Fig. 2 is a similar view of a modification.

Fig. 3 is a vertical section of a producer discharging product and ash at the same point.

Fig. 4 is a vertical section showing a producer discharging product through an exterior elevated grate.

The function of an apparatus of this kind may be illustrated as diagrammatically shown in Fig. 1. The coal or other fuel is introduced at the top through the hopper A and the air enters the furnace at its lowest point through B. The ashes are discharged at C. The raw material (we may for instance suppose it to be limestone) is introduced at D and is during its way down through the furnace, as indicated by arrows, exposed to the action of the gas in the furnace the temperature being regulated to suit the process in question. E are the discharge openings for taking out the resulting product. These openings are arranged at such distance below the lower end of the coal hopper, that the product automatically is led to the discharge openings E, following the natural slope formed by the coal or other fuel.

Figs. 2 and 3 show two other forms for such apparatus. According to the arrangement Fig. 2, the fuel and the material is introduced through the same top opening A, the latter being made so wide, that it is easy to fill in the raw material in such a way, that it will lie between a core of fuel and the walls of the furnace. The resulting product is taken out through an annular opening F between the upper stationary and the lower rotary part of the furnace. From this opening the product enters a space G where it is cooled and whence it may be taken out through the openings H. I is a water-trap and B′ is the grate.

Fig. 3 shows an arrangement in which the product treated passes down to the grate of the furnace and discharges through an annular opening K together with the ashes. Said opening is arranged at a suitable distance from the opening for introducing air.

In the apparatus now described it is supposed, that the raw material is caused to pass through the furnace outside of the fuel. But it is also possible to form a core of the raw material within a column of fuel surrounding the same.

The invention may also be carried out in a furnace, the upper part of which has greater width than the lower part, that is to say,

the upper part of the furnace projects outside of that part of the furnace through which the fuel or the inner column of material passes. The raw material in this case rests on a separate grate or bottom at a higher level and through this grate the resulting product may be removed. A diagram of the furnace of this kind is shown in Fig. 4 showing one half of the furnace.

A is the opening for introducing fuel and D is the opening for introducing raw material. C and E are grates through which the ashes and the resulting product are respectively removed. F is a pipe for leading off the gas formed in the furnace. As mentioned the figure only shows one half of the furnace, when carried out practically, the fuel also in this case will form a core inside the raw material. The grate E therefore will obtain the form of a ring. The two grates may be connected with a shaking arrangement so regulated, that the resulting product is discharged as it is formed.

The apparatus forming the subject matter of this invention is extensively used in industry for carrying out processes in which at present closed retorts very much are used for the purpose of heating, carbonating, deoxydation, calcination, dehydrating, etc. The process can be used for the production of lime, for hardening of metal articles, etc.

If the apparatus is used for reactions between two or more gases and a catalyzer is used, the latter is introduced through the same hopper through which the raw material is introduced, the gases being suitably carried in counter current against the catalyzer.

I claim:

1. The method of effecting thermic reactions, which comprises feeding contacting columns of solid fuel and material to be treated, allowing the material to follow the natural talus of the fuel to points of discharge and thereafter permitting the ash to descend alone in a column of greater cross-sectional area below said points of material discharge.

2. The method of effecting thermic reactions, which comprises feeding solid fuel and material to be treated in non-contacting columns, thereafter allowing them to contact, discharging the material at the talus of the fuel at the side of the material column and causing the ash to descend alone in a column of enlarged cross-section below said points of discharge.

3. The method of effecting thermic reactions, which comprises feeding solid fuel and material to be treated to form concentric columns, allowing said columns to contact during their descent, discharging the material at its sides at the end of the talus of the fuel below the contacting point, and thereafter causing the ash to descend below the level of discharge of the material in a column of greater cross-sectional area.

4. The method of effecting thermic reactions, which comprises vertically feeding contacting concentric columns of fuel and material, with the fuel at the centre, and maintaining the outer column of material being burnt shorter than the interior column of fuel, and discharging the column at different levels.

5. In a shaft furnace of the producer type, an internal, substantially central, fuel chamber, a substantially concentric external chamber for the material to be heated, said chambers merging at a lower level to cause concentric contacting material supporting columns, means to separately charge said chambers, means to permit the discharge of the outer column of material at a level above the zone of highest temperature, and means to permit the discharge of the central column as ash at a point below the zone of highest temperature.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

ALBERT HIORTH.

Witnesses:
O. RAUNDAL,
JOHN KRAMME.