No. 690,319. Patented Dec. 31, 1901.

I. L. ROBERTS.

PROCESS OF PRODUCING CARBIDS.

(Application filed Apr. 6, 1896.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

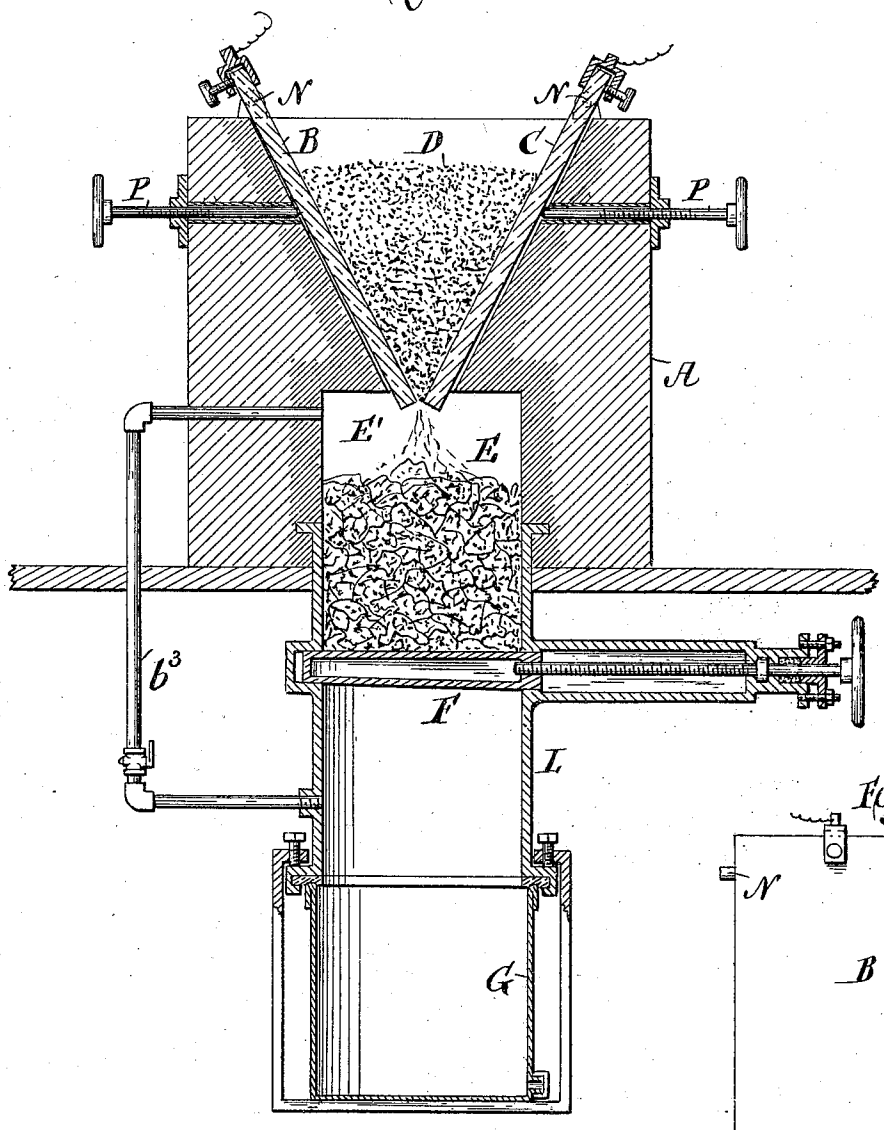


Fig 2.

Witnesses
Geo. Wadman
H. Coutant.

Inventor
Isaiah L. Roberts
By his attorney
E. N. Dickerson

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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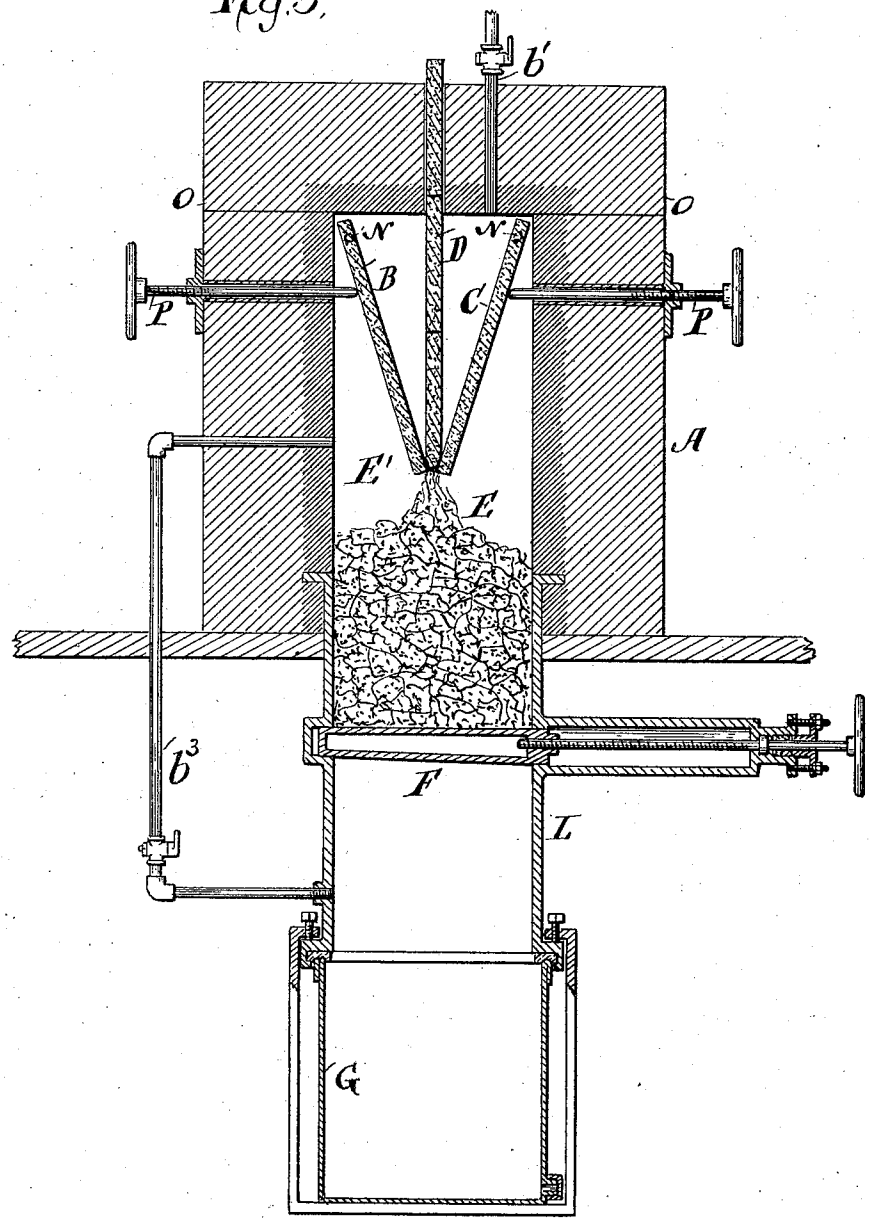
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Fig. 3.



Witnesses.
Geo. Wadman
H. Courtauk.

Inventor
Isaiah L. Roberts
By his attorney
E. H. Duckeiow

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ISAIAH L. ROBERTS, OF BROOKLYN, NEW YORK.

PROCESS OF PRODUCING CARBIDS.

SPECIFICATION forming part of Letters Patent No. 690,319, dated December 31, 1901.

Application filed April 6, 1896. Serial No. 586,314. (No specimens.)

To all whom it may concern:

Be it known that I, ISAIAH L. ROBERTS, of the city of Brooklyn, county of Kings, and State of New York, have invented a new and useful Improvement in Processes for the Production of Carbids, of which the following is a full, true, and exact description, reference being had to the accompanying drawings.

My invention relates to a process for the production of carbids.

I will describe a process embodying my invention and then point out the novel features in the claims.

In the drawings, Figure 1 is a vertical section through a furnace embodying my invention. Fig. 2 is a vertical elevation of the electrode shown in Fig. 1; and Fig. 3 is a modification of the furnace shown in Fig. 1, the operating parts being entirely confined within the furnace.

Similar letters of reference refer to corresponding parts.

A is the brickwork, and B and C are the electrodes.

D represents mixtures of carbon and oxid.

E represents carbids, and F represents gate-valves.

In constructing the furnace I use fire-brick or magnesia for the inner portion, and in the form shown in Fig. 3 I also build in a tube b' in the top for the escape of any gases evolved in working the furnace. A flanged pipe L is also built in the lower opening of the furnace and furnished with a gate-valve F.

The process of making carbids in this furnace is as follows: I make a mixture of the oxid and carbon by grinding them together in proper proportion, which is fed to the electrodes. The electrodes are then pushed together until they meet and touch. A current of electricity is then turned on, gently at first, as there is comparatively little resistance in the furnace when the electrodes are touching. When the current is passing, the electrodes are slightly drawn apart and an arc is formed. Then the current is increased sufficiently to heat the entire ends of the electrodes to a white heat. When this is done, the oxid and carbon will become hot enough to be a conductor of electricity, and then by arc and incandescence it will become so hot that it will become carbid of whatever metal is used which is capable of being made into a carbid and will fuse and drop down by gravity into the space E'.

I prefer to use a mixture of unslaked lime and carbon ground together in the proper proportions to form the carbid, and for use in the furnace described in Fig. 3 I press the mixture into bricks or cylinders by hydraulic pressure into molds. In order to make them sure of holding together, I mix in some binding material—such as bitumen, pitch, or sugar syrup—when grinding the lime and carbon, and thus grind the whole together. When pressing, I prefer to heat the mixture to the melting-point of the binder. The reason I prefer unslaked lime in all my furnaces is that it occupies less space and saves that heat necessary to drive off the water which is in slaked lime, thus concentrating the current on a greater quantity of material in a given space, which is impossible with slacked lime.

When the carbid is formed at the point of contact or arc, it drops away by gravity, as at that time it becomes more or less liquid and is caught on the gate-valve F. When the space between the said gate-valve and the arc gets too full, the valve is opened, and it is allowed to drop into a receptacle G, if desired. In this case the receptacle should fit tightly on the lower end of the tube at L, and the said receptacle must be filled with some gas containing little or no oxygen after the said receptacle is placed in position by displacement, as may be done by allowing the carbonic-oxid gas made in the production of carbid by the decomposition of its lime or oxid in making it and which escapes through the tube b^3 and which may be led into the receptacle after being fastened to the cylinder L before the gate-valve F is opened. When the receptacle is filled or when the amount of accumulated carbid on the gate-valve is removed, it may be again closed and the receptacle removed, thus repeating as often as desired.

The electrodes B and C are flat, and the furnace of Fig. 1 is in V shape at its top. These electrodes articulate at N N on pins, so that their lower ends may be moved together, forming an angle, by the use of the

screws P P, and on reversing the screws gravity will cause them to recede from each other, thus regulating the space between them as desired.

In order to make carbids in this furnace, I make a mixture of the oxid and carbon in a loose form and place it between the electrodes, as shown at D. To operate this furnace, I move the electrodes together at their lower ends by use of the screws P P and fill in the space between them with a loose mixture of carbon and oxid. I next turn on the current, gently at first, through the electrodes while in contact at their lower ends and establish a circuit and then separate them slightly, which will establish an arc. I then increase the current to such a degree as will bring the ends of the carbon to a high heat. The oxids and carbon in proximity to the arc will become very highly heated, and thus become a conductor of electricity, and will become so heated as to form the carbid, which will fuse and run through the space between the ends into the space above the gate-valve F and accumulate at E′, and thus the furnace will automatically regulate its own feed, and the carbid will automatically displace itself from the arc as fast as formed, while little or no oxid and carbon can escape unconverted into carbid.

Another form of furnace is shown in Fig. 3, wherein the oxid and lime are fed into the angle made by the two electrodes *b* C by gravitation in the form of a brick or stick D and are converted into carbid by incandescence and the arc combined. These bricks or sticks are joined at their ends by a small amount of asphalt or bitumen, which the heat of the furnace carbonizes as it advances and makes solid. On starting this furnace the current is started gently and increased as the carbons are allowed to fall apart by moving the screws P P until a strong arc is established and the ends of the electrodes are very hot. The bricks of oxid and carbon are fed in gently until the arc is touched. Then the mixture becomes so hot at the end of the brick or point of contact that it becomes a conductor of electricity and takes the current by incandescence and arc, according to whether it is a good or bad contact, and is heated to the point of fusion as carbid and drops down on the gate-valve F and is removed, as described in the other figures. This furnace has a movable cover at O O, so that new electrodes can be put in when the old ones are worn too short for practical use. A pipe *b′* conducts away the gases formed by the decomposition of the oxids.

Though my invention is especially applicable to the making of calcium carbid, it is also applicable to the making of other metallic carbids.

It is obvious that the point of pencil D in Fig. 3 is preheated by the hot gases in the chamber E′ as it is fed into the furnace.

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

1. The process of making calcium carbid which consists in feeding a mass of carbon and calcium oxid solely by gravity to a pair of angularly-disposed electrodes, passing a current of low amperage through the mass and then increasing the amperage of the current independently of the variable resistance due to the supply and discharge of the material thereby freeing the mass and effecting its gravitation.

2. The process of making calcium carbid which consists in feeding a brick or block of carbon and calcium oxid into the space between a pair of angularly-disposed electrodes and in applying an electric current first of gentle strength and subsequently of high intensity.

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

ISAIAH L. ROBERTS.

Witnesses:
H. COUTANT,
ERNEST HOPKINSON.