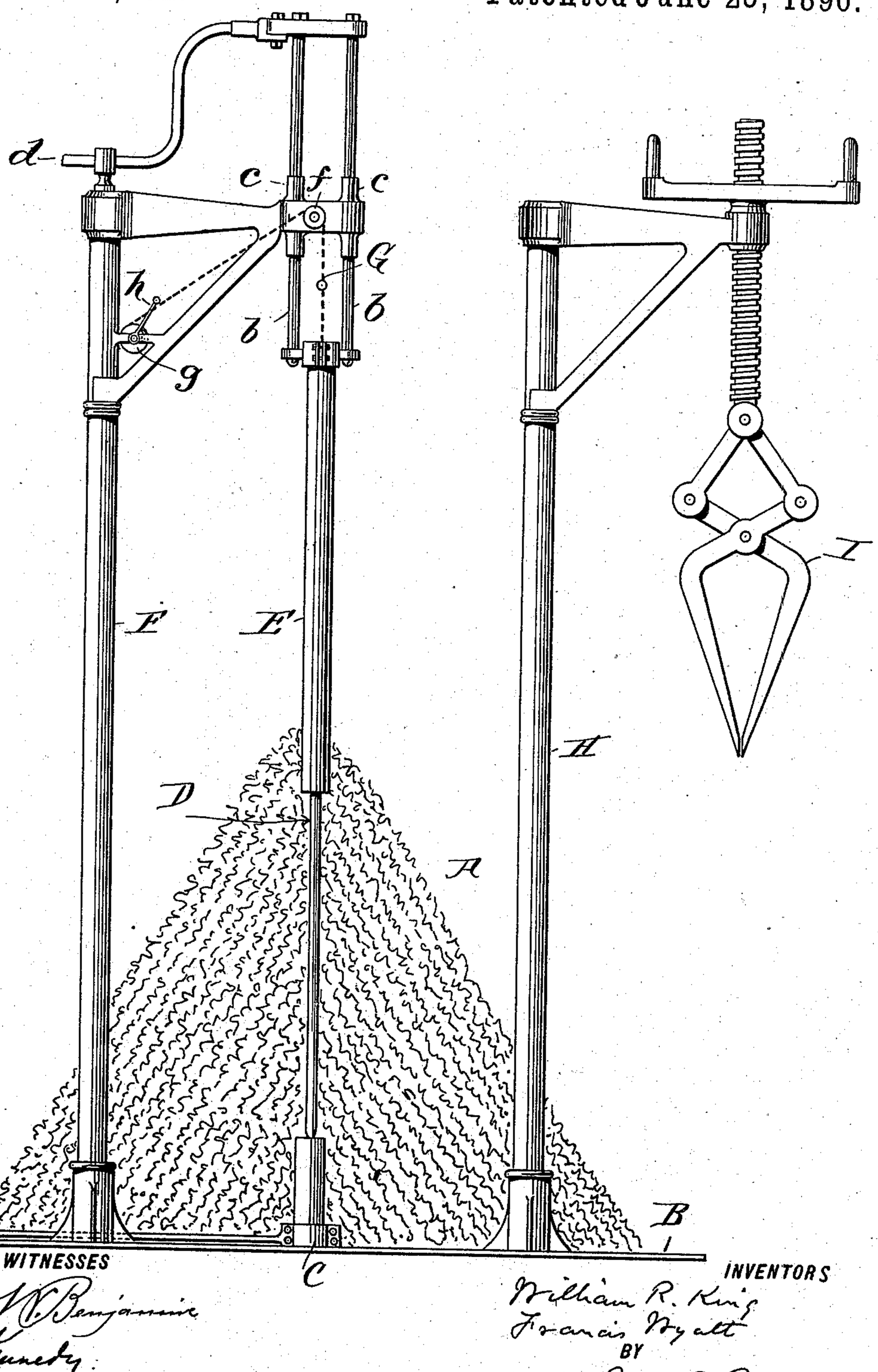
(No Model.)

W. R. KING & F. WYATT.

PROCESS OF FORMING CALCIUM CARBID.

No. 562,402. Patented June 23, 1896.



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PROCESS OF FORMING CALCIUM CARBID.

SPECIFICATION forming part of Letters Patent No. 562,402, dated June 23, 1896.

Application filed April 14, 1896. Serial No. 587,554. (No specimens.)

To all whom it may concern:

Be it known that we, WILLIAM R. KING, a citizen of the United States, and FRANCIS WYATT, a subject of Her Britannic Majesty, residents of the city, county, and State of New York, have made certain new and useful Improvements in Processes of Forming Calcium Carbid, of which the following is a specification.

The object of our invention is to provide an improved process of forming calcium carbid, which shall not only be more effective, simple, and cheap than the processes heretofore employed, but which shall also be a substantially continuous process.

In processes heretofore employed, it has been found necessary to wait, after a quantity of calcium carbid has been formed by the action of an electric-arc furnace, a considerable time for the furnace and its charge to cool before removing the charge and recharging. Many ingenious attempts have been made to increase the capacity of such furnaces and to diminish the time during which the furnace has to remain idle; but the delay is still very considerable and seriously interferes with the commercial manufacture of calcium carbid. There are very many other serious difficulties in the processes heretofore employed, which will readily suggest themselves to persons who are practically familiar with this art, and as far as we are aware, no thoroughly satisfactory process of forming calcium carbid has as yet been found.

Our improved process enables us to dispense altogether with a furnace and does away entirely with the necessity of waiting for the substance under treatment to be cooled before a second charge can be operated upon. In this way our process becomes substantially continuous, the current being turned off for such a short time that the aggregate of such stoppages in a day's run is of practically little importance.

To carry out this invention and secure the desired results, we first make a heap of pulverized coke and ground lime of any desired height. This may be a simple heap or mound of ordinary hillock shape in the open air, or the sides may be shored up to prevent the mound from taking up too much room, if preferred. This shoring up may be done by wooden planks, bricks, or any other material desired, but is not in any sense necessary to the carrying out of the process. We then force downward through the center of this heap until it reaches a point sufficiently near the bottom to allow the insertion of an electrode, a core of good conducting material. Of course, if desired, the electrode may be first put in position and the mound made over it. Electric connection is made with the lower end of this core through the electrode. The upper end of this core is then electrically connected by means of an electrode to the other pole of a battery or dynamo-machine and the mixture of coke and lime heaped up around this point of connection to a sufficient height to shut out the air. Either a direct or an alternating current may be employed, as preferred. The current is then turned on and continued until the voltmeter and ampere-meter show that the current is no longer fusing the carbon and calcium to produce calcium carbid. This becomes evident when the voltage gets too low or the resistance too high. During the operation the gases set free by the decomposition of the lime and coke seek the surface of the heap, where they burst into flame. Should the flame at any time be too prominent, the workman should shovel a little more of the mound onto the flame, as this undue prominence shows the presence of a too ready escape for the gases. When the operation is complete, there is a white-hot nugget of calcium carbid surrounding or taking the place of the core. The core has preferably been destroyed and if made of carbon or coke forms an integral part of the calcium-carbid nugget. The nugget is now lifted out of the mound and transported to a convenient place where it is allowed to cool. A new core is substituted for the old one, the mound of lime and coke heaped up around it, electrical connection again made, and a new nugget formed.

We have found that in spite of the intense heat necessary for the formation of calcium carbid, namely, about 5,000° Fahrenheit, which has to be maintained in the vicinity of the core, the surface of the mound, except where the gases are burning, is sufficiently

cool to be handled readily. It does not heat the shovels of the workmen and does not even feel uncomfortably warm to the hand.

It is obvious that our improved process is of extreme simplicity, doing away with all elaborate and expensive apparatus, and consists virtually in the heating of the vertical center of a mound composed of pulverized coke and ground lime to a white heat by the passage through said vertical center of an electric current along the conducting-core, which preferably becomes destroyed during the process.

We have found that simple pulverized lime and coke mixed in about equal proportions may be effectively employed in our improved process without previous treatment.

This process, though particularly intended for the formation of calcium carbid, may be employed with advantage in the formation of the carbids of the other alkali metals and alkaline-earth metals by substituting their oxids or compounds for the lime.

Simple mechanism for carrying our improved process into practical operation is shown in the accompanying drawing, in which—

A is a mound of mixed coke and lime resting upon the ground or floor B. At about the vertical center of this mound we set the lower electrode C, which is connected to a dynamo-machine by the wire *a*.

D is the core, which is preferably of carbon, of smaller diameter than the electrode, and which rests upon the lower electrode in a substantially vertical position through the vertical center of the mound.

E is the upper electrode, in substantially vertical line with the lower electrode, and when in operation is supported only by the core D and the surrounding mass of material. As these latter fuse and thereby shrink, the upper electrode is allowed to descend freely by reason of its weight.

F is a simple form of supporting-frame for the electrode when not in use. The electrode is mounted upon the slide-rods *b b*, of good conducting material, which pass through the insulating-sleeves *c c*, attached to the frame F, and at their upper ends are connected to the wire *d*, which leads to the dynamo-machine. The electrode is lifted away from the mound, when not in use, by the chain G, passing over the pulley *f* and secured to the roller *g*, which is free to revolve in one direction, but is turned in the other direction by the crank *h* and held in place by the pawl-and-ratchet device usual in such cases. This frame F is a swinging frame, for obvious reasons.

H is a simple swinging frame carrying the lifting-tongs I and adapted to bring said tongs over the vertical center of the mound, into which they are adapted to descend and grasp the nugget, while still hot, and raise it out of the mound. The frame is then swung out of the way and the nugget is deposited on any suitable transporting device. (Not shown.)

We claim—

1. The above-described substantially-continuous process of forming calcium carbid which consists in forming a mound of coke and lime mixed in proper proportions around a core of conducting material supported in vertical position between two superposed electrodes, heating the vertical center of said mound to incandescence by passing an electric current through said electrodes and core and maintaining said current until a nugget of calcium carbid is formed in said mound, permitting the upper electrode to descend freely as the supporting mixture beneath it is gradually reduced and fused, removing said nugget while hot, inserting a new core, covering it with the material of said mound and repeating the specified steps.

2. The above-described process of forming calcium carbid which consists in forming a mound of coke and lime mixed in proper proportions around a core of conducting material supported in vertical position between two superposed electrodes, heating the vertical center of said mound to incandescence by passing an electric current through said electrodes and core and maintaining said current until a nugget of calcium carbid is formed in said mound, permitting the upper electrode to descend freely as the supporting mixture beneath it is gradually reduced and fused, removing said nugget, inserting a new core, covering it with the material of said mound and repeating the specified steps.

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