

No. 698,462.

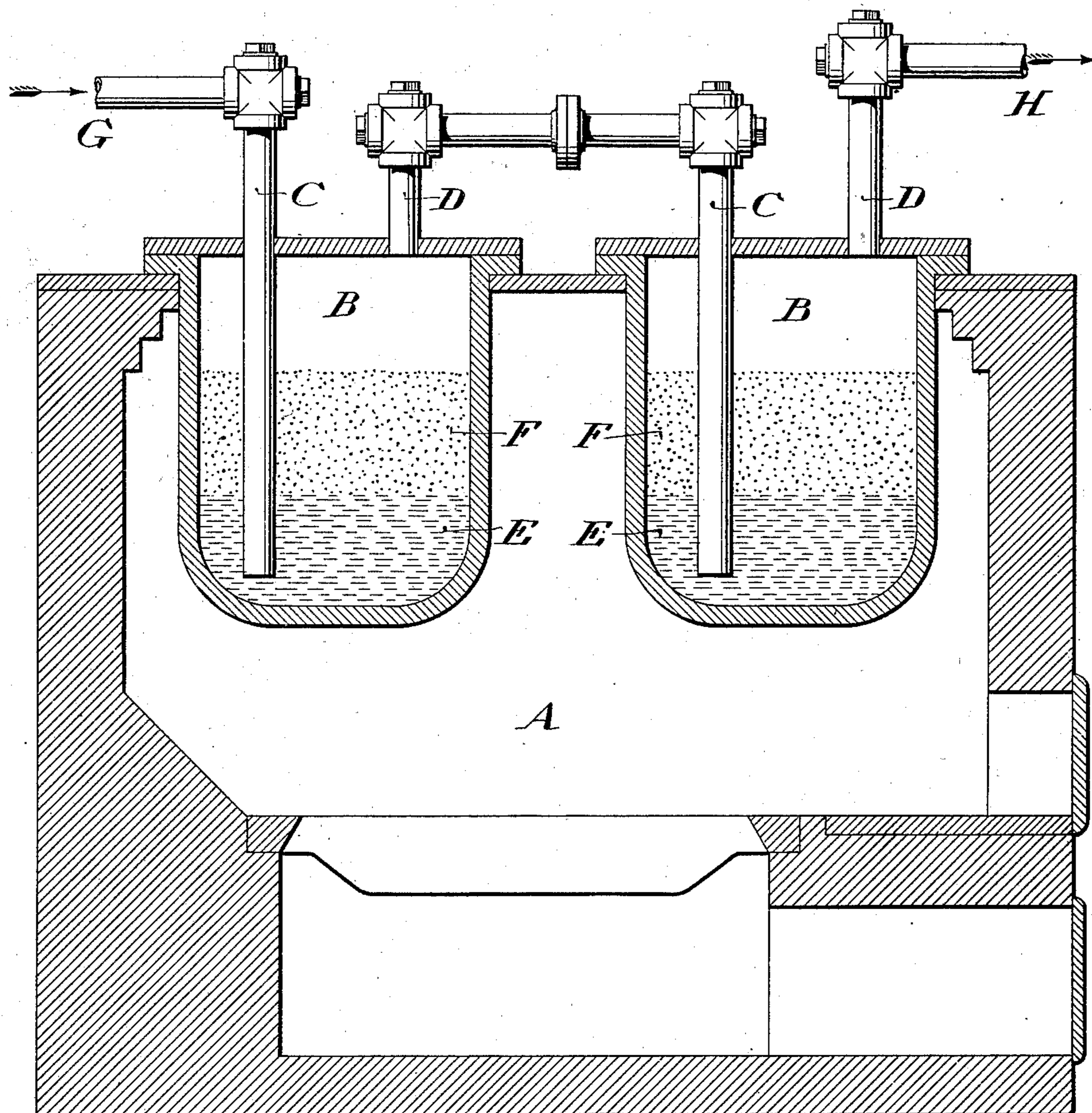
Patented Apr. 29, 1902.

J. D. DARLING.

PROCESS OF MAKING ALKALINE CYANIDS.

(Application filed May 27, 1901.)

(No Model.)



WITNESSES:

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UNITED STATES PATENT OFFICE.

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PROCESS OF MAKING ALKALINE CYANIDS.

SPECIFICATION forming part of Letters Patent No. 698,462, dated April 29, 1902.

Application filed May 27, 1901. Serial No. 62,157. (No specimens.)

To all whom it may concern:

Be it known that I, JAMES D. DARLING, a citizen of the United States, residing at No. 4826 Greenway avenue, in the city and county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improvement in the Manufacture of Alkaline Cyanids, (Case A,) of which the following is a specification, reference being had to the accompanying drawing.

There are many well-known processes by which the formation of alkaline cyanid is accomplished by the direct combination at proper temperatures of carbon, alkali, and nitrogen. In most of these processes the alkali is supplied in the form of a hydrate or carbonate. In this case it is necessary to supply more carbon than is theoretically required, and as a result the product is a black mass consisting of alkaline cyanid with a considerable excess of carbon, sometimes termed "cyanized" carbon. It is necessary in order to produce a marketable article to remove the carbon, which has usually been accomplished either by converting the cyanized carbon into ferrocyanid or by filtration processes, which are tedious and expensive. In certain other processes the alkali is supplied in metallic form. In this case it is possible to convert all of the carbon into alkaline cyanid; but the process is attended by the disadvantage of the comparatively high cost of the alkali metal. Furthermore, the nitrogen must then be supplied in the form of ammonia, which is much more expensive than nitrogen by itself.

By my present invention I employ as the chief source of alkali the cheaper carbonate, hydroxid, or oxid, (preferably the latter,) and I get rid of the excess of carbon which would remain if nothing else were used by subjecting the cyanized carbon thus produced to the action of alkali metal and ammonia-gas, whereby an additional quantity of alkaline cyanid is formed by the combination of this excess of carbon with the alkali metal and ammonia-gas.

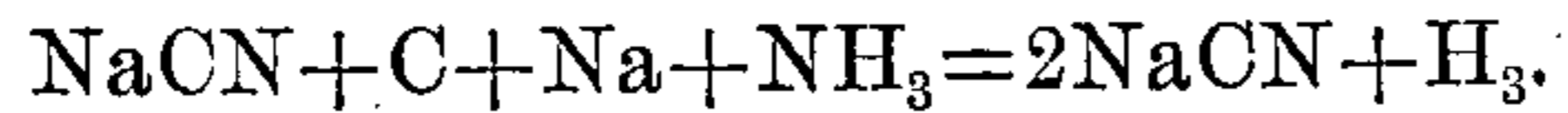
For carrying out my process no particular form of apparatus is necessary; but I prefer to employ one such as I have figured in the accompanying drawing, in which—

A is a furnace having set within it large closed iron vessels B B. Two only are shown; but it is understood that any desired number may be employed. Each of these vessels contains an inlet-pipe C, reaching nearly to the bottom, and an outlet-pipe D, leading from the top. The vessels are connected in series, as shown.

In practicing my process I first produce cyanized charcoal by any of the well-known processes for combining an alkaline carbonate, hydroxid, or oxid with carbon and nitrogen. I prefer to use the monoxids of the alkali metals, although other oxids or the hydroxids or carbonates will answer, and it will therefore be understood that when I speak in the claim of this specification of "alkaline oxids" that I mean to include in that term the hydroxids and carbonates. If desired, this part of the process may be carried on in the apparatus which I have shown and in which the succeeding step of the process takes place. When this first step has been completed, I introduce into each of the vessels a quantity of alkali metal E, reaching well above the level of the inlet-pipe. On top of this rests a mass F of cyanized charcoal. The whole is brought to a proper temperature by the furnace, and gaseous ammonia is passed through the series of vessels, entering at G and passing out at H.

In order that the result shall contain no carbon mixed with the alkaline cyanid, it is necessary that the proportions of the alkali metal to the carbon should approximate the theoretical. Thus if sodium cyanid is to be formed the pure product will contain twenty-three pounds of sodium and twelve pounds of carbon. Consequently if the first step of the process produces one hundred and ten pounds of cyanized charcoal containing from ten to eleven per cent. of uncombined carbon—i. e., about twelve pounds—I add twenty-three pounds of metallic sodium. In order to carry out the process, at least seven-teen pounds of ammonia-gas must be passed through the vessel. I have found that in this way by using the proper proportions of the cyanized charcoal and the alkaline metal it is possible to convert all of the free carbon

which remains mixed with the previously-formed cyanid into new cyanid, so that at the completion of the process there remains nothing in the vessel but pure alkaline cyanid.
5 The reaction which takes place is complicated; but I believe it to be substantially represented by the following equation:



10 Having thus described my invention, I claim—

The process of producing pure alkaline cyanid, which consists in subjecting alkaline

oxid to the action of carbon and nitrogen under the influence of heat, whereby cyanized 15 charcoal is produced; and subjecting this cyanized charcoal to the action of ammonia-gas and alkali metal under the influence of heat, whereby the carbon remaining in the cyanized charcoal is converted into cyanid, substan- 20 tially as described.

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Witnesses:

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