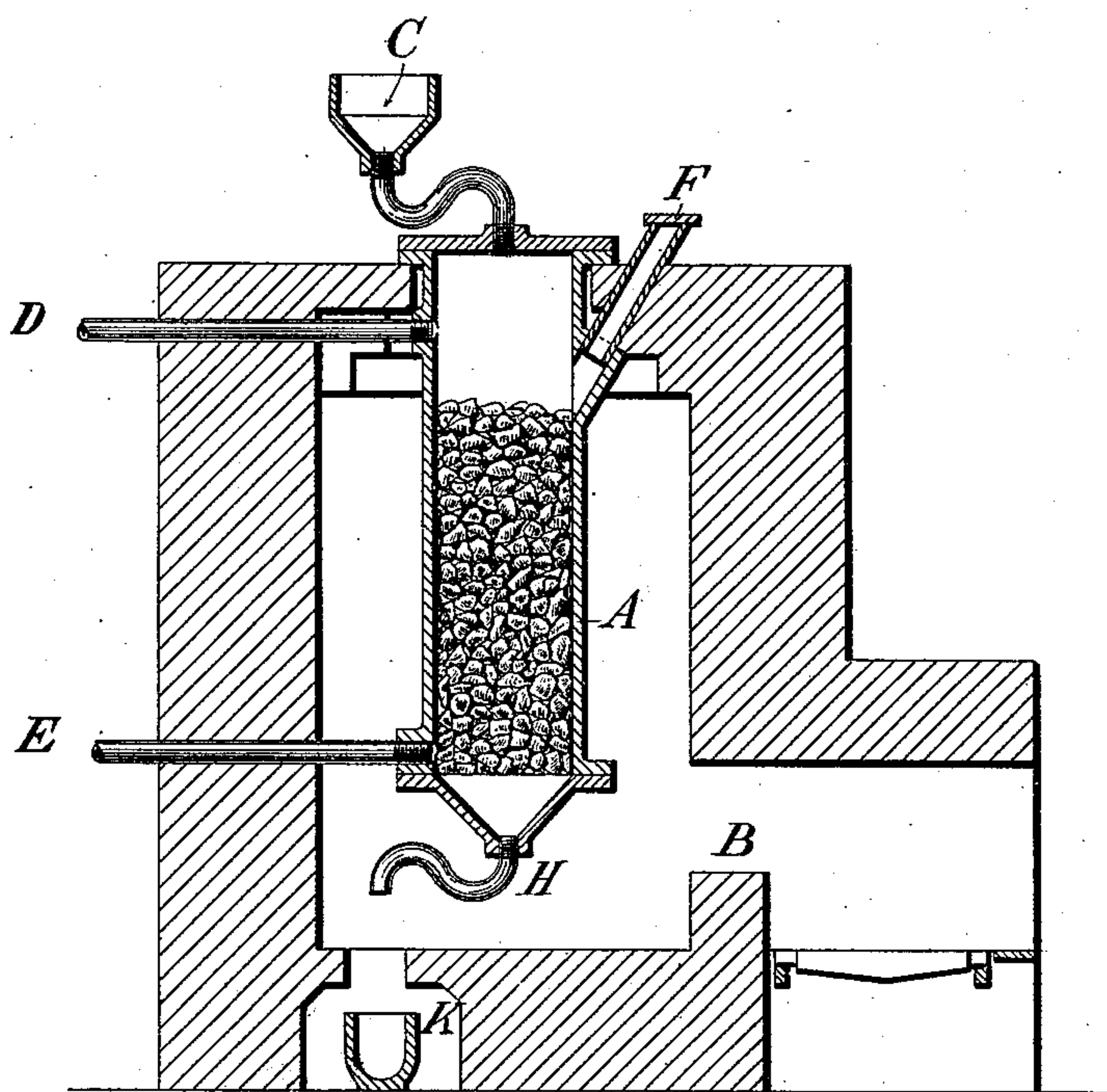


(No Model.)

H. Y. CASTNER.
PROCESS OF MAKING CYANIDS.

No. 541,066.

Patented June 18, 1895.



WITNESSES.

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UNITED STATES PATENT OFFICE.

HAMILTON YOUNG CASTNER, OF LONDON, ENGLAND.

PROCESS OF MAKING CYANIDS.

SPECIFICATION forming part of Letters Patent No. 541,066, dated June 18, 1895.

Application filed July 5, 1894. Serial No. 516,613. (No specimens.)

To all whom it may concern:

Be it known that I, HAMILTON YOUNG CASTNER, a citizen of the United States, residing at Abchurch Lane, in the city of London, England, have invented a certain new and useful Improvement in the Manufacture of Cyanids, of which the following is a specification.

This invention relates to the manufacture of alkali cyanids by the employment of the alkali in a metallic state, carbon in a natural or nascent condition and nascent nitrogen which may be produced by the decomposition of ammonia.

Many processes have been suggested for the production of alkali cyanids by the decomposition of ammonia and the combination of nascent nitrogen with carbon and alkali but in all cases the alkali used has been in the form of carbonate or hydrate. The reactions of these processes have been more or less complicated by the presence of carbonic acid or oxid produced during the operation and large losses of nitrogen occur. These defects together with a varying high temperature give a product of irregular composition due to varying proportions of alkaline carbonate and cyanate.

The essential novelty of the present invention is the substitution of an alkaline metal in place of the alkaline salt whereby the combination of the three elements is easily effected, the yield is almost theoretical and the product is pure. It will be apparent to any one familiar with this class of process that given the suggestion of employing the needed alkali in a metallic state, many processes may be devised for obtaining the desired result without departing from the essential requisites of nascent nitrogen and carbon either nascent or natural. For instance the process may be carried on by causing metallic sodium to flow down a column of heated charcoal in an iron retort set vertically in a furnace and provided with suitable inlet and outlet pipes while dry ammonia is admitted at the bottom and ascends.

In the drawing accompanying this specification is shown in sectional elevation one form of apparatus by which the process may be carried out.

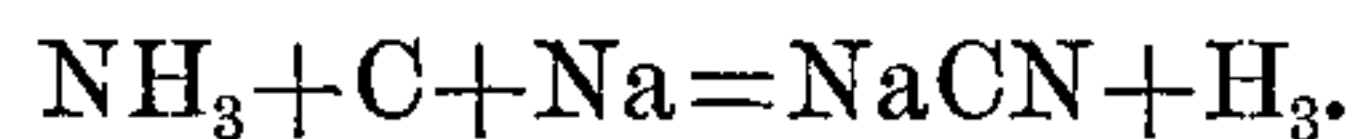
In said drawing, A, represents an iron retort set in a furnace B, and provided with inlet pipe E, and outlet pipe D, for the gases, a

feed pipe F, for the admission of carbon when that substance is employed, and a further feed pipe terminating in a hopper or vessel C, to hold the alkaline metal which gradually melts therein, owing to the heat passing from the retort, and as it melts flows down the retort, where it comes in contact with the heated carbon or contained material and also with the ascending gases admitted through E. The bottom of the retort terminates in a gooseneck or trap H, in which is at first placed sufficient cyanid to form a seal and prevent the escape of gases. As cyanid continues to form, the flow from H, is collected in K.

Instead of the retort containing heated charcoal it may contain some inert material in fragments such as iron or porcelain which will serve to retard the flow of the molten metal, and also expose a large surface of the same to the action of the ascending ammonia and hydrocarbon gases which enter the retort near the bottom say through pipe E.

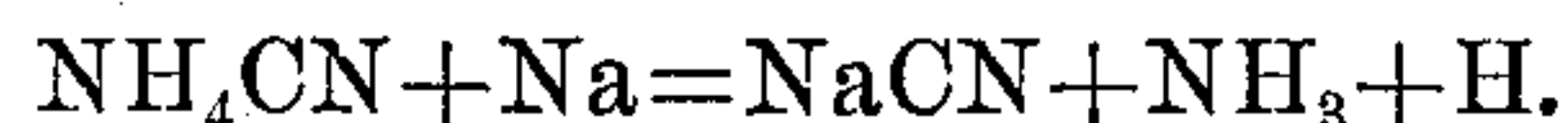
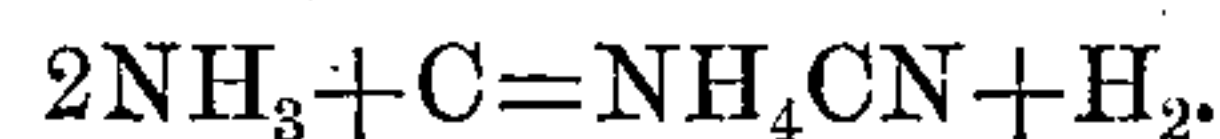
In each case by regulating the amount of materials entering the retort in proportion to the composition of the product the yield so far as the alkali metal is concerned will be almost theoretical. The gases escaping by pipe D and which may contain ammonia may be treated in any of the usual methods for its recovery. The cyanid formed by the reaction melts and flows to the lower end of the retort where it may be drawn off as desired or allowed to flow through H, as described.

The reactions taking place may be expressed as follows:



The process may also be carried on by passing dry ammonia gas through heated carbon and the resulting gas consisting of ammonium cyanid and hydrogen over molten alkali metal whence cyanid of the metal used will be formed and ammonia set free, which may again be passed over heated charcoal to form ammonium cyanid and then over the molten metal to form more cyanid.

The reaction taking place may be expressed as follows:



It will be apparent that where metallic sodium is mentioned the same remarks apply to potassium in which case the product will be cyanid of potassium; also that instead of
5 using a pure alkali metal an alkaline alloy may be used or the vapor of an alkali metal. In all cases it is essential that little or no oxygen gases are present during the reactions.

For economical working it is of course of
10 advantage to follow the theoretical proportions as closely as possible, and it is found by experiment that the reaction will proceed best just below a dull red heat, which is equivalent to just above the melting point of the cyanid
15 being formed.

I am aware that cyanids have been formed by the action of nascent nitrogen on a heated mixture of carbon and alkali, that ammonia and hydrocarbon gases have been passed over
20 or through fused alkali, that ammonium cyanid has been formed by passing ammonia over heated carbon and having originated the

commercial employment of sodium in connection with ferrocyanids for the making of cyanid I am familiar with this process but so
25 far as I am at present aware, the employment of the alkali in a metallic state, either pure, as an alloy, or as a vapor for the direct preparation of cyanids, with nascent nitrogen and carbon either nascent or natural, the process
30 being carried on in one operation or in succeeding steps is new.

What I claim is—

The improvements in the manufacture of alkaline cyanids, consisting in treating previously or separately made alkaline metal with
35 nascent nitrogen and carbon, as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

HAMILTON YOUNG CASTNER.

Witnesses:

PHILIP M. JUSTICE,
JAMES BOLES.