

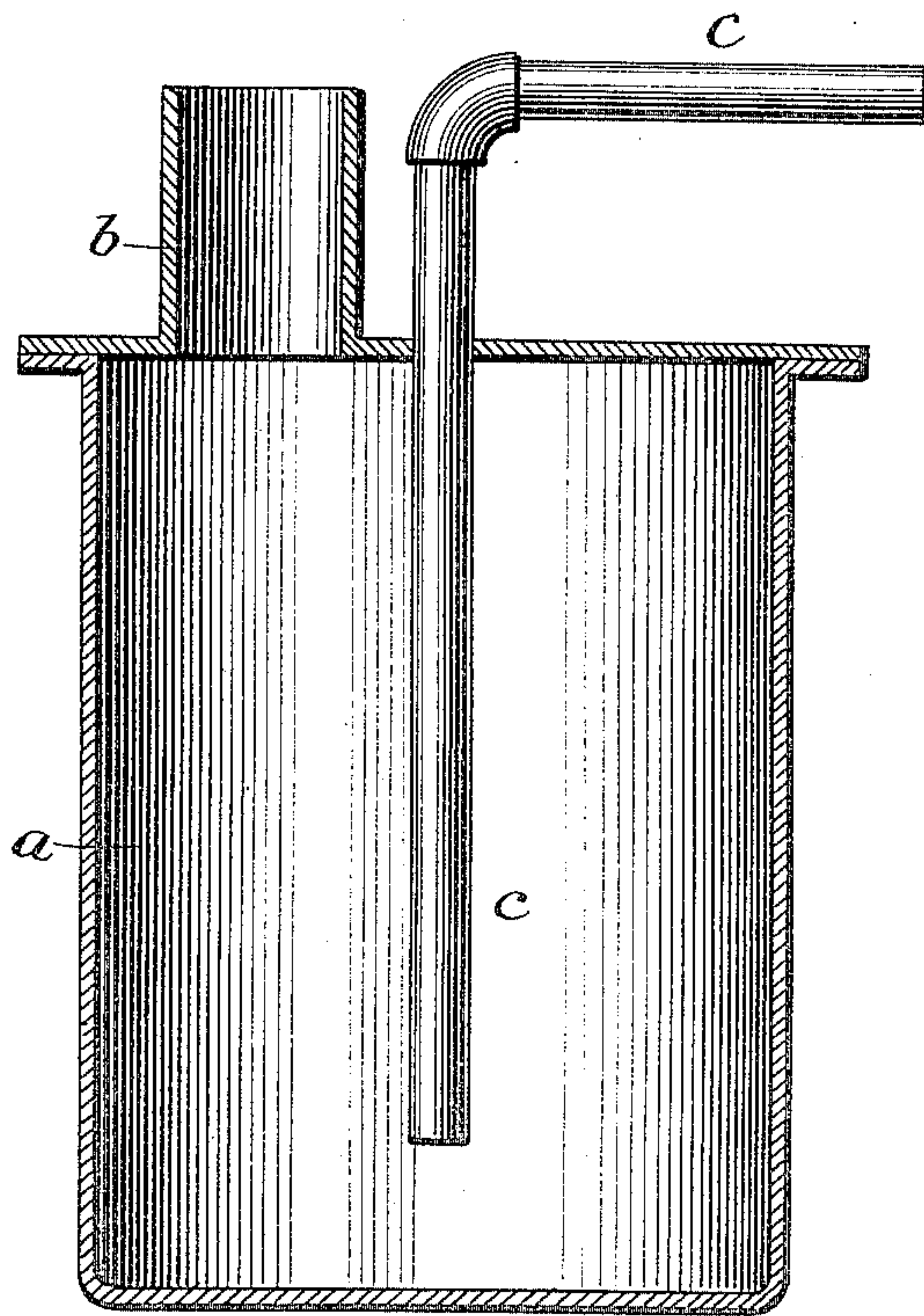
No. 686,949.

Patented Nov. 19, 1901.

J. PFLEGER.  
METHOD OF MAKING CYANIDS.

(Application filed Mar. 15, 1901.)

(No Model.)



Witnesses

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Inventor

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By

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# UNITED STATES PATENT OFFICE.

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## METHOD OF MAKING CYANIDS.

SPECIFICATION forming part of Letters Patent No. 686,949, dated November 19, 1901.

Application filed March 15, 1901. Serial No. 51,416. (No specimens.)

*To all whom it may concern:*

Be it known that I, JOHANNES PFLEGER, a subject of the Emperor of Germany, and a resident of 215 Gutleutstrasse, Frankfort-on-the-Main, Germany, have invented certain new and useful Improvements in the Manufacture of Alkali Cyanids, of which the following is a specification.

In the specification of my application for Letters Patent, Serial No. 39,382, dated December 10, 1900, a process is described by which the synthesis of alkali cyanids is effected from an alkali metal, ammonia, and carbon by transforming the alkali amid, which is easily decomposable at a high temperature, into the corresponding remarkably stable cyanamid by adding to it, as it forms a calculated quantity of cyanid, and converting the said cyanamid into cyanid by combination with a further equivalent of carbon while the temperature is raised. Further tests made by me have shown that the intermediate formation of the cyanamid and a better utilization of the alkali metal and ammonia can be effected in an improved manner. I have discovered that cyanamid can also be formed directly from the amid of the alkali metal and carbon if the temperature of the reacting mixture be maintained at a point not exceeding the temperature at which the amide of the alkali metal decomposes.

The formation of cyanamid from alkali amid and carbon according to the formula:



commences at 350° centigrade and is a most powerful one at 400° centigrade.

The object of the invention described in the specification of the aforesaid application for Letters Patent is to transform immediately into cyanamid the sodium amid obtained by the combination of sodium and ammonia, so as to protect it from decomposition, as the said sodium amid is easily decomposed at the temperature required for the formation of cyanid. The same object is attained according to the present invention by omitting wholly or in part the addition of cyanid recommended in the specification of the said prior application and keeping the

temperature of the first part of the process so low that no cyanid is formed, but the whole of the sodium amid is at the moment of its formation converted into cyanamid by the carbon present. While this cyanamid is in the course of formation the temperature must be raised slowly to the higher melting-point of this body and brought finally to about 600° centigrade. Unlike that which takes place in the direct formation of cyanid, which requires a much higher temperature, the temperature at which the cyanamid is formed according to this invention does not involve any important loss through the decomposition of alkali amid. It is only after the whole of the sodium is converted into cyanamid, and thus protected against losses, that the temperature is so raised as to effect its conversion into cyanid according to Drechsel's well-known reaction



Instead of solid carbon—such, for example, as charcoal—other carbonaceous substances which contain carbon mechanically or chemically combined and are capable of giving it up as required by the above reactions may be used. For instance, liquid or gaseous hydrocarbons may be introduced into the molten sodium through the same inlet as the ammonia or through a separate inlet.

The accompanying drawing shows a melting vessel in sectional elevation, in which my process may be carried out.

In the drawing, *a* is the vessel, *b* the charging-opening, and *c* the tube, which may be used for passing ammonia into the vessel.

I claim—

1. The process herein described of making alkali cyanids, which consists in first reacting alkali metal with carbon and ammonia in proportions necessary for the formation of alkali cyanamid, while maintaining the temperature of the mass at about 350° to 600° centigrade, and then reacting the produced cyanamid with a further quantity of carbon at a higher temperature, whereby cyanid is formed, as and for the purpose set forth.

2. The process herein described of making alkali cyanids, which consists in first reacting



alkali metal with fluid carbon compounds and ammonia while maintaining the temperature of the mass at about 350° to 600° centigrade, whereby alkali cyanamid is formed, and reacting the produced cyanamid with a further quantity of carbon at a higher temperature, whereby cyanid is formed, as and for the purpose set forth.

3. The process herein described of making alkali cyanids, which consist in first reacting alkali metal with gaseous carbon compounds and ammonia while maintaining the temperature of the mass at about 350° to 600° centigrade, whereby alkali cyanamid is formed, and reacting the produced cyanamid with a further quantity of carbon at a higher temperature, whereby cyanid is formed, as and for the purpose set forth.

4. The process herein described of making alkali cyanids, which consists in first reacting alkali metal with carbonaceous substances and ammonia while maintaining the temperature at about 350° to 600° centigrade, whereby cyanamid is formed, and then reacting the produced cyanamid with a further quantity of carbonaceous substances at a temperature of substantially 750° to 800° centigrade, whereby cyanid is formed, as and for the purpose set forth.

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

JOHANNES PFLEGER.

Witnesses:

JEAN GRUND,  
CARL GRUND.