

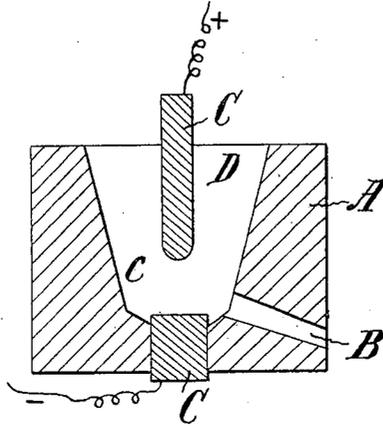
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C. KELLNER.  
PROCESS OF PRODUCING METALLIC CYANIDS.

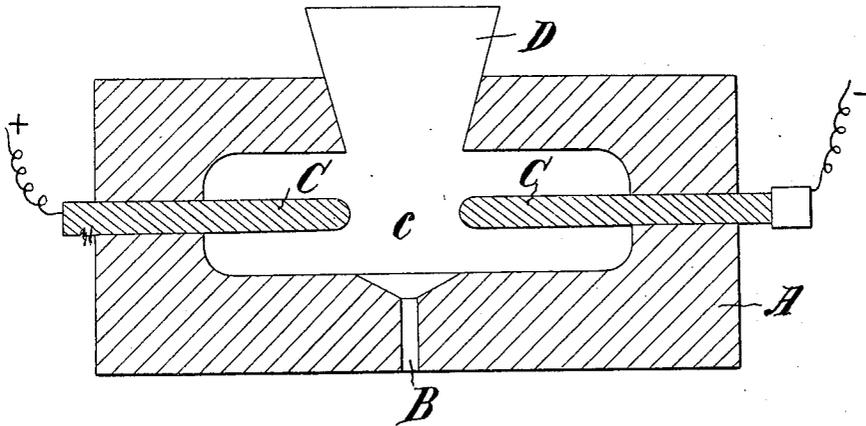
No. 579,988.

Patented Apr. 6, 1897.

*Fig. 1.*



*Fig. 2.*



*Witnesses*  
*B. S. Odell,*  
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*Inventor*  
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*By* *Murray D. [Signature]*

# UNITED STATES PATENT OFFICE.

CARL KELLNER, OF VIENNA, AUSTRIA-HUNGARY.

## PROCESS OF PRODUCING METALLIC CYANIDS.

SPECIFICATION forming part of Letters Patent No. 579,988, dated April 6, 1897.

Application filed February 11, 1896. Serial No. 578,924. (No specimens.)

*To all whom it may concern.*

Be it known that I, CARL KELLNER, a subject of the Emperor of Austria-Hungary, residing at Vienna, in the Province of Lower Austria, in the Empire of Austria-Hungary, have invented certain new and useful Improvements in the Process of Producing Metallic Cyanids; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

All the methods, both indirect and direct, of producing metallic cyanids known hitherto are connected with several serious inconveniences of different nature. Thus, for instance, when the said cyanids are produced in an indirect way, *i. e.*, by the intermediary way of metallic ferrocyanids and by the decomposition of the latter by alkaline carbonates at a high temperature, the raw molten product must subsequently be submitted, in order to obtain a salable commercial article, to a thorough purification, which operation is very expensive and takes up a great deal of time.

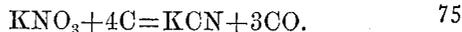
When metallic cyanids are produced in a direct way, by fusing the oxids or carbonates of the respective metals in the presence of carbonaceous substances rich in nitrogen, or in the presence of carbonaceous substances and of a gas mixture rich in nitrogen, the appliances required for the execution of this process, even when the fusing is effected by means of the electric current, are a great deal too complicated for the execution of the process on an extensive manufacturing scale, particularly because the continuous introduction into the molten mass at such high temperatures of air or generator-gases rich in nitrogen is always connected with considerable inconvenience.

The present invention has for its object a process by which the above-mentioned defects are entirely obviated in such a manner that according to this invention the employment of carbonaceous substances rich in nitrogen or of gas rich in nitrogen is entirely avoided during the process of formation of the metallic cyanids, because the particular metallic com-

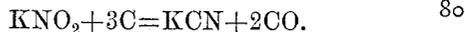
ination serving as initial material for the production of the corresponding cyanid serves also simultaneously as source of nitrogen.

For practically carrying out this improved process a nitrate or a nitrite of the particular metal the cyanid of which is to be produced is fused in the arc of an electric current. During the fusing operation between the carbon of the electrodes and the fused salts a chemical reaction takes place in such a manner that the salt is reduced and in the place of the oxygen of the same carbon is simultaneously substituted, whereby the desired cyanid combination is produced. Thus, for instance, for producing cyanid of potassium saltpeter is employed. The reduction of the saltpeter in the heat and the simultaneous introduction of carbon into the same are effected by means of the electrical arc, and the formation of carbonates is avoided during this operation.

The chemical reaction which takes place during this operation is expressed by the following formula:



If instead of a nitrate a nitrite should be employed, the reaction will take place in quite an analogous manner and viz:



For the execution of the above-described process forming the object of the present invention it is preferable to make use of an electric melting-furnace of known construction.

In order to promote the chemical action of the carbon of the anode upon the salt, the nitrate or nitrite employed as initial material can also be mixed with carbon free from nitrogen and in this state submitted to the action of the electrical arc.

When working with nitrates on a large scale, it will be advisable to melt the nitrate in a separate vessel and mix the carbon therewith gradually, so as to promote the partial transformation of the nitrate into nitrite. This is, however, of no great importance as regards the essence of the present invention.

Any suitably-constructed apparatus can be

employed in carrying out the above-described process, and in the accompanying drawings Figures 1 and 2 show in vertical sections two forms of such apparatus.

5 The apparatus or electric furnace A is of course constructed of any suitable refractory material, *c* indicating the reducing-chamber; B, the tap-hole; D, the opening or hopper through which the material is introduced; C  
10 C, the carbon electrodes connected by wires in a well-known manner to the + and - poles of the source of electricity.

In Fig. 1 the walls of the furnace converge to direct the material into the zone of heat  
15 between the electrodes C, which are here arranged in a vertical plane. In Fig. 2, on the contrary, the electrodes C are arranged in a horizontal plane, the material being directed between them by a hopper-like inlet immedi-

ately above the space between the said elec- 20 trodes.

I claim—

1. The described process of obtaining cyanids, which consists in decomposing a suitable nitrate or nitrite by the heat of and in 25 an electric arc between carbon electrodes.

2. In the process of obtaining cyanids, decomposing a suitable nitrate or nitrite in presence of carbon free from nitrogen, by the heat of an electric arc, substantially as de- 30 scribed.

In testimony whereof I affix my signature in presence of two witnesses.

CARL KELLNER.

Witnesses:

DEAN B. MASON,  
HARRY BELMONT.