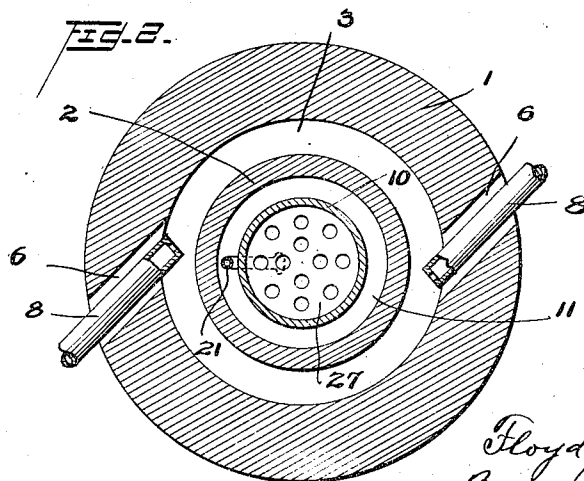
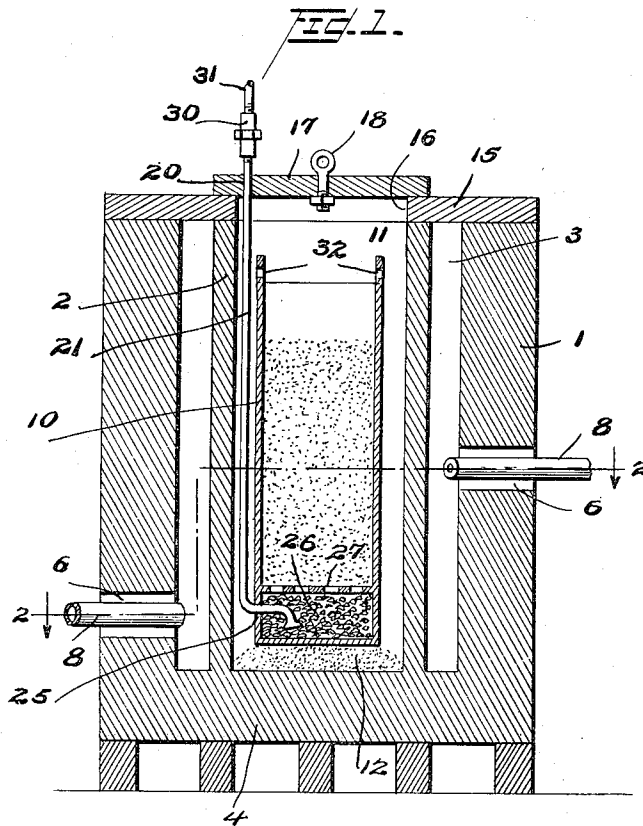


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 APPARATUS FOR THE MANUFACTURE OF ALKALI CYANID.
 APPLICATION FILED JULY 25, 1917.

1,309,903.

Patented July 15, 1919.



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Specification of Letters Patent.

Patented July 15, 1919.

Application filed July 25, 1917. Serial No. 182,644.

To all whom it may concern:

Be it known that I, FLOYD J. METZGER, a citizen of the United States, residing in New York, county of New York, State of New York, have invented certain new and useful Improvements in Apparatus for the Manufacture of Alkali Cyanid, of which the following is a specification.

In the manufacture of alkali cyanid by heating together in a metal retort or container a mixture of carbonaceous material, alkali metal carbonate or hydroxid and nitrogen one of the practical difficulties encountered is that resulting from the wear and tear of the metal, usually iron, of which the retort or container is constructed. This is due largely to the fact that when the said retort or container is subjected to the usual oxidizing furnace gases at the high temperature necessary to cause the required reactions, the life of the retort is comparatively short so that the expense of upkeep is an item of considerable importance.

One of the objects of my invention is to provide a furnace so constructed that in the ordinary normal operation or use thereof the oxidizing action of the furnace gases thereon is to a large extent prevented.

A further object of my invention is to provide means whereby any oxygen, however small the amount may be, which may be present in the nitrogen which is introduced into the charge to be treated, may be removed before it enters the charge, because oxygen, even in small amounts, has a marked decomposing action on the cyanid which is formed in the operation of manufacturing the same in the manner above suggested.

Another object of my invention is to simplify and cheapen the construction of furnaces employed in the manufacture of cyanid, while at the same time maintaining a high degree of efficiency therein.

Other objects and advantages of my invention will be referred to and particularly pointed out in the detailed description thereof which follows or will be apparent from such description.

In order that the principle of my invention may be more readily and clearly understood and its practical advantages fully comprehended and appreciated reference should be had to the accompanying drawing in

which I have illustrated one form of a convenient embodiment thereof. However, it will be understood that changes in the details of construction may be made within the scope of the claims without departing from my invention.

In the drawing:

Figure 1 is a vertical longitudinal sectional view of a furnace constructed in accordance with my invention; and

Fig. 2 is a transverse sectional view thereof taken on the line 2—2 of Fig. 1.

Referring to the drawing, 1 designates an outer wall of any suitable refractory material and 2 the inner wall of the same or similar material. The two walls are separated from each other by a chamber 3 which extends entirely around the inner wall 2. In the construction, as shown, these walls and the chamber are annular in transverse section, but it will be understood that they may be of any other preferred shape. The said chamber 3 is the combustion chamber of the furnace. The bottom of the furnace is designated by the numeral 4.

The outer walls 1 are provided with openings 6 which extend diagonally there-through. That is to say, they are inclined at an obtuse angle with respect to the outer surfaces of the outer and inner walls of the furnace. Pipes 8 are provided for supplying gaseous fuel for the combustion chamber. These pipes project through the openings 6, their inner ends terminating in the combustion chamber 3. The diameters of the holes 6 are greater than that of the external diameters of the pipes 8 in order that air may be supplied therethrough to the combustion chamber for furnishing the oxygen necessary to proper combustion within the chamber.

10 designates a retort or container of metal, usually iron, the external diameter of which is substantially less than the internal diameter of the chamber 11 within the inner wall 2, so that when the retort or container 10 is placed within the chamber 11, as shown in the drawing, an annular space is left between the exterior of the said retort or container and the interior surface or side of the wall 2. The retort or container 10 may be supported in any suitable manner within the chamber 11 upon the bottom 4.

I have illustrated the same as being supported upon a bed or body of sand or other like material 12 situated in the lower end of the said chamber 11. The retort or container rests or stands directly upon this material 12. Any suitable means may be employed for supporting the retort in the chamber 11.

The combustion chamber 3 is closed by means of an annular top or cover 15 which rests upon the top of the walls 1 and 2, as shown in Fig. 1 of the drawing. The said top or cover 15 is provided with a central opening at 16 which is adapted to be closed by means of a top or cover 17 provided with an eyelet 18 by means of which it may be readily lifted for removal when desired. The top or cover 17 rests upon the inner edge of the annular top or cover 15. The said top or cover 17 is provided with a relatively small hole or opening 20 through which a tube or conduit 21 extends and which passes downwardly into and through the annular space intermediate the retort or container 10 and the inner wall 2. The tube or conduit 21 fits closely the opening 20 in the top or cover 17, although the latter is movable with respect to said tube so that it may be removed therefrom when desired. The lower end of the tube or conduit projects through an opening 25 in the side of the retort or container near the bottom of the same and terminates in a compartment 26 formed between the bottom of the retort or container 10 and a perforated plate or disk 27 extending transversely of and situated a relatively short distance above the bottom of said retort or container. This compartment contains carbon, such as coke, in fragmentary or broken up form or other carbonaceous material.

In operation the portion of the retort or container 10 above the perforated plate or disk 27 is filled with or contains a mixture of carbonaceous material and an alkali carbonate, such as sodium carbonate.

Preferably, in practice, the retorts or containers 10 are charged with the mixture of a carbonaceous material and alkali outside of the furnace and are thereafter introduced into the chamber 11. After having been treated by being raised to the proper temperature in the presence of nitrogen to effect the necessary reactions to form cyanid the retort or container is removed. To permit the insertion and removal of the retort or container into or from the furnace chamber 11, the top or cover 17 should be removed,—without, however, removing the tube or conduit 21. This is accomplished by providing a removable coupling 30 for coupling the lower end of the nitrogen supply tube 31 with the upper end of the tube or conduit 21. By uncoupling tube 31 from the upper end of the tube 21 and removing

the coupling 30 it will be apparent that the top or cover 17 may be moved upwardly out of engagement with the said tube 21.

To facilitate the insertion and removal of the retort or container 10 into and from the furnace chamber 11 I have provided small holes or eyes 32 in oppositely disposed relation to each other near the upper end thereof to permit of the engagement of a lifting means, not shown, therewith.

In operation a retort or container properly charged with the necessary materials, including carbon in the form preferred and alkali metal carbonate is placed within the furnace chamber 11 and the cover 17 is then placed in position. The tube 31 is then coupled with the upper end of the tube or conduit 21. Nitrogen is introduced through the tube or conduit 21 and is discharged adjacent to the lower side of the compartment 26 containing coke in granular or fragmentary form or other carbonaceous material. This material, being situated in the portion of the furnace which is subjected to the action of the heat of the same, becomes heated to redness so that any oxygen which may be present as an impurity in the nitrogen, and in practice there is nearly always a small percentage of oxygen present, is converted into carbon monoxid which has no injurious effect on the cyanid formed in the portion of the retort or container above the perforated plate or disk 27.

It will also be seen that by my construction I am enabled to effect the preheating of the nitrogen by passing it down through the hot zone of the furnace on the outside of the retort or container, as is clearly shown in Fig. 1 of the drawing. By this construction the nitrogen is preheated before it contacts with any portion of the charge being treated.

Furthermore by the construction and operation shown and above described I remove from the nitrogen any oxygen which may be present before the nitrogen enters any portion of the charge being treated. Such oxygen, having been removed by converting it into carbon monoxid before it reaches the charge cannot have any injurious effect on the cyanid which may be formed in the retort or container.

It will also be noted that the annular space surrounding the retort or container 10 is open at its top and is in direct communication with the interior of the retort or container 10. The result of this is that said annular space becomes filled with nitrogen gas together with carbon monoxid and any other nonoxidizing gases produced by the reactions taking place within the charge contained within the retort 10. The outer surface of the latter is completely surrounded by inert gases and is protected thereby from the oxidizing action of the

furnace gases and from such other deteriorating action as might result if not so protected.

I claim:—

5 1. In apparatus for the production of alkali cyanid, the combination of a furnace provided with a furnace chamber, a retort situated within said chamber and having an external diameter less than the internal
10 diameter of the said furnace chamber whereby a space is provided between the said retort and the interior surface of the said chamber, and a conduit extending into the said furnace chamber intermediate the
15 said retort and the interior surface of the said chamber, said conduit entering the said retort at a point at or near the bottom thereof.

20 2. In apparatus for the production of alkali cyanid, the combination of a furnace, a retort in said furnace, said retort being divided into a plurality of compartments, one of said compartments being adapted to contain a mixture of carbonaceous material
25 and an alkali metal compound, means for preheating and supplying nitrogen in gaseous form to the other one of said compartments, and means in said last mentioned compartment for removing from the said
30 gaseous nitrogen any oxygen which may be present therein before the said nitrogen reaches the charge in the first named compartment.

3. In apparatus for the production of
35 alkali cyanid, the combination of a furnace having inner and outer walls separated by a space constituting a combustion chamber, a retort situated within the said furnace, said retort being provided with a perforated disk situated a relatively short distance above its bottom, the portion of said
40 retort above the said disk being adapted to contain a charge consisting of a mixture of carbonaceous material and an alkali metal compound and the portion of said retort below the said disk containing carbonaceous
45 material, means for supplying nitrogen gas or a nitrogen containing gas to the said retort at a point near the bottom thereof below the said disk and means whereby the
50 nitrogen is preheated before it is delivered to the said retort.

4. In apparatus for the production of
55 alkali cyanid, the combination of a furnace having inner and outer side walls separated by a combustion chamber, the said furnace also being provided with a furnace chamber, a retort situated in the said furnace chamber and being spaced from the side
60 walls of said chamber and the said retort being provided with a perforated disk

situated therein a short distance above its bottom, the upper portion of said retort being adapted to receive a charge consisting of a mixture of carbonaceous material
65 and an alkali metal compound and the portion of said retort below said disk containing carbonaceous material, a tube extending into the said furnace chamber and passing downwardly in the space between the
70 interior surface of said chamber and the exterior surface of the said retort and terminating in the latter at a point near the bottom thereof below the said disk.

5. In apparatus for the production of
75 alkali cyanid, the combination of a furnace, a retort situated within the said furnace, a wall of refractory material surrounding said retort and forming a chamber for the latter, the external diameter of the said retort being less than the diameter of said
80 chamber, the said furnace being provided with a combustion chamber outside of the said refractory wall, means for supplying fuel to the combustion chamber for heating
85 the same, a tube extending into the chamber within said wall and downwardly intermediate the said wall and the said retort whereby nitrogen which is delivered through the said tube is preheated by the
90 heat of the furnace, the said tube entering the said retort and terminating at a point near the bottom of the latter.

6. In apparatus for the production of
95 alkali cyanid, the combination of a furnace comprising inner and outer walls separated by a space constituting a combustion chamber and the said furnace being provided also with a furnace chamber, a retort adapted to be placed within and removed
100 from the said furnace chamber, a cover for closing the top of the combustion chamber, said cover having a central opening in alinement with the furnace chamber, a removable cover for closing the said furnace
105 chamber, the said retort being adapted to be placed within and removed from the said furnace chamber when the cover therefor is removed, a tube extending into the said furnace chamber between the retort and the
110 opposing surface of the said furnace chamber, the said tube entering the said retort and terminating at a point near the bottom thereof, and the said tube being connected with the said retort so that it is placed in
115 and removed from the furnace chamber as the retort is placed within and removed from said chamber.

In testimony that I claim the foregoing as my invention I have hereunto signed my
120 name this 23 day of July, A. D. 1917.

FLOYD J. METZGER.