No. 889,120. PATENTED MAY 26, 1908.

J. GORMLY.

APPARATUS FOR TREATING SOLID MATERIAL.

APPLICATION FILED APR. 12, 1907.

2 SHEETS—SHEET 1.

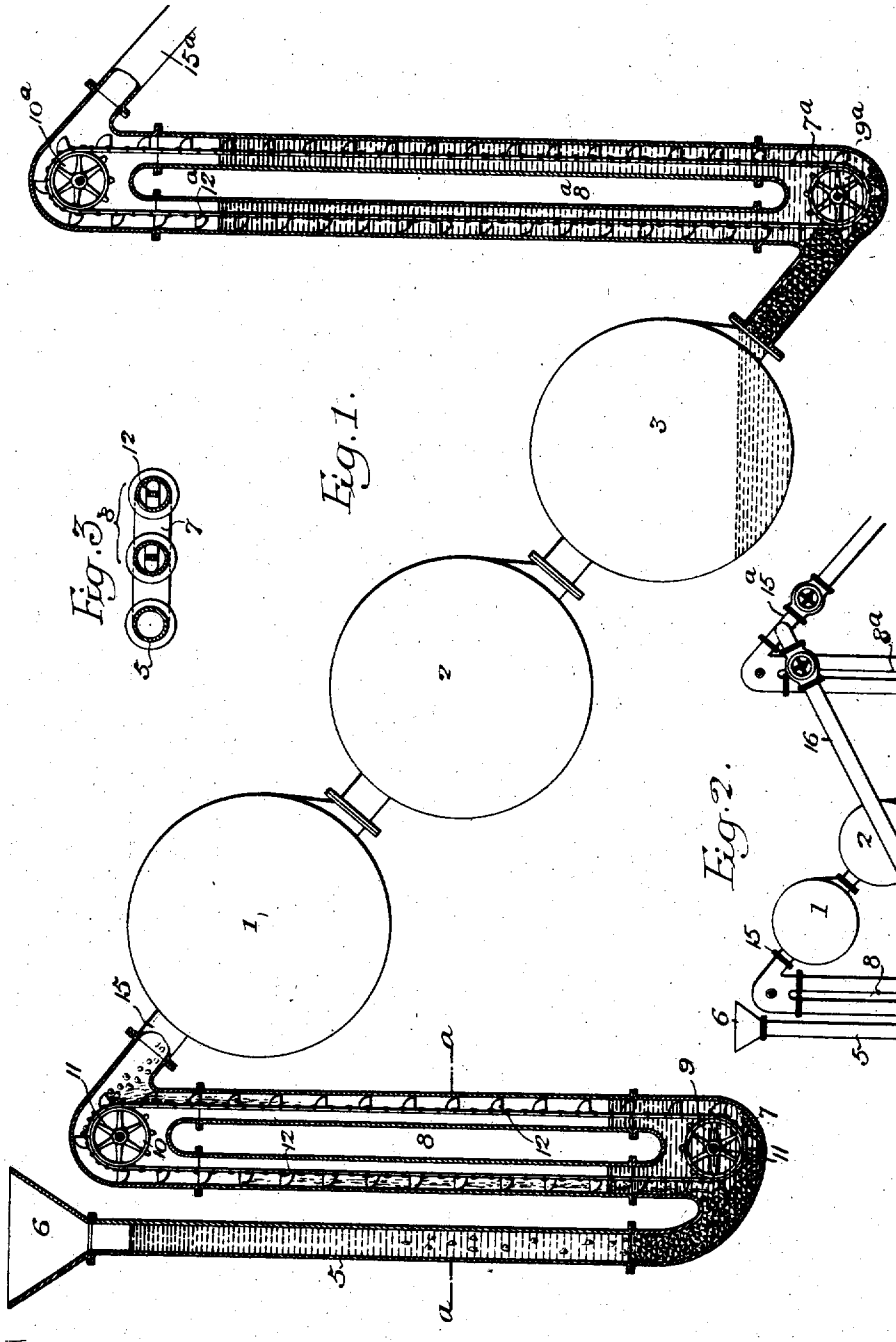


Fig. 1.

Fig. 3.

Fig. 2.

Witnesses:-
Titus G. Fowler.
William A. Rowe.

Inventor.
John Gormly
by his Attorneys.
Howson & Howson

No. 889,120. PATENTED MAY 26, 1908.

J. GORMLY.

APPARATUS FOR TREATING SOLID MATERIAL.

APPLICATION FILED APR. 12, 1907.

2 SHEETS—SHEET 2.

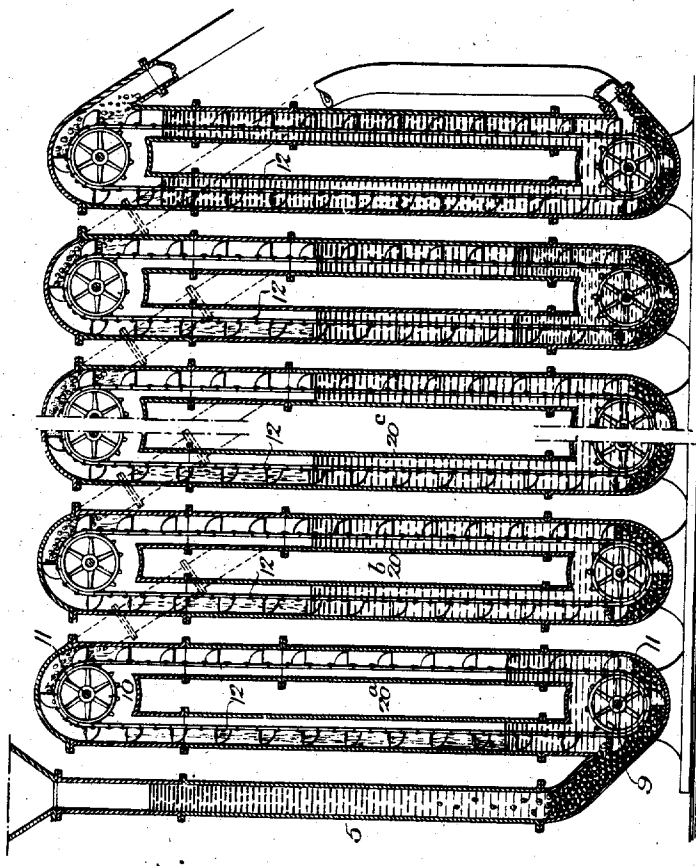


Fig. 5.

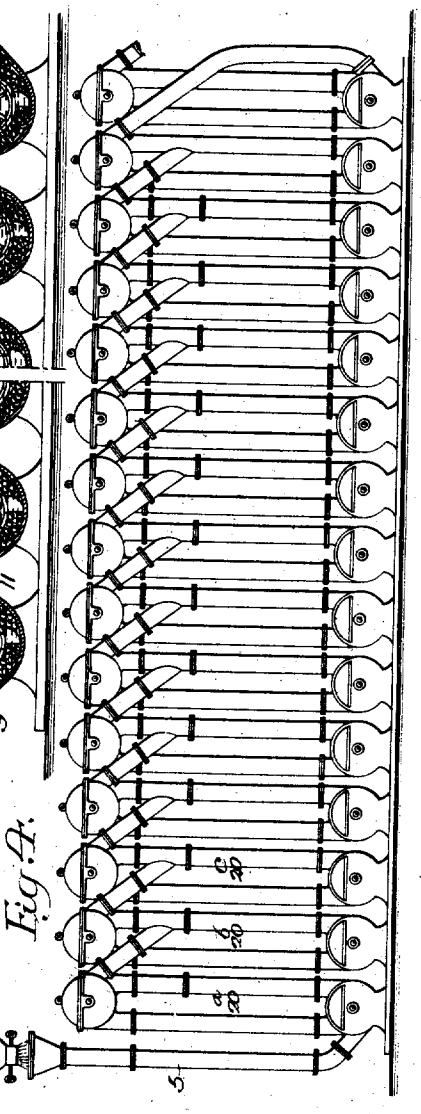
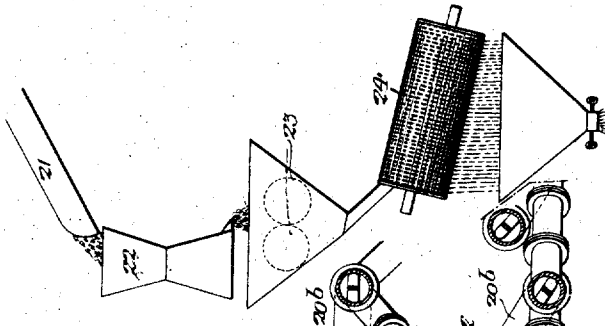


Fig. 4.



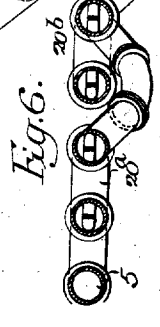


Fig. 6.

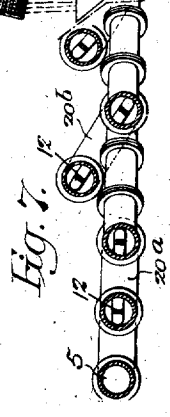


Fig. 7.

Witnesses:—
Lewis W. Grover.
William A. Rowe.

Inventor:
John Gormly
by his Attorneys
Howson & Howson

UNITED STATES PATENT OFFICE.

JOHN GORMLY, OF PHILADELPHIA, PENNSYLVANIA.

APPARATUS FOR TREATING SOLID MATERIAL.

No. 889,120. Specification of Letters Patent. Patented May 26, 1908.

Original application filed October 30, 1906, Serial No. 341,233. Divided and this application filed April 12, 1907. Serial No. 367,881.

To all whom it may concern:

Be it known that I, JOHN GORMLY, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented an Improved Apparatus for Treating Solid Material, (being a division of my application filed October 30, 1906, Serial No. 341,233,) of which the following is a specification.

My invention relates to the treatment of solid material of various kinds, notably ores of the precious metals, and it consists of an apparatus comprising a closed receptacle or a series of the same wherein such material may be treated under pressure, in a vacuum or at atmospheric pressure by a special method or process; and whereby such material may be introduced into such receptacle or receptacles and removed therefrom without affecting the conditions present within the same.

Although it will be understood that apparatus embodying my invention may be employed for treating various materials under widely varying conditions, where it may be desired to employ a vacuum or atmospheric or higher pressure, the particular embodiment of my invention is in connection with a process of and an apparatus for cyaniding ores.

My invention is fully shown in the accompanying drawings, in which:

Figure 1, is a sectional view of one form of apparatus embodying my invention and capable of carrying the improved method or process into effect; Fig. 2, is an elevation of the same on a smaller scale; Fig. 3, is a sectional view on the line *a*—*a*, Fig. 1; Fig. 4, is a view in elevation of another form of apparatus embodying my invention and capable of carrying out the method or process forming the subject of my companion application; Fig. 5, is an enlarged sectional view of a portion of the same, and Figs. 6 and 7, are sectional views illustrating details of the structure shown in Fig. 5.

In Fig. 1, a series of suitable treating chambers or drums are indicated at 1, 2 and 3, in which, when the process of treatment is employed in connection with ores, lixiviation of the same is carried out. These treating chambers may be of any suitable type, such for instance as those disclosed in the patent of S. T. Muffly, No. 820,810, May 15, 1906; but as my invention relates more particularly to the introduction of the material to and its removal from such chambers, no description of the same is necessary.

At the inlet end of the apparatus, I provide a pipe 5, of suitable diameter, carrying at its upper end a funnel-shaped hopper 6, and communicating at its lower end with the base 7 of a duplex tubular-structure 8 in which is mounted a chain wheel 9; such structure having another chain wheel 10 at the upper portion of the same. These wheels are carried by suitable shafts 11, and power from any suitable source (not shown) being applied, preferably to the upper shaft, said wheels will be caused to turn and traverse a bucket conveyer 12 through such tubular-structure.

When employed in connection with the treatment of ores of the precious metals, the pipe 5 and the tubular-structure 8 will contain a cyaniding solution, and when the apparatus is run with pressure within the chambers 1, 2 and 3, greater than the atmosphere, this liquid will occupy substantially the position shown in Fig. 1. The ore or other material to be treated is introduced into the hopper 6 of the pipe 5, and passes through the solution contained therein to the bottom of said pipe, thence entering the tubular-structure 8 and being carried to the top of this latter structure by the conveyer 12 and emptied into the pipe 15 leading to the chamber 1.

After the material has been treated by any agent, fluid or liquid, within the chambers 1, 2 and 3, it passes to the bottom 7^a of a tubular-structure 8^a provided with chain wheels 9^a and 10^a over which a bucket conveyer 12^a passes, such structure also containing a quantity of the solution through which the material under treatment is carried by said bucket conveyer. From the tubular structure 8^a, the material is emptied into a pipe 15^a and conveyed away for further treatment, or in some instances it may be returned through a pipe 16, as shown in Fig. 2, to the bottom of the tubular structure 8 for a second passage through the bodies of treating solution and the treating chambers.

The cyaniding liquid or other treating solution through which the solid material is passed, forms liquid seals at each end of the apparatus, thereby preventing the entrance of the atmosphere and consequently insuring

that the conditions under which the material is treated within the chambers, whether in a vacuum, under pressure, or at atmospheric pressure, are maintained at a constant state of efficiency.

In Figs. 4 and 5, the latter being an enlarged sectional view, I have shown a form of apparatus in which treating chambers 20^a, 20^b, 20^c &c., of the same general character as the duplex tubular-structures 8 and 8^a, are provided. Chain conveyers 12 are employed for passing the material under treatment continuously through bodies of a treating liquid, or in some instances a treating fluid; in the present instance bodies of liquid being shown. Pressure being maintained within these chambers, the liquid will occupy substantially, the position indicated in Fig. 4, which shows the end chambers of such form of apparatus. In connection with this view I have also shown a feeding spout 21, crushing mill 22, grinding rolls 23 and a screen 24 for sifting the ore or other material before its passage to the treating apparatus forming the subject of my invention.

Although I have shown and described bucket conveyers carried by an endless chain for transferring the material for treatment from the inlet pipe to the chambers 1, 2 and 3, and from the latter to a discharge pipe, in the form of apparatus shown in Fig. 1, and for conveying the material entirely through the apparatus shown in Fig. 4, it will be obvious that other conveying means may be employed without departing from my invention, such as a belt passing over plain pulleys and carrying buckets or other supporting elements, and it is conceivable that under certain conditions the material for treatment could be mechanically pushed through the treating solution or other liquid forming the seals at the ends of the apparatus, as well as through the fluid or liquid within the treating chambers.

By preference one of the chain wheels or pulleys is mounted in an adjustable bearing so that any wear or stretch of the chain may be taken up.

I claim:

1. An apparatus for treating solid material, having a closed chamber in which pressure differing from the atmosphere may be maintained, a body of treating liquid within said chamber, means for introducing such material thereto, a treating liquid forming a seal through which said material is introduced, means for discharging said material, and a treating liquid forming a seal through which said material is discharged.

2. An apparatus for treating solid material, having a closed chamber in which pressure differing from the atmosphere may be maintained, a body of treating liquid within said chamber, bodies of treating liquid forming seals at the inlet and discharge ends of such apparatus, and means for traversing such material into and through the pressure chamber and through such seals.

3. An apparatus for treating solid material, having a closed chamber in which pressure coinciding with or differing from the atmosphere may be maintained, a body of treating liquid within said chamber, means for introducing such material thereto, a body of treating liquid forming a seal through which such material is introduced, means for discharging said material, and a body of treating liquid forming a seal through which such material is discharged.

4. The combination, in an apparatus for treating solid material, of a series of treating chambers, bodies of treating liquid within the same, bodies of treating liquid forming seals at the inlet and outlet ends of said chambers, and endless conveyers for introducing material to and removing it from said treating chambers through said liquid seals.

5. The combination, in an apparatus for treating solid material, of a series of treating chambers in which pressures differing from the atmosphere may be maintained, bodies of treating liquid within said chambers, bodies of treating liquid forming seals at the inlet and outlet ends of said chambers, endless conveyers for introducing material to and removing it from said treating chambers through said liquid seals, and means for passing said material through the treating chambers.

6. The combination, in an apparatus for treating solid material, of a series of treating chambers, vertically disposed tubular-structures containing bodies of a treating solution forming liquid seals at the inlet and outlet ends of said chambers, and endless conveyers arranged to travel in said tubular-chambers for introducing material to and removing it from said treating chambers through said liquid seals.

7. The combination, in an apparatus for treating ores of metals soluble in cyanid solutions, of a series of lixiviating chambers, tubular-structures containing bodies of cyaniding solution at the inlet and discharge ends of said apparatus and forming liquid seals for the lixiviating chambers, and means for carrying ore through the cyaniding solution in said tubular-structures to and from the lixiviating chambers whereby such ore may receive initial and final treatment by the cyaniding solution in addition to its treatment in the lixiviating chambers.

8. The combination, in an apparatus for introducing and treating solid material, of a treating chamber in which pressure differing from the atmosphere may be maintained, tubular liquid-holding structures at the inlet and discharge ends of said treating chamber, treating solutions in said chambers, and conveying apparatus arranged in said liquid-

holding structures for traversing material to be treated to and from the treating chamber and through said bodies of treating liquid, the latter forming liquid seals.

9. The combination, in an apparatus for treating solid material under pressure differing with respect to the atmosphere, of a treating chamber, vertically-disposed tubular-structures forming inlet and outlet passages communicating with said chamber, bodies of treating solution disposed within said passages, and bucket conveyers in said tubular-structures for traversing the material under treatment through said bodies of solution to the pressure chambers, said bodies of solution forming liquid seals.

10. The combination, in an apparatus for treating solid material, of a treating chamber, means for changing the pressure within said chamber, tubular structures forming inlet and outlet passages communicating with said chamber, bodies of treating solution disposed within said passages, and bucket conveyers in said tubular-structures for traversing the material under treatment through said bodies of solution, the latter forming liquid seals.

11. The combination, in an apparatus for introducing and treating solid material, of a series of treating chambers, liquid holding chambers at the inlet and discharge ends of said treating chambers, treating solutions in all of said chambers, and means for traversing the material to be treated to and through the treating chambers and through said bodies of treating liquid, that in the inlet and discharge passages forming liquid seals.

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

JOHN GORMLY.

Witnesses:

EDITH F. EHLEMAN,

LYNNE K. LEWIS.