J. A. FLEMING.

DEVICE FOR TREATING ORES.

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1,150,669. **Patented Aug. 17, 1915.**

Fig. 1.

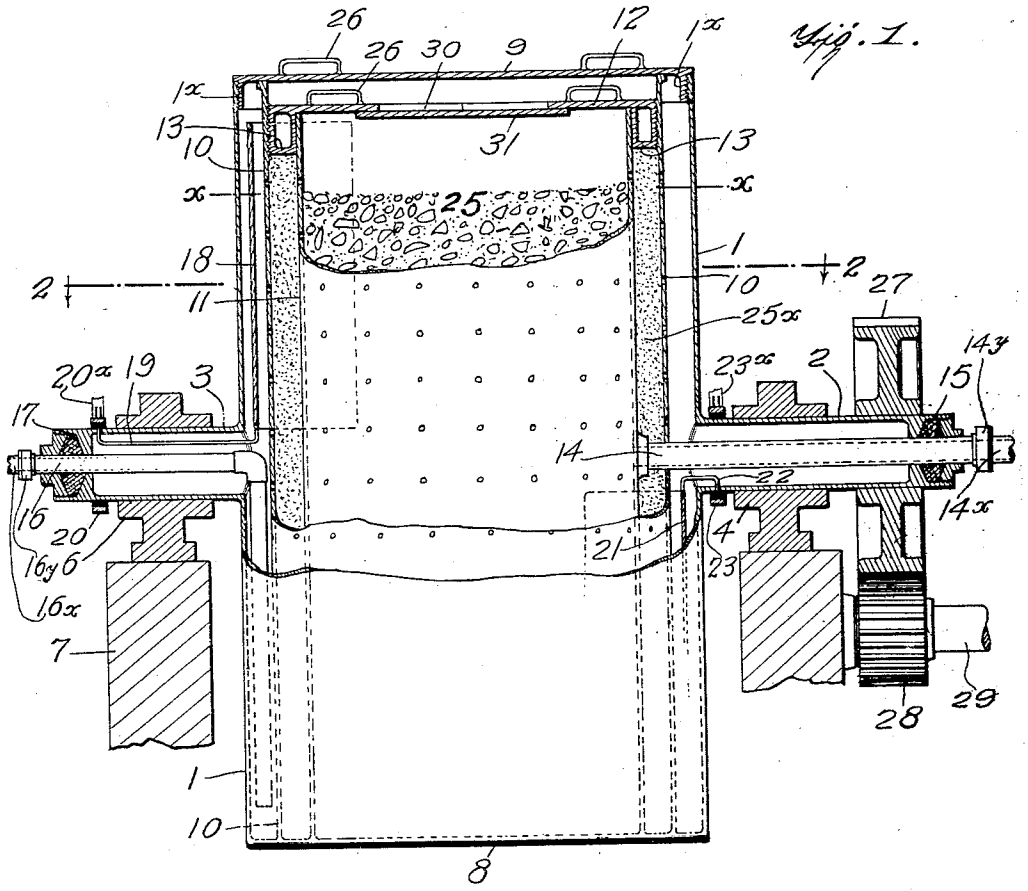
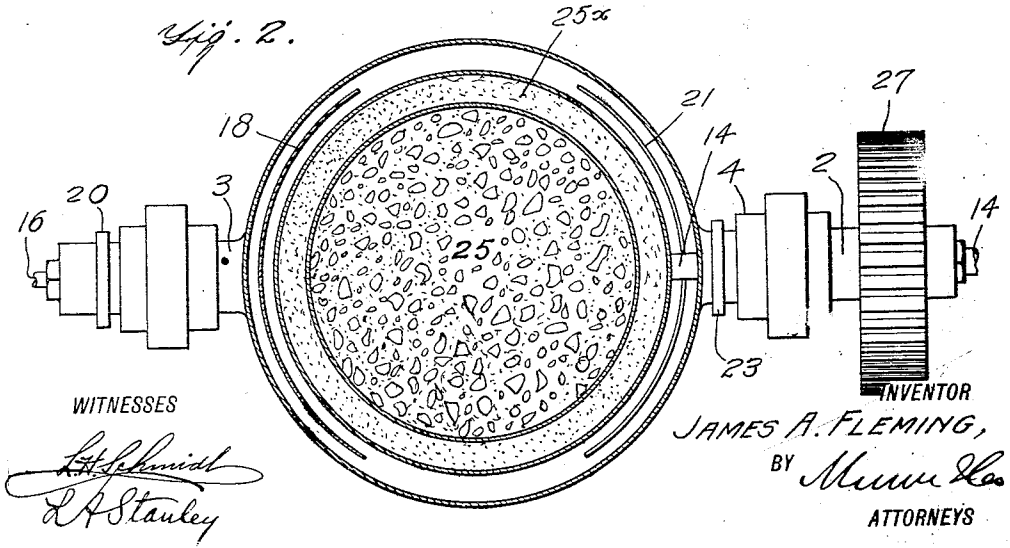


Fig. 2.



WITNESSES

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DEVICE FOR TREATING ORES.

1,150,669. Specification of Letters Patent. Patented Aug. 17, 1915.

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To all whom it may concern:

Be it known that I, JAMES A. FLEMING, a citizen of the United States, and a resident of Globe, in the county of Gila and State of Arizona, have made certain new and useful Improvements in Devices for Treating Ores, of which the following is a specification.

My invention relates to improvements in devices for treating ores, especially those devices in which ores are leached by chemicals for the purpose of extracting valuable minerals contained therein, and it consists in the combinations, constructions and arrangement of parts hereinafter described and claimed.

An object of my invention is to provide a device in which the ores are treated to the leaching action and the lixiviate containing the valuable metal is then separated from the remaining portions of the ore by a filter or screen, and in which there is no possibility of the filter becoming clogged up, since it is constructed to be self-cleaning.

A further object of my invention is to provide a rotary ore treating device of the type described in which the liquid reagent is introduced through the trunnions of the device and is also withdrawn through the trunnions, thus providing for the charging and withdrawal of the liquid reagent without bringing the ore container to rest.

A further object of my invention is to provide a device of the type described in which the lixiviate after being separated from the ore body may be treated by electrical means so as to cause a precipitation of the more valuable metals by electrolysis.

A further object of my invention is to provide a device of the type described in which the lixiviate may be removed by vacuum means.

Other objects and advantages will appear in the following specification, and the novel features of the device will be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings forming part of this application in which—

Figure 1 is a central vertical section through the device, and Fig. 2 is a section along the line 2—2 of Fig. 1.

In carrying out my invention I make use of an outer casing 1 which is preferably of cylindrical shape, and which is provided with integral hollow trunnions 2 and 3 respectively. The trunnion 2 is supported in suitable bearings 4 carried upon a base 5, while the trunnion 3 is also supported upon bearings 6 upon a base 7.

As will be observed from Fig. 1 a bottom 8 is provided for the cylinder 1, while a top 9 is also provided. This top may be secured to the outer cylindrical casing 1 in any suitable manner. In the drawings I have shown it as being provided with a threaded flange 1^x arranged to fit inside of the casing 1 and secured to the latter by screwing it to the threaded portion of the interior of the casing 1.

On the interior of the casing 1 is a second cylinder having double perforated walls. These double perforated walls are indicated at 10 and 11 respectively. They extend to the bottom of the main casing 1, as shown. An inner cover 12 is provided having a portion 13, which extends between the walls 10 and 11, and which is threaded to be screwed into position so as to render the device steam tight.

Extending through the hollow trunnion 2 is an intake pipe 14 whose end terminates in the interior of the inner cylinder. A stuffing box 15 is provided for preventing the escape of liquid air or steam, as will be explained hereinafter. The intake pipe 14 communicates with a stationary feed pipe 14^x, a slip joint 14^y being provided for permitting the rotation of the pipe 14 with respect to the fixed pipe 14^x.

The hollow trunnion 3 has a rotatable pipe 16 which extends through the trunnion and then is bent downwardly and extends in the space between the outer wall 1 and the adjacent wall 10. This pipe 16 passes through a packing gland or box 17, and is secured to a fixed suction pipe 16^x by means of a slip joint 16^y similar to the joint 14^y. A cathode 18 is provided which communicates by means of a conductor 19 with a contact ring 20 disposed on the exterior of the trunnion 3. An anode 21 is disposed at the opposite side of the tank and is connected to a lead wire 22 which is connected to a conducting ring 23 disposed on the trunnion 2.

From the foregoing description of the various parts of the device the operation thereof may be readily understood.

In the use of the device the outer and inner covers 9 and 12 respectively are removed while the device is in the position shown in Fig. 1. Finely crushed ore 25

is introduced into the interior of the inner cylinder until it reaches approximately the line x—x, care being taken not to completely fill the inner cylinder. The space between the cylindrical walls 10 and 11 is now filled with any suitable filtering material 25^x such as pebbles, or in case it is desirable to deposit the valuable metal on the filtering material other filtering means may be used, thus if the device is used for cyaniding gold ores by means of cyanid of potassium, zinc shavings may be used and the gold may be deposited upon the zinc shavings while the solution is passing through them. In any event the space between the walls 10 and 11 is filled with the filtering medium and then the tops 12 and 9 are replaced in the order mentioned, care being taken to screw these tops down tight in order to prevent leakage. To this end I may provide handles 26 which may be of the form shown in Fig. 1 or of any other suitable form. Let us assume that the filtering medium consists of pebbles and that it is the lixiviate that is to be afterward treated for recovering metals. The liquid reagent may be introduced through the pipes 14^x and 14 into the interior of the inner cylinder. The receptacle as a whole is now revolved by any suitable means, such as by a drive gear 27 which is in mesh with the gear 28 on the power shaft 29. In order to cause the liquid reagent to thoroughly permeate the crushed ore air or steam may be forced through the pipes 14^x and 14. As the device revolves and the liquid reagent permeates through the ore it dissolves out the precious metal contents and passes through the perforated plates, and through the filtering medium into the space between the outer casing 1 and the cylinder 10. Usually in devices of this kind the perforations in the walls 11 tend to clog up but the movement of the ore body as the device revolves tends to clean the wall 11 so as to permit the free flow of the liquid therethrough. This point is of importance since it obviates unnecessary delays in cleaning the filter. The liquid which is passed through the walls 10 into the space between the latter and the outer casing 1 may now be drawn off by means of the pipes 16 and 16^x and another charge of the reagent may be introduced until all the valuable metallic contents of the charge of ore has been extracted. When this occurs the device may be tilted so as to discharge the remnant of the ore through the manhole 30, a manhole cover 31 being provided for normally keeping said manhole closed. In case the device should be used for cyaniding gold both the remnant of the ore from which the metal has been extracted and also the zinc shavings may be removed, the former by opening the manhole and the latter by removing the cover 12.

In case it should be desired to treat the lixiviate by electricity so as to secure a deposit of the metal upon a suitable cathode this may be done without stopping the working of the apparatus. To this end I provide the cathode 18 and the anode 21 as stated. The current comes through the conducting ring 23 by means of a brush 23^x and thence to the anode 21. From this point it passes through the body of the ore and the reagent to the cathode 18 and thence by conductor 19 to the ring 20 and out by the brush 20^x. The metal is thus deposited on the cathode. This may occur while the device is being revolved, or if desirable, it may be done while the device is standing still. The stuffing boxes 15 and 17 prevent leakage of the liquid reagent or of the steam or air past the pipes 14 and 16, while at the same time permitting the revolution of the trunnions 2 and 3 in their bearings.

I claim:—

1. In a device for treating ores, an outer casing, an inner receptacle disposed within said casing and spaced therefrom, said inner receptacle having double perforated walls, the space between said double perforated walls being arranged to contain a granular material, means for introducing a liquid into the interior of the inner receptacle, and means for withdrawing liquid from the space between the inner receptacle and the outer casing.

2. In a device for treating ores, an outer casing, an inner receptacle disposed within said casing and spaced therefrom, said inner receptacle having double perforated walls arranged to receive a granular material, means for revolving said outer casing and said inner receptacle, means for introducing a liquid reagent into the interior of said inner receptacle during the revolution of the latter, and means for withdrawing liquid from the space between the inner receptacle and the outer casing.

3. In a device for treating ores, an outer casing, an inner receptacle disposed within said casing and spaced therefrom, said inner receptacle having double perforated walls, a filtering medium disposed between said double perforated walls, means for revolving said outer casing and said inner receptacle, means for introducing a liquid reagent into the interior of said inner receptacle during the revolution of the latter, and means for withdrawing liquid from the space between the inner receptacle and the outer casing.

4. In a device for treating ores, an outer casing provided with hollow trunnions, an inner receptacle provided with double perforated walls, said inner receptacle being spaced from said outer casing, a filtering medium disposed between the perforated walls of the inner receptacle, a pipe ar-

ranged to pass through one of said hollow trunnions for conveying a liquid reagent into the interior of the inner receptacle, and a suction pipe arranged to pass through the other trunnion and being in communication with the space between the outer casing and the outer wall of the inner receptacle.

5. In a device for treating ores, an outer casing provided with hollow trunnions, an inner receptacle provided with double perforated walls, said inner receptacle being spaced from said outer casing, a filtering medium disposed between the perforated walls of the inner receptacle, a pipe arranged to pass through one of said hollow trunnions for conveying a liquid reagent into the interior of the inner receptacle, a suction pipe arranged to pass through the other trunnion and being in communication with the space between the outer casing and the outer wall of the inner receptacle, and removable covers at one end of said device for said inner receptacle and said outer casing.

6. In a device for treating ores, an outer casing provided with hollow trunnions, an inner receptacle provided with double perforated walls, said inner receptacle being spaced from said outer casing, a filtering medium disposed between the perforated walls of the inner receptacle, a pipe arranged to pass through one of said hollow trunnions for conveying a liquid reagent into the interior of the inner receptacle, a suction pipe arranged to pass through the other trunnion and being in communication with the space between the outer casing and the outer wall of the inner receptacle, removable covers at one end of said device for said inner receptacle and said outer casing, a cathode disposed in the space between the outer casing and the outer wall of the inner receptacle on one side of the device, an anode in the corresponding space on the other side of the device, and means for connecting said anode and said cathode with a source of current.

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Witnesses:
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