

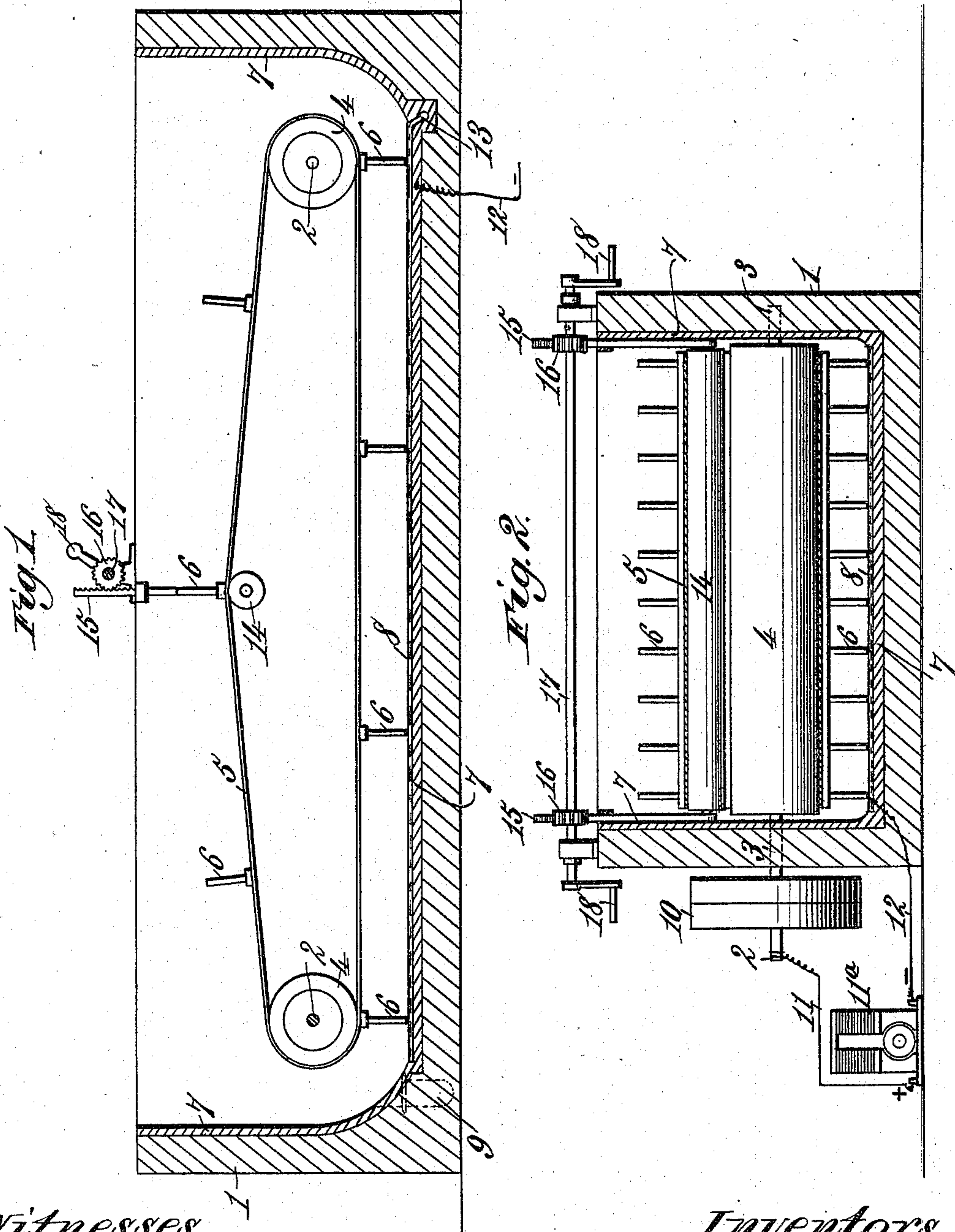
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3 Sheets—Sheet 1.

L. PELATAN & F. CLERICI.  
ELECTROLYTIC APPARATUS FOR EXTRACTING GOLD AND SILVER  
FROM THEIR ORES.

No. 568,099.

Patented Sept. 22, 1896.



Witnesses.  
Robert Enright,  
Dennis Sundry.

Inventors.  
Louis Pelatan,  
Fabrizio Clerici.  
By James L. Norris,  
Atty.

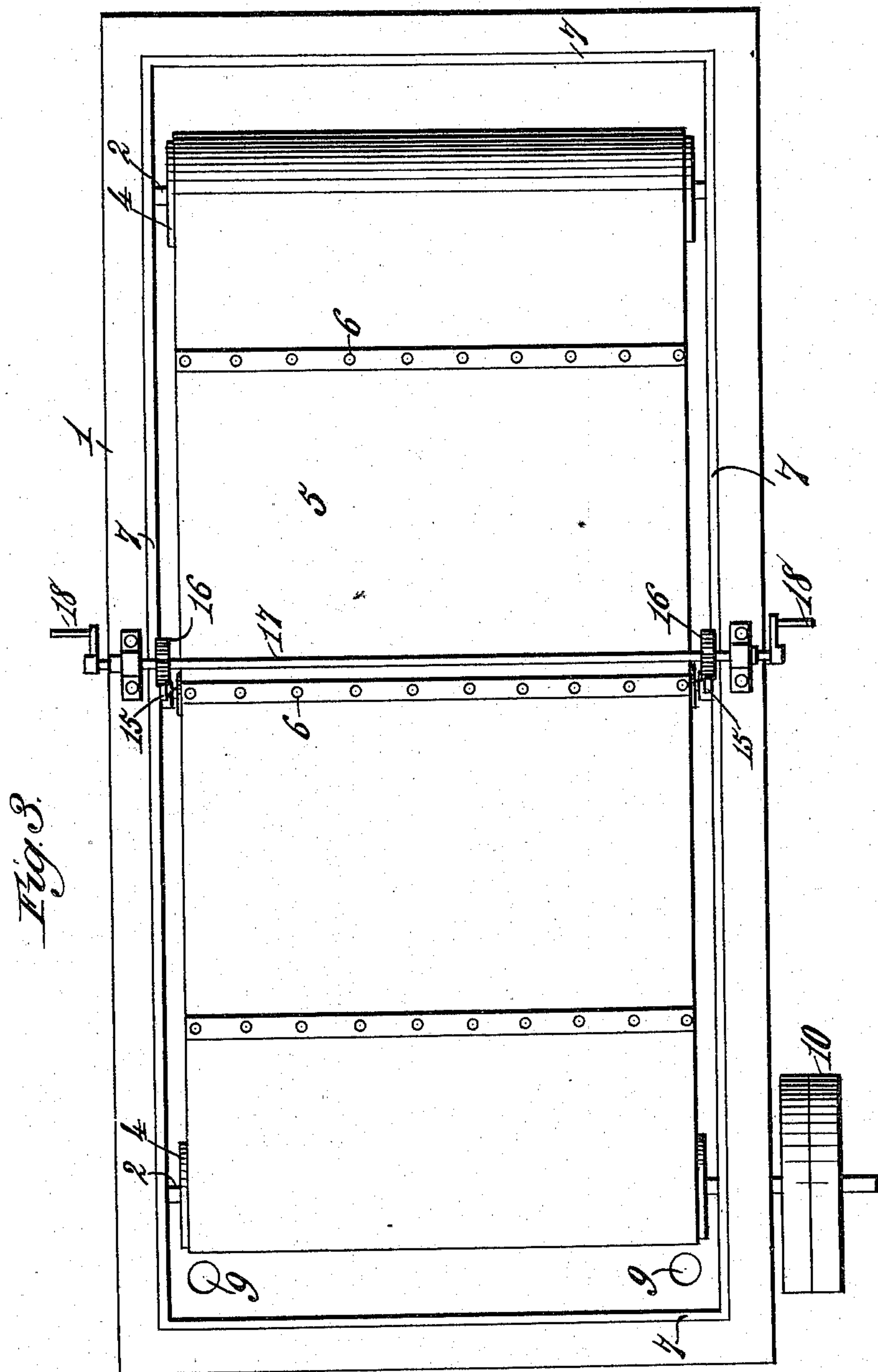
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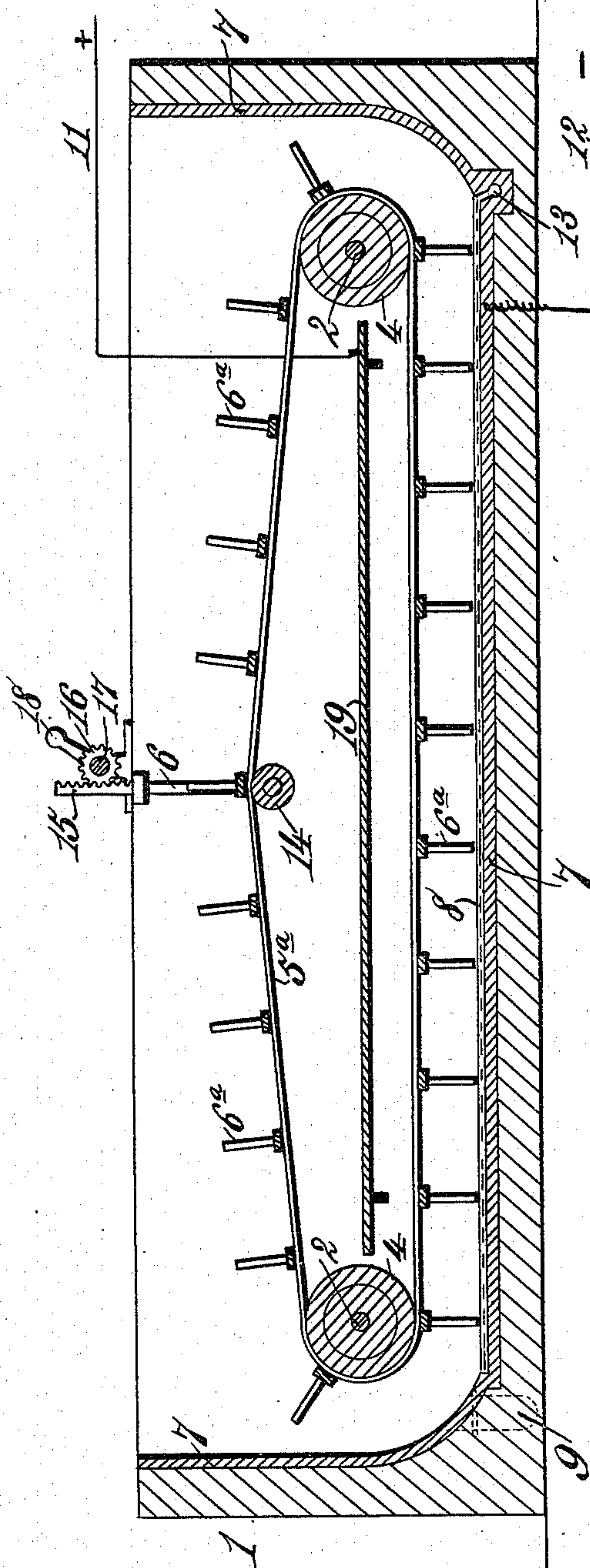
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Fig. 4.



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# UNITED STATES PATENT OFFICE.

LOUIS PELATAN, OF PARIS, FRANCE, AND FABRIZIO CLERICI, OF MILAN, ITALY.

ELECTROLYTIC APPARATUS FOR EXTRACTING GOLD AND SILVER FROM THEIR ORES.

SPECIFICATION forming part of Letters Patent No. 568,099, dated September 22, 1896.

Application filed October 1, 1895. Renewed August 22, 1896. Serial No. 603,649. (No model.)

*To all whom it may concern:*

Be it known that we, LOUIS PELATAN, a citizen of the Republic of France, residing at Paris, France, and FABRIZIO CLERICI, a subject of the King of Italy, residing at Milan, Italy, have invented new and useful Improvements in Electrolytic Apparatus for the Direct Extraction of Gold and Silver from their Ores or other Compounds, of which the following is a specification.

Our invention has for its object to provide novel improvements in electrolytic apparatus for the direct extraction of gold and silver from their ores or other compounds. In this invention the mineral ores or other compounds which contain the precious metals are pulverized and mixed with a solution of a suitable solvent in the same vat in which the said metals are separated by electrolysis and in which, also, they are retained by a mercury cathode, the solvent used being that which is best adapted to the nature of the materials to be treated, those preferably employed being alkaline cyanids or chlorin, but any of the suitable chemical agents may be used. The solutions used being always very weak, the conductivity of the bath is insured by mixing with the electrolyte an alkaline salt, preferably chlorid of sodium. Our present invention, however, does not relate especially to these points, which we have already described in our prior patents and which we only refer to here in order that our present invention may be better understood.

Our said invention consists in an electrolytic vat or tank constructed for facilitating the reactions required by a particular arrangement of anodes and cathodes and in the apparatus by which the liquids are kept in circulation during the electrolytic action.

In order that our invention may be readily understood, we will describe it with reference to the accompanying drawings, in which—

Figure 1 is a vertical section of the electrolytic vat. Fig. 2 is a transverse section of the same, showing the means by which the anodes are set in motion in order to secure the continuous agitation of the electrolyte. Fig. 3 is a plan view of the vat, showing the different parts thereof. Fig. 4 is a

vertical longitudinal section showing a modified construction.

In the said drawings the reference-numeral 1 indicates the vat or tank, which may be made of brickwork, wood, or any suitable material, its inner walls being preferably coated with cement. Within said vat or tank are arranged horizontal shafts 2, the ends of which rest on bearings 3, fixed in the walls or sides of the vat at a suitable distance from the bottom thereof to carry light cylinders or drums 4. The two cylinders or drums 4 are mounted one at each extremity of the inside of the vat. They support an endless belt 5, having nearly the same width as the vat and provided with agitators 6. The endless belt 5 when used as an anode as well as a stirrer can be formed wholly or in part of a suitable metal. Consequently the anode may be made of or at least coated with steel, iron, platinum, lead, or any other suitable metal. The anodes which we employ by preference are made of thin steel plates.

The walls and the bottom of the apparatus are usually provided with an insulating-lining of cement, ebonite, or other like material, as shown at 7 in Figs. 1 and 2. When the vat is constructed of brickwork or the like, a lining of cement is preferable. The whole bottom of the vat must be perfectly level and tight and covered with a cathode 8, which may be made either of amalgamated copper, or lead plates covered with mercury, or of mercury. Suitable orifices 9 for the discharge of the contents of the apparatus when the operation is over or whenever required are arranged in the vat.

One of the horizontal shafts 2 is connected by any suitable gear with an engine, by which it is rotated, as well as the cylinder or drum 4, mounted on the said shaft. This cylinder or drum 4, when set in motion, drives the endless belt 5, with the result that the other cylinder or drum at the other end of the vat is also revolved thereby.

The gear, as shown in the drawings, consists simply of a driving-wheel 10, mounted on one of the shafts 2 outside the vat, the said wheel being rotated in the usual way by a belt.



The shafts 2 and the endless belt or anode 5 are connected by means of a conductor 11 to the positive pole of a generator of electricity, such as a dynamo 11<sup>a</sup>. (Shown conventionally in Fig. 2.) Another conductor 12 connects the negative pole with the cathode. Suitable orifices 13 for the discharge of the mercury when the latter is used to form the cathode are arranged in the bottom of the vat. The distance between the lower face of the endless belt 5, used as the anode, and the bottom of the vat, on which is disposed the cathode 8, must be such as to render short-circuiting impossible, which, if it took place, would prevent the satisfactory working of the apparatus. In order to maintain a suitable distance between the anode, which has to transmit to one of the cylinders or drums 4 the rotating movement imparted to the other by the driving-engine, we use a stretcher so constructed as to force upward the upper face of said endless anode.

We do not confine ourselves to any special form of stretcher, but the one shown in the drawings consists of a cylinder 14, made of wood or any suitable material, said cylinder being set across the vat and underneath the upper portion of the anode. This cylinder is supported by vertical racks 15, which are connected with spur-gears 16, mounted on a shaft 17. Both ends of this shaft having handles 18, as shown in Figs. 2 and 3, the operator can easily raise or lower the cylinder 14 whenever such adjustment is necessary. In the arrangement shown the agitation is effected by means of the endless belt 5, used both as a stirrer and as an anode, the same being provided with agitating-arms 6. These arms are made of wood or any other suitable material. They are set in rows on the outside of the endless anode, so as to perfectly stir the solutions in the vat and to prevent any settling of the material under treatment on the mercury cathode, which would obstruct the current of electricity and so prevent the proper electrolytic action from taking place.

The electrolytic vat described can be made of any required size, but whenever the length of the said vat becomes such that a single endless belt would be inconveniently long we arrange inside the vat two or more pairs of cylinders 4, each set of two cylinders carrying an endless belt exactly similar to the endless belt 5 we have just been describing. The several anodes are then placed close to one another, so as to practically cover the whole surface of the vat.

The operation of the apparatus is as follows: The auriferous or argentiferous materials are introduced into the vat, in the bottom of which the mercury cathodes have been already prepared, as hereinbefore described. The necessary solvent, for example, alkaline cyanid, is then added to the liquid, together with sodium chlorid, which is added for insuring the conductivity of the electro-

lyte. The cyanid solutions used are very dilute, and as a rule their strength does not exceed three parts of cyanid for a thousand parts of water. The driving-wheel 10 is then caused to revolve and thereby to rotate the shaft 2 and cylinder 4, the rotating movement being imparted to the endless anode 5, and through this anode to the other cylinder 4 and shaft 2. The contents of the vat are thus thoroughly stirred up by the arms 6 of the endless belt and a current of electricity is passed through between the anode and the cathode by means of the conductors 11 and 12. When it has been proven, by the examination of test portions removed from the vat, that the electrical action is completed, the said vat is emptied. The precious metals will then be found deposited on the mercury in the clean-up by the means usually employed. The vat or tank may then be at once prepared for a fresh operation. We have shown and described the endless belt 5 as being constructed and arranged to act as the anode and as the means for stirring the contents of the vat or tank. We may, however, form the belt 5 of any suitable non-conducting material and use it for stirring only. In this case the anode will be formed of a plate 19, preferably of iron or steel, arranged inside the belt, as shown in Fig. 4. It is connected by a wire 11 to the positive pole of a source of electric energy. In order to enable the current to pass from the anode to the cathode without obstruction, we may form the belt of two or more strips 5<sup>a</sup> of any suitable material and attach transverse bars thereto to carry the stirrer 6<sup>a</sup>.

Our present invention is an improvement upon that for which we filed an application in the United States Patent Office upon the 25th day of June, 1895, Serial No. 554,013.

Although it is believed that the apparatus described is the best for the purpose of carrying this invention into effect, we do not limit ourselves to the use of apparatus constructed or arranged precisely as described and illustrated.

What we claim is—

1. The apparatus herein described for the direct extraction of gold and silver from their ores and other compounds, said apparatus comprising a vat, a mercury cathode upon the flat bottom thereof, an endless-belt anode, a portion of which is in parallelism with the bottom of the tank, and means for moving said endless-belt anode continuously in one direction, substantially as described.

2. The combination with a vat or tank having a cathode in its flat bottom, of an anode having the form of an endless belt, rolls arranged near the ends of the vat to support and give continuous movement to said belt-anode in substantial parallelism with the cathode the outer face of the anode being provided with non-conducting arms projecting therefrom, and means for driving said rolls, substantially as described.



3. The combination with a vat having a flat bottom of greater length than width, of a cathode supported upon said flat bottom, an anode, in the form of an endless belt, consisting of a strip, or series of strips, of a suitable metal such as iron or steel having stirring-arms projecting from its outer face, rolls arranged near the ends of the vat for supporting and giving motion to the said anode, means for rotating one of said rolls, and an adjustable stretcher arranged beneath the upper portion of the endless anode, substantially as described.

4. The combination with a vat having a flat bottom, of a cathode of mercury spread thereon, an anode having the form of an endless

belt, rolls arranged near the ends of the vat to support and give continuous movement to said anode in parallelism with the surface of the cathode, and means for imparting continuous movement to said anode, in one direction, it being provided with stirring devices moving with it, substantially as described.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

LOUIS PELATAN.  
FABRIZIO CLERICI.

Witnesses:

LUIGI GIFFI,  
VTE. G. DE SALLMARD.