

L. J. KENDRICK & J. G. TUNNICLIFFE.

AMALGAMATING SYSTEM.

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1,013,496.

Patented Jan. 2, 1912.

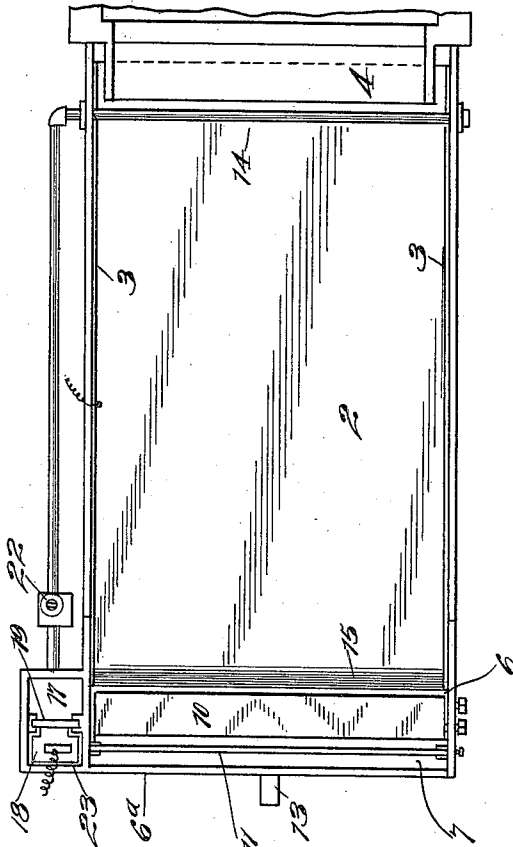


Fig. 1.

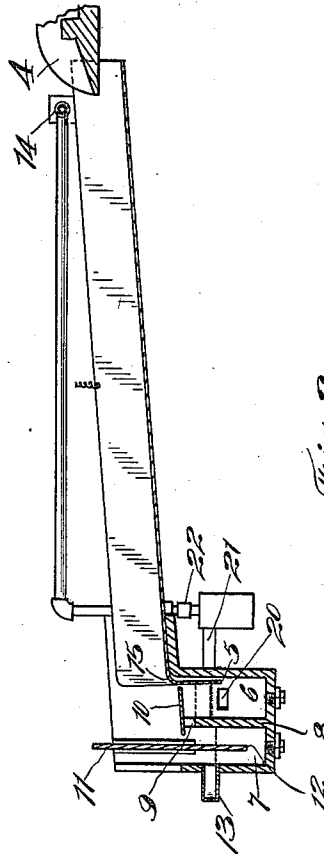


Fig. 2.

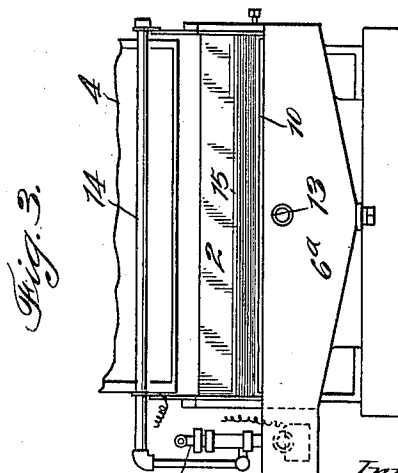


Fig. 3.

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UNITED STATES PATENT OFFICE.

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AMALGAMATING SYSTEM.

1,013,496.

Specification of Letters Patent.

Patented Jan. 2, 1912.

Application filed November 23, 1910. Serial No. 593,808.

To all whom it may concern:

Be it known that we, LEVI J. KENDRICK and JESSE G. TUNNICLIFFE, citizens of the United States, residing at Berkeley, in the county of Alameda and State of California, have invented new and useful Improvements in Amalgamating Systems, of which the following is a specification.

This invention relates to a system for the recovery of precious metals and particularly to the recovery of gold and other values from ground pulp.

The object of our invention is to provide a system for the continuous separation of gold and other values from pulp, involving a suitable plate and mercury containing traps; to provide a system for the recovery of valuable metals including a suitable apparatus whereby the mercury may be continuously circulated; and also to provide a system for the amalgamation of valuable metals involving apparatus for circulating mercury and means for keeping the mercury clean and active.

The invention consists of the parts and construction, and combination of parts hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is the plan view of the apparatus or system. Fig. 2 is the central vertical section through the plate and traps. Fig. 3 is a front end view of the lower mercury trap and working pump.

Our present system involves the use of a suitably inclined plate 2, preferably made of copper and having upturned longitudinal flanges 3 along its edges, the upper end of the plate 2 being positioned adjacent the lip 4 of a suitable stamp battery so as to receive the discharged pulp delivered from the battery. The plate 2 is inclined at a suitable angle to the horizon and is of appropriate length and width and has its lower end turned downwardly and slightly rearwardly forming a lip 5 which projects down into a separating box or frame 6^a which is divided longitudinally into two separate compartments forming traps 6 and 7, having inclined bottoms as shown in Fig. 3, which converge toward the central portion of the box 6^a. The box 6^a is divided into its two separate traps 6 and 7 by a vertical central wall 8 upon the upper horizontal surface 9 of which is fastened an adjustable catchment plate 10 having a suit-

able incline and which may be moved toward and from the rearwardly inclined lip 5 of the plate 2. The trap 7 is provided with a central regulator board or plate 11 which may be adjusted vertically so that its lower edge 12 can be moved to and from the bottom of the trap 7 which is provided with a suitable discharge pipe 13.

In operation the pulp from the mortar will flow downwardly over the plate 2, and as it flows a suitable proportion of mercury is discharged from a distributor 14 supported adjacent the upper end of the plate 2 so that the mercury will drop upon the plate and amalgamate with the flowing values from the mortar. Since, as stated, the plate 2 is preferably made of copper there will be formed upon its upper surface an amalgam due to the association of the amalgamable metals in the pulp and the mercury from the distributor 14. The incline of the plate 2 is such that the travel of the pulp down its surface will gradually carry down the mercury and the amalgam as it accumulates and this will normally cling to the plate and be carried downwardly around the curved corner 15 of the plate 2 and follow backwardly on the lip 5 being finally deposited in the trap compartment 6. The water and the lighter sand and other materials composing the pulp flow over the curved corner 15 of the plate 2 and fall upon the adjustable plate 10, thus the valuable particles including the heavy metals, the amalgam, and all of the mercury will follow the line of the plate and its lip 5, while the valueless gangue or tailing will be separated and fall upon the plate 10, from which it runs into the trap 7 in which such particles of mercury or other heavy materials as do not travel down the oblique lip 5 and be gathered in the trap 6 will collect, the heavy material of the tailings will be deposited in the bottom of the trap 7 and the incoming water and also material will be traveling downwardly and beneath the end 12 of the vertical board from beneath which it will be discharged at 13.

One of the features of our invention is the provision of means whereby the mercury accumulating in the trap 6 may be constantly maintained at a suitable or given level, and the excess mercury will flow from the trap 6 to a regenerating or enlivening chamber from which it will flow and be pumped again to the distributor, thereby

making the mercury travel continuously through the system. This continuous circulation of the mercury and its purification is obtained by mounting upon one end of the box 6^a a suitable receptacle divided into two divisions as 17 and 18 by a porous wall or plate 19, the compartment 17 being open for direct communication with the trap 6 by means of the port 20 formed in the adjacent end of the box 6^a and which is made at a suitable height by which the level or depth of mercury in the trap is determined; the excess of mercury accumulating in the trap 6 will flow through the port 20 into the pocket 17 from which it may flow through a discharge pipe 21 into a pump 22 of any suitable form by which it is pumped to the distributor located transversely at the upper end of the amalgamated plate 2. By this means we are enabled when the apparatus is charged with the given volume of mercury to constantly circulate the same as it collects in and overflows from the chamber 6 into the pocket 17 and adjacent pump 22 by which it is forced to the distributor 14. In this manner all of the amalgamable values are extracted from the pulp, heavy amalgam accumulating in the bottom of the trap 6 from which it can be drawn at suitable intervals through a drain provided for that purpose. Similarly accumulated values in the trap compartment 7 may be drawn off also.

It is well known that mercury when subjected or liable to contact with foreign materials, gradually becomes "sickened", that is it fails to act quickly and loses its luster and affinity for the amalgamable metals and in order to constantly keep the mercury we use in the system in a clean and active state or "quicken" it, we immerse in the pocket 18 at end of box 6^a an electrical cathode, preferably lead or other positive element to which we connect a positive electric conductor and fill the pocket 18 with a suitable salt or sodium solution and also attach, at a suitable point, to the copper plate 2 a minus electric anode so that when a current is sent through the conductor electrolysis will occur between the positive electric element in the pocket 18 and the minus element formed by the mercury in the pocket 17, the electrolysis results in the purification, quickening or enlivening of the mercury in the pocket 17 so that this is active and clean when it is forced by the pump into the distributor 14. The porous wall or plate 19 allows the electrolysis to occur between materials contained in the pockets 17 and 18. The wall of the pocket 18 is lined with a suitable insulating material as represented at 23.

It will be seen that our system comprehends the circulation of the volume of mercury constantly over a sensitized plate on

which the pulp from the battery is discharged and in so forming the plate that the amalgam and mercury will be directed into one compartment and the relatively valueless tailing from which the values have been extracted by the mercury will be collected in another trap which is designed to further separate such valuable particles as have been carried over; and also involves means for the regeneration or quickening of the mercury bath by means of electrolysis through the application of electricity.

By means of the adjustable lip or separator plate 10 it is possible to skim the volume of pulp as it passes the rounded corner 15 of the plate 2 to a nicety and by this means if the separator 10 is adjusted quite closely to the curved portion 15 the greater percentage of the volume of the pulp may be immediately separated and discharged over the plate 10 into the trap compartment 7, and that portion remaining on the plate 2 and traveling downwardly into the trap 6 will be composed mostly of mercury, amalgam and the heavy material of the pulp. Between the lower surface of the plate 10 and the wall 8 to which it is attached there is left a space above the surface 9 allowing for the flow of sand into the compartment 7 which accumulates upon the surface of the mercury in the trap 6. Another important object of the adjustable plate 10 is that by adjusting the volume of pulp and water which is discharged into the compartment 6 the agitation of the mercury is prevented by carrying over to the compartment 7 the gangue or tailings so that the material in the trap 6 is agitated but very little as the sand and mercury glide down the inclined lip 5.

Having thus described our invention, what we claim and desire to secure by Letters Patent is—

1. In combination, an amalgamated plate, means for flowing pulp and liquid mercury thereover, a mercury trap below and in proximity to said plate, said trap having an overflow discharge conduit connected with the trap below the mercury level therein, said plate having a depending extension reversely inclined with respect to the flow of pulp and terminating in the mercury trap below the mercury level therein, and means for intercepting the gangue and water at the discharge end of the plate, and conducting the same past the mercury trap.

2. In combination, an amalgamator adapted to discharge a stream of pulp and mercury, a mercury trap at the discharge end of the amalgamator, a gangue trap beyond the mercury trap and separated therefrom by means having an overflow from the mercury trap to the gangue trap, a division plate slightly spaced from the discharge

end of the amalgamator and extending over
the mercury trap to the gangue trap, and
above the overflow passage, between the
traps, the mercury trap being provided with
5 means limiting the mercury level below that
of the overflow to the gangue trap and the
gangue trap provided with means to deflect
the material below the liquid level therein.

In testimony whereof we have hereunto
set our hands in the presence of two sub- 10
scribing witnesses.

LEVI J. KENDRICK.

JESSE G. TUNNICLIFFE.

Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."