

No. 870,643.

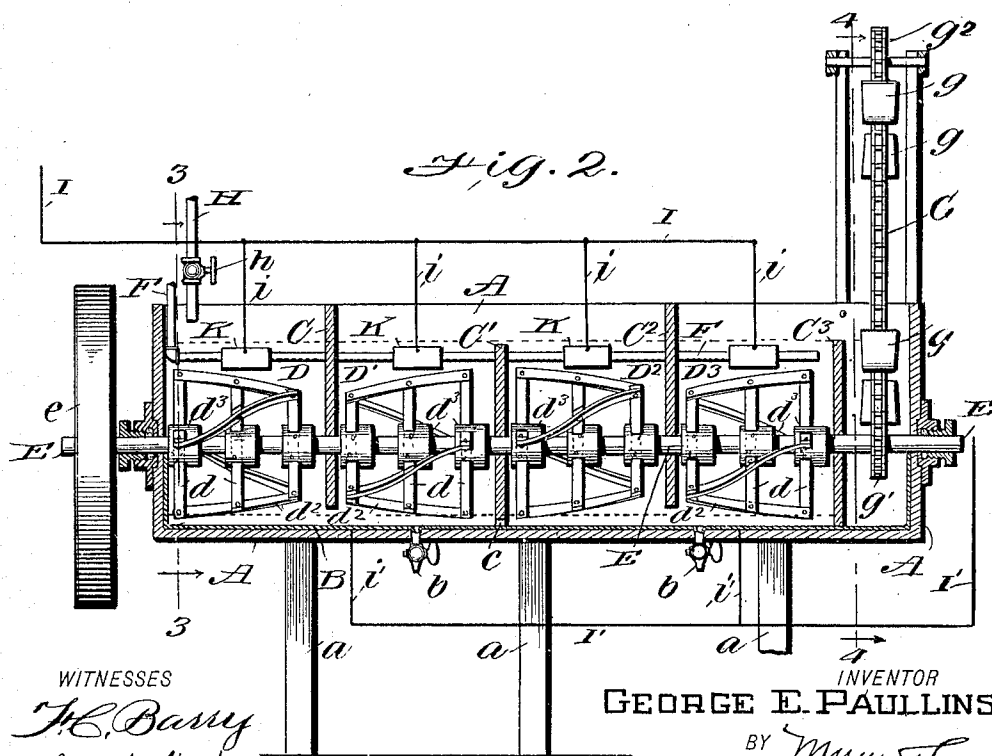
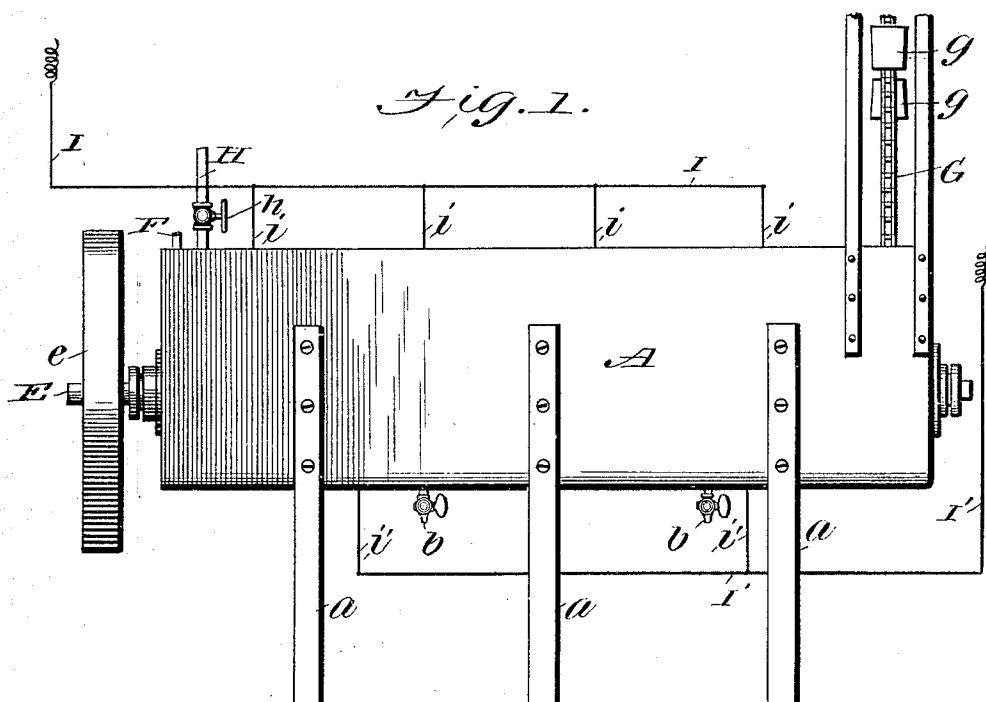
PATENTED NOV. 12, 1907.

G. E. PAULLINS.

AMALGAMATOR.

APPLICATION FILED OCT. 6, 1905.

2 SHEETS—SHEET 1.



WITNESSES

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Amos W. Hart

INVENTOR

GEORGE E. PAULLINS

BY *Munn & Co.*

ATTORNEYS

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2 SHEETS—SHEET 2.

Fig. 3.

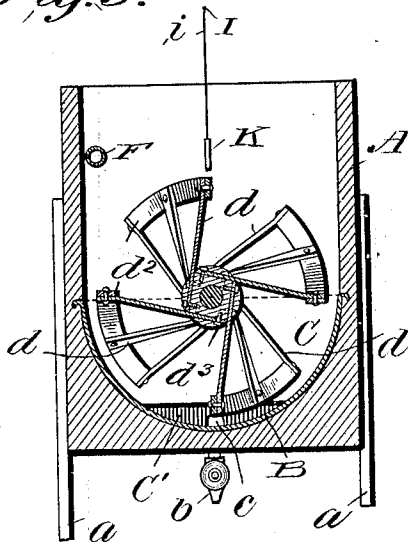


Fig. 4.

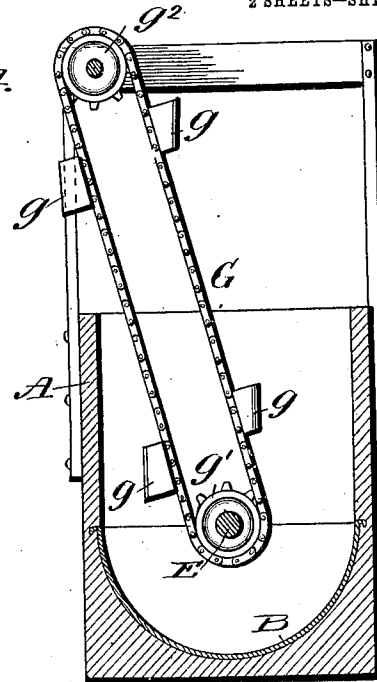
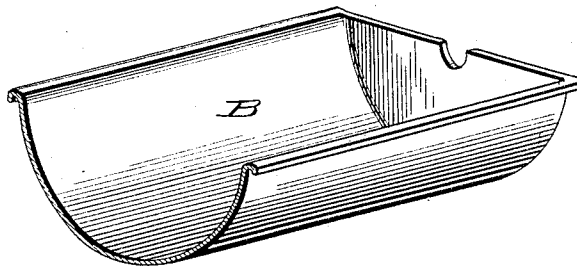


Fig. 5.



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UNITED STATES PATENT OFFICE.

GEORGE E. PAULLINS, OF COLORADO SPRINGS, COLORADO, ASSIGNOR OF FIVE TWENTY-FOURTHS TO CHARLES E. BIBB, FIVE TWENTY-FOURTHS TO CHARLES H. THEOBALD, AND FIVE TWENTY-FOURTHS TO HAYWOOD L. BUTLER, ALL OF COLORADO SPRINGS, COLORADO.

AMALGAMATOR.

No. 870,643.

Specification of Letters Patent.

Patented Nov. 12, 1907.

Application filed October 6, 1905. Serial No. 281,677.

To all whom it may concern:

Be it known that I, GEORGE E. PAULLINS, a citizen of the United States, and a resident of Colorado Springs, in the county of El Paso and State of Colorado, have

invented an Improved Amalgamator, of which the following is a specification.

My invention is an improved apparatus for extracting gold and silver from refractory ores, a portion of these metals being converted into amalgam with mercury in the receptacle into which pulverized ore is delivered and wherein it is treated mechanically and electrically, and the fine ore separated from such metal in the free state being removed by mechanical means.

The details of construction arrangement, and operation of the apparatus are as hereinafter described and shown in the accompanying drawings, in which

Figure 1 is a side view of my improved apparatus. Figure 2 is a longitudinal vertical section of the same.

Figure 3 is a vertical cross-section on the line 3—3 of Figure 2. Figure 4 is a similar section on the line 4—4 of Figure 2. Figure 5 is a perspective view of a portion of the copper pan forming the lining of the bottom of the receptacle in which the ore is treated.

A indicates a long wooden trough whose sides are extended to a considerable height. The same may be supported by legs *a* or any other suitable means. A copper pan B, see Fig. 5, covers the rounded bottom of the trough A, it being fitted closely thereto so as to constitute a lining and its upper edges being turned outward into kerfs in the sides of the trough A at points where the vertical and curved lines meet; see especially Figs. 3 and 4. Within the trough is arranged a series of vertical partitions C, C', C², C³. The first and the third partitions are cut away at the bottom as indicated in Fig. 3, thus leaving an opening of considerable extent through which the pulp has free passage, as will be presently explained. The partition C', which intervenes the partitions C, C², and is arranged equidistantly therefrom, does not extend to the top of the trough A and is in close contact with the bottom of the copper pan B, a small hole *c*, see Figs. 2 and 3, being formed therein to permit the passage of mercury. The last partition C³ is arranged in the same manner as the partition C', save that it is not provided with a passage for mercury. In each of the compartments thus formed is arranged an agitator, and they are indicated successively by the letters D, D', D², and D³. These are supported and keyed upon a longitudinal shaft E arranged centrally in the trough A and rotation is in practice imparted thereto by a belt running on a pulley *e*; see Fig. 2. Each of the agitators is formed of radial arms *d* whose

outer ends are connected by metal strips *d*². Thus, in the preferred construction there are four series of arms *d* and four strips *d*². The inner ends of the arms *d* enter sockets in hubs or collars *d*³ secured upon the shaft E and arranged in such manner that the strips *d*² are inclined or arranged spirally around the shaft. It is to be noted, however, that the length of all of the arms *d* is the same so that the strips *d*² are throughout their length the same distance from the pan C. This will be apparent from an inspection of Fig. 3. The object in arranging the arms and the strips *d*² spirally is to cause the strips to force the pulp toward the partition on the right. The agitator D will force the material toward the partition C, so that it passes through an opening beneath the latter into the next compartment where the agitator D' acts thereon. It is apparent that the agitator D² will operate in the same manner as the agitator D, and the agitator D³ in the same manner as the agitator D'. A solution of common salt is held in the trough A to a height sufficient to cover the several agitators D, etc. A quantity of mercury is also deposited in the trough, in the pan C, and is thus present in all the compartments save the last, that is to say, the end compartment wherein is arranged a bucket elevator G. It is delivered from a perforated pipe F which is arranged, as shown in Figs. 2 and 3, close to one side of the trough and a short distance below the top thereof. The elevator is formed of a chain, see Figs. 2 and 4, provided with buckets *g* and running on sprocket wheels *g*' and *g*², the wheel *g*' being keyed on the shaft E. This endless conveyer is inclined from one side of the trough as shown. The saline solution may be delivered into the trough A by means of the pipe H, see Fig. 2, which is provided with a stop-cock to regulate delivery as may be required.

The bottom of the pan B, as shown, is provided with a series of cocks *b* that extend through the bottom of the trough A and serve for drawing off amalgam. I provide means for passing an electric current through the saline solution in the trough. Thus, wires I, I', are connected with the poles of dynamos or a series of batteries, and branch wires *i* extend therefrom to plates K arranged in the trough while other branches *i*' connect with the bottom of the copper pan B.

The operation of my improved apparatus will now be understood from the following description. Ore in a finely pulverized condition is fed into the first compartment wherein is arranged the agitator D. This may be effected by gravity, the ore flowing through a spout or pipe of suitable dimension. The agitator D mixes the ore with the saline solution and the mercury and thus converts it into a condition and form ordi-

narly known as pulp, and forces the same to the right so it passes under the partition C into the second compartment where it is subjected to the action of the agitator D', and, the saline solution and the ore being constantly supplied through the pipes, the pulp overflows the top of the second partition C' into the third compartment where it is subjected to the action of the agitator D' and passes under the partition C² in the same manner as in the trough C', as described. In the fourth compartment, the agitator D³ acts upon it in the same manner as before described, and the pulp passes over the partition C³ into the last and smaller compartment, wherein is arranged the endless conveyer or elevator G. In said last compartment there being little agitation of the pulp, a separation occurs by gravity, the fine ore settling to the bottom where the buckets *g* of the elevator take it up and convey it outside the trough, as will be readily understood.

It is apparent that the saline solution fills the trough to a uniform depth in the several compartments and that the action of the several agitators D, etc. besides stirring the ore, serves to force it to the right so that it passes onward successively from one compartment to another. In other words, the pulp is worked from the left end of the trough to the right, and finally into the last compartment as before described. The free metals form for the most part an amalgam with the mercury, which may be drawn off by the cocks *b*. By locating the mercury pipe close to one of the sides of the trough A the mercury drops on the adjacent side of the copper pan B, and thus tends to remove the amalgam adhering thereto. During the operation of the agitators as before described, an electric current passes through the solution and facilitates the separation of the metals from other portions of the ore and also the process of amalgamation.

What I claim is—

1. The improved apparatus for the purpose specified comprising a wooden trough having its rounded bottom lined with copper and provided with a series of transverse partitions alternate ones extending to the bottom and ter-

minating below the top of the trough and others terminating above the bottom of the trough and extending to the top thereof, a shaft passing through the longitudinal center of the trough, a series of agitators keyed thereon and comprising radial arms and strips connecting their outer ends, an endless conveyer arranged in the last compartment which is adjacent to the last of the series of agitators, a perforated pipe arranged along one side of the trough for delivering mercury into the several compartments containing the agitators, a pipe arranged for discharging a saline solution into the trough, and electric-circuit connections comprising conductors extending to a source of electric supply, one of said conductors being connected with the copper lining of the trough and the other with plates arranged in the trough, as shown and described.

2. The improved apparatus for the purpose specified, comprising a wooden trough having its rounded bottom provided with a copper lining, a series of transverse wooden partitions, the first and third extending to the top of the trough and terminating short of the bottom thereof and the alternating or second and fourth partitions extending to the bottom and terminating short of the top, whereby a passage for fluid is provided beneath one partition and over the adjacent one as described, a longitudinal shaft passing through the trough and its several partitions, and a series of agitators corresponding in number to the compartments of the trough, the same consisting of a series of radial arms fixed to the shaft, and metal strips connecting their outer ends, the arms being arranged spirally so that the strips are inclined to the axis of the shaft, as shown and described.

3. The improved apparatus comprising a wooden trough having a copper-lined bottom, a series of transverse wooden partitions terminating alternately short of the bottom and top of the trough as described, a longitudinal shaft, and a series of agitators arranged one in each of the several compartments formed by said partitions, and pipes arranged for delivery of mercury and a saline solution into the trough, the bottom of the latter having cocks for drawing off the amalgam, and a conveyer arranged at the rear end of the trough for removing the ore deposited from the solution, as shown and described.

In testimony whereof I affix my signature in the presence of two witnesses.

GEO. E. PAULLINS.

Witnesses:

S. H. WOLKER,
J. T. LOKANCE.