

K. SENN.
 PAN MOTION AMALGAMATOR.
 APPLICATION FILED DEC. 26, 1913.

1,172,171.

Patented Feb. 15, 1916.
 2 SHEETS—SHEET 1.

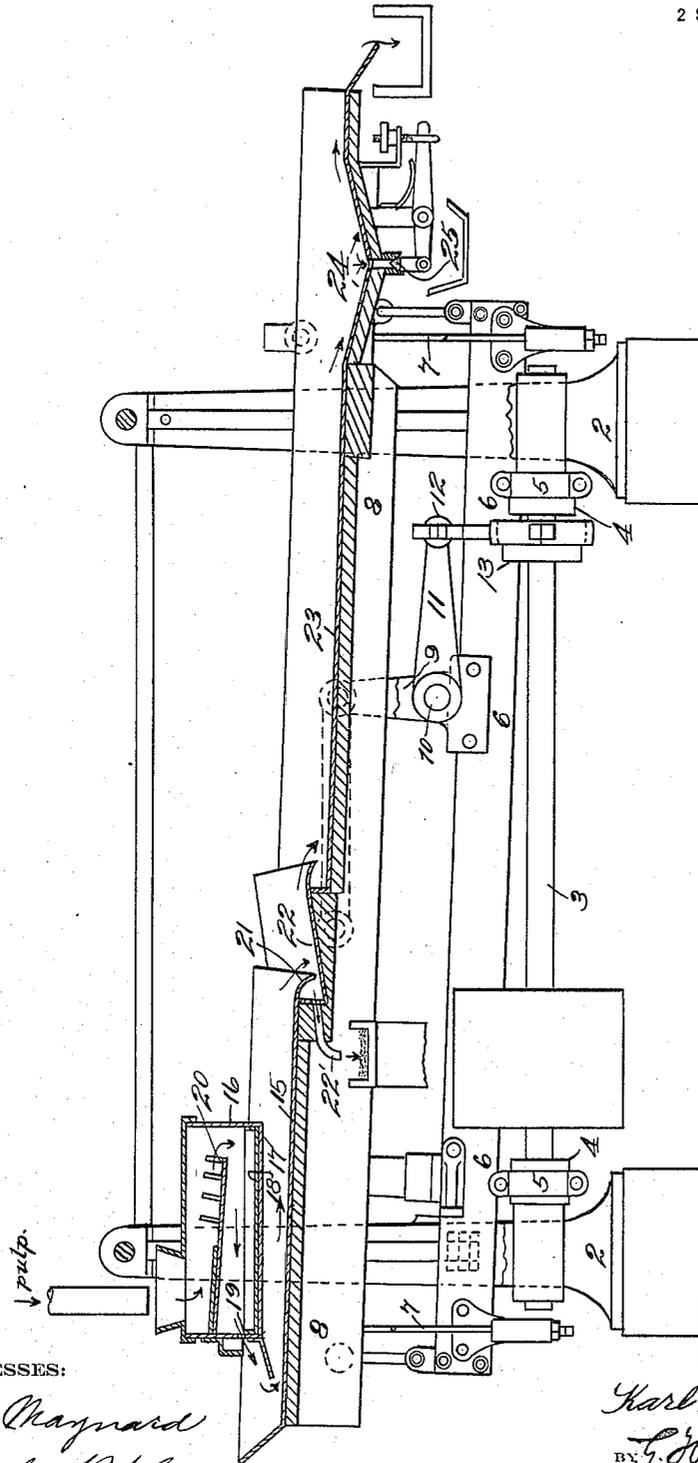


Fig. 1.

WITNESSES:

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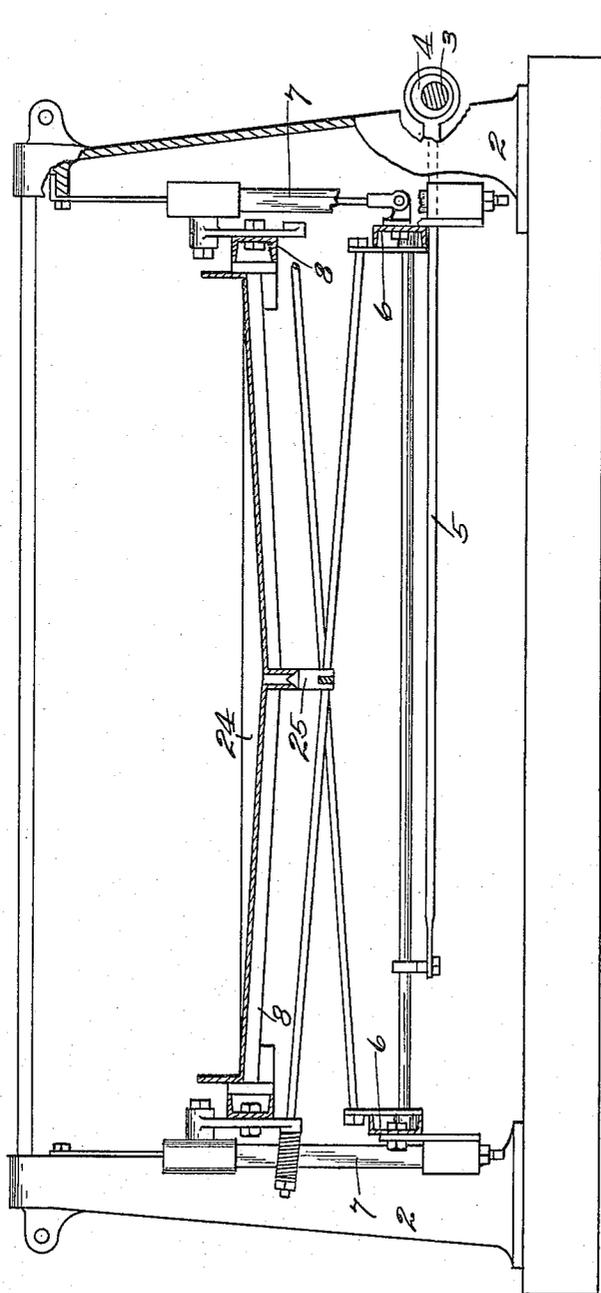


Fig. 2.

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UNITED STATES PATENT OFFICE.

KARL SENN, OF ALAMEDA, CALIFORNIA.

PAN-MOTION AMALGAMATOR.

1,172,171.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, KARL SENN, a citizen of the United States, residing at Alameda, in the county of Alameda and State of California, have invented new and useful Improvements in Pan-Motion Amalgamators, of which the following is a specification.

This invention relates to apparatus for recovering the valuable content of ore pulp.

The object of the present invention is to provide a machine involving an amalgamating plate and concentrating device onto which the ore in the form of a liquid pulp may be fed, and to provide means for giving the plate a substantially circular orbital movement in approximately a horizontal plane, so that all amalgamatable values in the pulp will be agitated sufficiently and will be caused to move through a path of sufficient length that ample time will be provided for the fine and other values which will amalgamate to be deposited upon the amalgam plate and recovered and the concentrated ore particles collected from the gangue.

The producing of a mechanical means for perfect amalgamation and ore concentration running under continuous operation is one of the aims of the present invention. To get the best results in amalgamation it is necessary to pass the pulp over the greatest possible surface, and hold the mineral in constant contact with the latter. The so-called "panning" in washing gold is known to be the most perfect method of amalgamation, because the light particles are held in suspension while the gold settles to the bottom and is brought into contact with the quicksilver. Utilizing the pan motion on a slightly pitched plate or series of plates, the same results are accomplished as in a miner's pan; that is, the heaviest mineral comes in contact with the amalgam surface while all the gangue is held in suspension and carried toward the lower end of the plate. Any mineral in the form of sulfids which would not amalgamate forms a layer on the plate, and, due to the motion, is carried down the inclined table, further concentrated in a shallow concave pan, and drawn off through a discharge port in the bottom of the pan, a short distance from where the gangue discharges into the launder.

The invention consists primarily of a sub-

stantial frame or support upon which is mounted a carrier, with means for giving the carrier a side shake, the carrier in turn supporting the table or amalgam plate, with means for giving the amalgam table an end-wise movement, which, in combination with the side shake of the carrier, produces a substantially circular orbital movement in the carrier; and further comprises means for recovering by amalgamating free metal and concentrating the ore values in the pulp.

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

Figure 1 is a side elevation of the amalgamator. Fig. 2 is a cross section of the same.

The machine may be mounted upon or may include a suitable frame or support 2, upon one side of which is mounted a longitudinally extending drive shaft 3, this being provided with eccentrics 4, operating connecting rods 5, which are connected to a carrier frame 6 of suitable proportions and design, which is given a side shake by the eccentrics 4 when the shaft 3 is revolving.

Suitably and flexibly mounted upon the carrier 6, as by flexible standards 7, is an appropriate table structure 8 movable laterally uniformly with the carrier 6 and connected to the upright crank arms 9 of a rocker shaft 10, journaled on the carrier 6 and upon which is keyed a crank arm or lever 11, connected by a universal joint 12 to an eccentric 13 on the shaft 3, and whereby during the rotation of the latter the lower shaft 10 is oscillated, and its motion transmitted through the crank arm or arms 9 to throw the table 8 longitudinally simultaneously with the side-shake movement of the carrier 6; the combined longitudinal and side movement of the table 8 producing a substantially circular orbit closely simulating the well-known pan movement by which values are concentrated by hand by miners.

It is understood that I may utilize any suitable form of mechanism for driving the table 8 in a substantially circular orbital movement in a nearly horizontal plane, and the table 8 is here shown as slightly inclined from its upper or head end downward to the tail or foot end, the top surface of the table being covered with removable copper or amalgam plates 15, the upper and fore-

most one of which is adapted to receive ore from a distributing device, comprising a box 16 with a catchment basin 17, upon the bottom of which may be provided a removable amalgam plate 18, the front end of the box being provided with a discharge aperture, the lower lip 19 of which is somewhat above the amalgam plate 18, and behind which lip the heavier concentrates and valves of the ore fed to the box 16 will accumulate and be easily and readily removable. Within the distributor box 16 may be provided a suitable baffle plate 20 for spreading the in-feeding pulp lengthwise across the distributor box 16 so as to produce a relatively thin film of pulp which will constantly discharge over the front lip 19 onto the upper end of the plate 15.

Since the distributor box 16 is mounted upon the table structure 8, it is understood that as soon as any ore is fed into the distributor box it will be subjected to the gyratory, agitating, circular movement of the table so that the various grades of substance in the pulp as to their specific gravities will quickly separate from one another, the heaviest particles, such for instance, as large particles of gold, will quickly collect in the trap or basin 17, while the lighter particles and the concentrate-bearing values will issue over the lip 19 onto the plate 15. As the overflow of the pulp discharges onto the plate 15, it will gravitate with a predetermined speed determined by the inclination of the table 8 along the surface of the amalgam plate 15, which meantime, is being constantly gyrated in its circular orbit, so that every portion of the pulp must travel in a path which consists of an indefinite number of circular orbits to which is added the length of the table or amalgamating surface 15, so that ample time is provided for the separation of the heavier substances of the pulp and for the amalgamation of the gold or other amalgamable values on the plate 15, from which the pulp falls in its downward travel over the downturned end 21 into a trap or pocket structure 22 in which is preferably an amalgam plate, and in which the particles of amalgam and gold which may possibly escape the first plate 15 will collect, and on account of the retrograde or opposite inclination of the plate 22 to the plate 15 be retained a considerable time, so that the escaped amalgam or flowered quicksilver or fine gold will eventually conglomerate and discharge through an aperture 22'. From the tailing end of the catchment pocket 22 the pulp flows into still another lower and inclined amalgam plate 23, where a further possible saving of values is had.

Inasmuch as most mineral pulp or ores include a certain percentage of sulfids or mineral-bearing ores I position adjacent to the lower end of the amalgam plate 23 a con-

caved pan 24 with a discharge gate 25, which may be adjusted with the requisite or desired degree, and through which the heavier concentrates or a portion of the pulp will gravitate during the operation of the machine, the lighter worthless gangue traveling with the larger percentage of water over the discharge end of the table. An advantage in providing the tap gate 25 is that the operator can segregate a large proportion of the richer concentrates as they reach the pan 24; and furthermore, any portion of amalgam or quicksilver which may possibly escape the plates will quickly collect in the pan and pass through the gate 25 and thus be saved by being collected in a suitable receiver or launder below the discharge tap 25, and which need not be shown.

From the foregoing it will be seen that I have provided a novel, simple, practical and efficacious separator, which having a portion, particularly an amalgamating surface subjected to a circular gyratory movement in a substantially horizontal plane will thoroughly agitate the pulp passing over the amalgamating surfaces, the agitation not being too violent and yet serving to prevent the gangue from settling and dragging upon the amalgamating surfaces and thus avoiding the scouring of the soft amalgam therefrom; the discharge of the gangue and less valuable content of the pulp being obtained by the moving volume of water, the speed of which is determined by the angle of inclination of the amalgamating surfaces, and since all of the water and its solid content in the form of crushed ore must traverse the length of the amalgamating surface, and at the same time be carried through a multiplicity of horizontal gyrations, the effective separation of the more valuable content of the ore is rapidly produced. The resulting effect of providing an inclined amalgamating surface having a gyratory, horizontal movement is that the distance that the body of pulp must travel from one table to the other is substantially initially increased, and yet the amalgamating area is relatively and comparatively very small.

Having thus described my invention what I claim and desire to secure by Letters Patent is:

1. In an amalgamating apparatus, a table arranged at an incline and having an amalgam plate at its high end, said table having a pocket adjacent said high end, the inner end of the plate being downturned to extend in the pocket, an amalgam plate in the pocket having its outer end inclined downwardly in a direction toward the high end of the table and having its tailing end turned downwardly, a third amalgam plate on the table having one end underlying said tailing end of the second amalgam plate and having its outer end portion concaved to

form a pan the bottom of which extends below the plane of the third plate, said pan having a discharge outlet and said pocket also having a discharge outlet.

5 2. In an amalgamating apparatus, an inclined table having an amalgam plate at its high end, a pocket at the inner end of the plate, said plate having its inner end extending downwardly in the pocket, an
10 amalgam plate in the pocket beneath said inner end of the first plate inclined downwardly toward the high end of the table, a third amalgam plate extending from the

pocket through the low end of the table, said third plate having a concaved part adjacent
15 its outer end to form a pan, said pocket and pan having outlets, and the outer end of the third plate having a discharge portion.

In testimony whereof I have hereunto set my hand in the presence of two subscribing
20 witnesses.

KARL SENN.

Witnesses:

GEORGE A. SCOTT,
JOHN H. HERRING.

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