

A. B. KITTSOON.

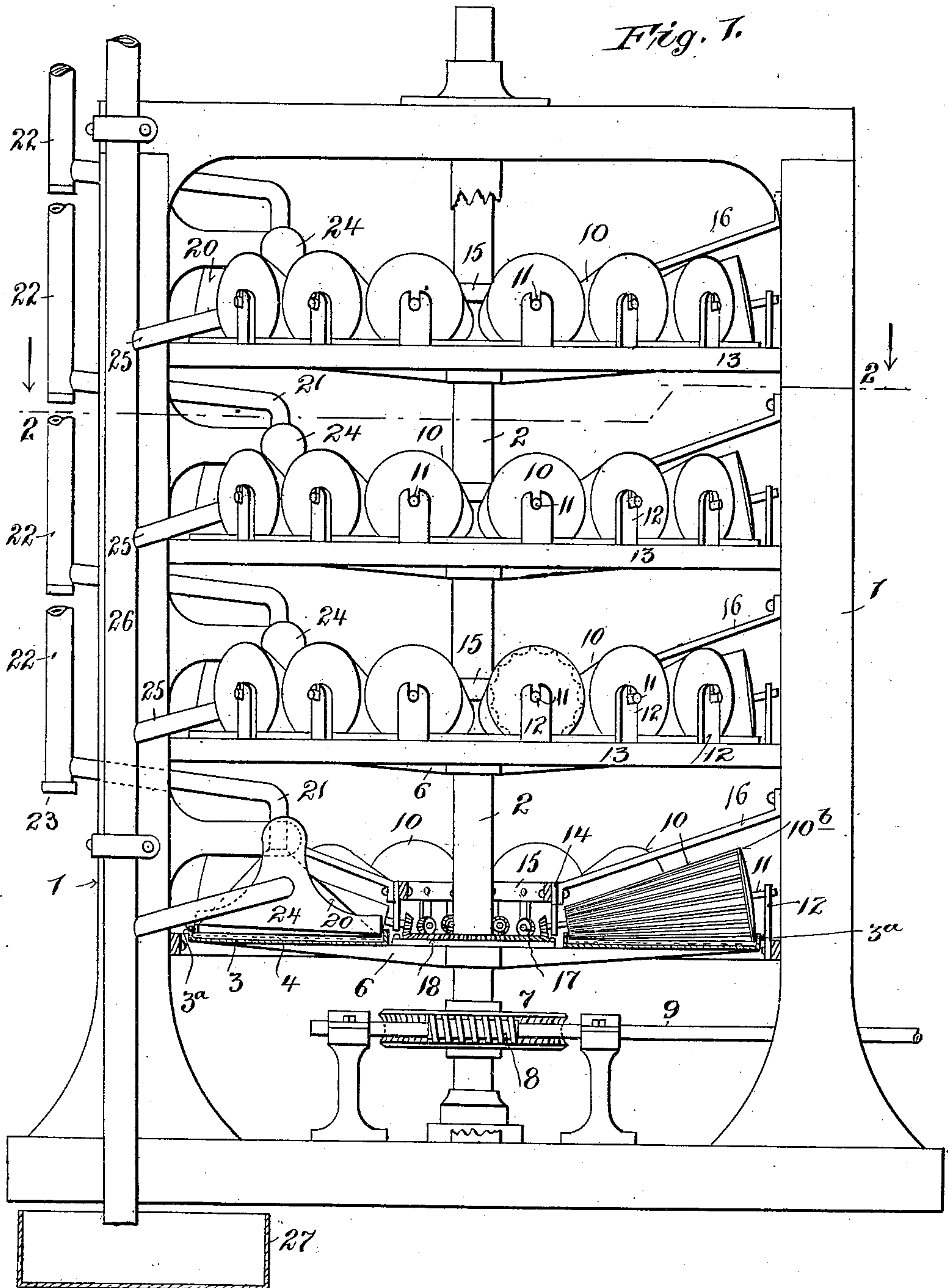
AMALGAMATOR.

APPLICATION FILED AUG. 11, 1904. RENEWED AUG. 21, 1907.

991,857.

Patented May 9, 1911.

2 SHEETS—SHEET 1.



Witnesses  
*C. M. Benjamin*  
*M. Hollingshead*

Inventor  
*A. B. Kittson.*  
By *his Attorney* *T. A. Bourne*

A. B. KITTSON.

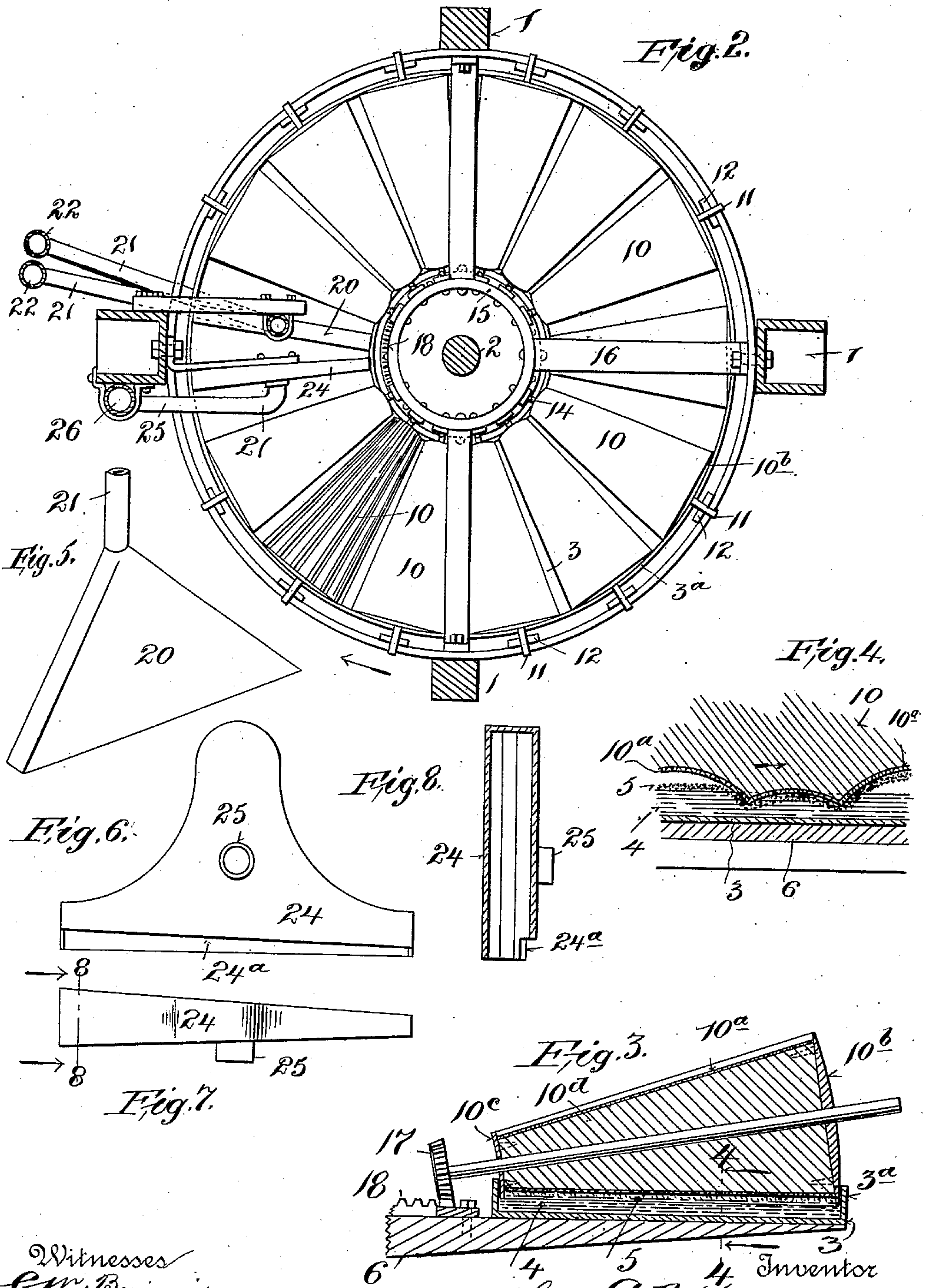
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2 SHEETS—SHEET 2.



Witnesses  
*Wm. Benjamin*  
*M. Hollingshead*

Inventor  
*A.B. Kittson*  
 By *A.F. Bourne* Attorney



# UNITED STATES PATENT OFFICE.

ALFRED B. KITTSOON, OF NEW YORK, N. Y., ASSIGNOR TO AMERICAN GOLD AMALGAMATION COMPANY, OF PORTLAND, MAINE.

## AMALGAMATOR.

991,857.

Specification of Letters Patent.

Patented May 9, 1911.

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*To all whom it may concern:*

Be it known that I, ALFRED B. KITTSOON, a citizen of the United States, residing in New York city, borough of Bronx, New York, have invented certain new and useful Improvements in Amalgamators, of which the following is a specification.

My invention relates to improvements in the class of amalgamators set forth in U. S. Letters Patent No. 497,669, granted to me May 16, 1893, and the invention has for its object to provide means to assure the more complete amalgamation of the metal in the pulp, and particularly to recover the fine and float gold carried with the pulp.

The invention comprises the novel details of improvement that will be more fully hereinafter set forth and then pointed out in the claims.

Reference is to be had to the accompanying drawings forming part hereof, wherein,

Figure 1 is a side elevation, partly in section, of an amalgamator embodying my improvements, Fig. 2 is a horizontal section on the line 2, 2, in Fig. 1, one of the amalgamating rolls being removed, Fig. 3 is a longitudinal section through an amalgamating roll and the rotary pan for the mercury, Fig. 4 is an enlarged detail section on the line 4, 4, in Fig. 3, Fig. 5 is a perspective view of the pulp feeder, Fig. 6 is a side view of the cleaner for removing the refuse from the surface of the mercury in the rotary pan, Fig. 7 is a plan view of Fig. 6, and Fig. 8 is a cross section on the line 8, 8, in Fig. 7.

Similar numerals of reference indicate corresponding parts in the several views.

The numeral 1 in the drawings indicates a suitable frame provided with a vertical shaft 2, carrying pans 3, having upturned inner and outer edges 3<sup>a</sup>, adapted to contain a fluid and continuous body of mercury 4, upon which mercury the pulp or powdered ore 5, is to be deposited. The pans 3 are shown secured on arms or spiders 6 carried by shaft 2, and in Fig. 1 I have shown four such pans arranged one beneath another, although the number of pans may be varied as desired. While the shaft 2 may be rotated in suitable manner I have shown for the purpose a worm wheel 7 and worm 8

carried by a shaft 9, which may be rotated by any suitable power.

At 10 are indicated rolls of tapering form located above the pans, so as to dip into the mercury therein as indicated in Fig. 4. The rolls 10 are carried by shafts 11 journaled in bearings or uprights 12 shown carried by rings 13 supported by frame 1 and in bearings 14 shown carried by rings 15 supported by arms 16 secured to frame 1. The shafts 11 have pinions 17 which mesh with an annular rack 18 rigidly connected with each pan as by being secured to the corresponding spider or arms 6, whereby as the pans rotate the rolls 10 will correspondingly rotate so that the surface of the rolls entering the mercury will move in the direction of movement of the mercury as indicated by the arrows in Fig. 4. The ratio of the rack and pinion should preferably be such that the surface speed of the rolls corresponds to the speed of the pan. The arrangement for supporting and rotating the rolls is similar for each series of rolls.

The operative surfaces of the rolls is to be made for amalgamating, and to this end the exterior surface of the roll should be made of copper 10<sup>a</sup>. The rolls may be made of copper shells secured to heads 10<sup>b</sup>, 10<sup>c</sup>, or may be mounted upon an inner drum 10<sup>d</sup> which may be solid or in skeleton form. To assure that the heads 10<sup>b</sup>, 10<sup>c</sup> may lie close to the upturned edges 3<sup>a</sup> of pan 3 I provide the exterior surface of the head 10<sup>b</sup> in convex form and the exterior surface of the head 10<sup>c</sup> in concave form, substantially corresponding to the circle of the edges 3<sup>a</sup> of the pan, as indicated in Fig. 3.

As one of the objects of my invention is to cause the pulp or powdered ore 5 to be pressed into the mercury during the rotation of the pan and roll, I provide the surface of the rolls with longitudinally disposed concave faces 10<sup>e</sup> (see Fig. 4) and so adjust the rolls with respect to the surface of the mercury in the pan that the inner surface or bottom of the concave faces of the rolls will touch the mercury, as indicated below the dotted lines in Fig. 4, and the concaves are so shaped that the outer or higher points of the concave faces shall dip down into the body of mercury sufficiently deep to pre-



vent the pulp being forced ahead of the roll or backward of the roll, whereby the pulp or powdered ore that passes under each concave face of the rolls will be forced into the mercury so that all particles of the pulp or powdered ore will be immersed in the mercury.

The surface of the copper 10<sup>a</sup> of the rolls will be silvered and coated with mercury in any well known manner, and it will be understood that as the mercury is carried under the rolls as the latter rotate, the pulp will come in contact with the amalgamating surface of the rolls and the float gold will be amalgamated upon such surface of the rolls, as indicated at the right hand side of Fig. 4, while the remaining pulp will be carried along with the mercury from roll to roll after having been forced into the mercury. By utilizing a number of rolls around each pan and providing each roll with a plurality of concave amalgamating surfaces it will be observed that the pulp during one rotation of the pan will be forced into the mercury a number of times and the amalgamating surfaces 10<sup>e</sup> of the rolls will come in contact with float gold a number of times, whereby a very large percentage of the gold or other precious metal in the ore or pulp carried upon the surface of the mercury in the pan or with the amalgamating rolls, whereby the efficiency of the apparatus is greatly increased.

To deliver the pulp or powdered ore to the surface of the mercury in the pan I provide a feeder indicated at 20 which is substantially in the form of an inverted narrow funnel, the lower or large end of which extends horizontally and radially across the pan slightly above the surface of the mercury therein to deliver the pulp or powdered ore upon the mercury. There being one such feeder for each pan I find it convenient to connect each feeder by a pipe 21 with a suitable hopper or tank by which to supply the pulp or powdered ore to the feeders. To remove the refuse pulp from the surface of the mercury I provide a cleaner indicated at 24, which extends over the pan 3 and whose lower back edge fits close to the surface of the mercury. The cleaner is shown more fully in Figs. 6, 7 and 8, and as shown is in the form of a hollow box, the lower edge of one side of which is cut away at 24<sup>a</sup> and by preference the lower edge of the corresponding wall of the cleaner is inclined slightly upwardly and outwardly to accommodate the varying quantity of refuse lying upon the surface of the mercury in a radial direction. I connect the cleaner 24 with an air suction device exhaust-fan or blower (not shown) and to this end the cleaners are connected by pipes 25 with a pipe 26 whose lower end enters a receptacle 27 containing water, the upper end of pipe 26 being con-

nected with any suitable air exhausting device. During the operation of the machine air suction is maintained through the cleaners 24 and as the pans 3 rotate the refuse pulp, etc., is pushed against and collects in the corresponding cleaner 24 and against the lower wall thereof, and the suction through the cleaners causes ore and water from the top of the mercury to be drawn up into the cleaners and to drop through the pipes 25 into the pipe 26, the force of the exhaust being so regulated that the refuse ore and water will fall through pipe 26 into receptacle 27, and without drawing up the mercury.

In the operation of the amalgamator the pans 3 are filled with mercury to the proper level and rotated, the pulp being fed continuously through pipe 22 and feeders 20 to the surface of the mercury in proportion as the refuse is drawn away through the cleaners 24, so that a clear surface of mercury is presented under each feeder 20. As the rolls 10 rotate at the same surface speed as the mercury the latter and the pulp are not agitated by the rolls. After the mercury has become sufficiently charged with gold or silver by reason of the pulp being forced into the mercury and the surface gold or silver becoming amalgamated upon the copper rolls, the amalgam is to be removed from the pan and fresh mercury supplied thereto, and when the copper rolls have collected sufficient amalgam they may be removed and the amalgam removed therefrom by scraping or otherwise.

My invention is not limited to the particular details of construction shown and described as the same may be varied without departing from the spirit thereof.

Having now described my invention what I claim is:

1. In an amalgamator the combination of a rotary pan adapted to contain mercury, with a tapering roll having an amalgamating surface extending over and adapted to enter the mercury to push pulp therein while overlying and engaging the free metal on the surface of the pulp and to amalgamate such free metal on the surface of the roll, and means to rotate said pan and roll at substantially the same surface speed, substantially as described.

2. In an amalgamator the combination of a rotary pan adapted to contain mercury, with a conical roll having a copper surface provided with longitudinally disposed concave tapering faces, dipping into the mercury, and means to rotate said pan and roll at substantially the same surface speed, substantially as described.

3. A roll for an amalgamator having a tapering copper surface provided with tapering concave faces, the marginal edges of adjacent faces meeting in longitudinally



disposed tapering pointed projections, substantially as described.

4. In an amalgamator the combination of  
5 a rotary pan adapted to contain mercury,  
with a cleaner extending across the same  
and having a lower edge adjacent to the  
surface of mercury in the pan and a second

lower edge inclined upwardly and outwardly, substantially as described.

ALFRED B. KITTSON.

Witnesses:

H. B. BRADBURY,  
T. F. BOURNE.

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

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