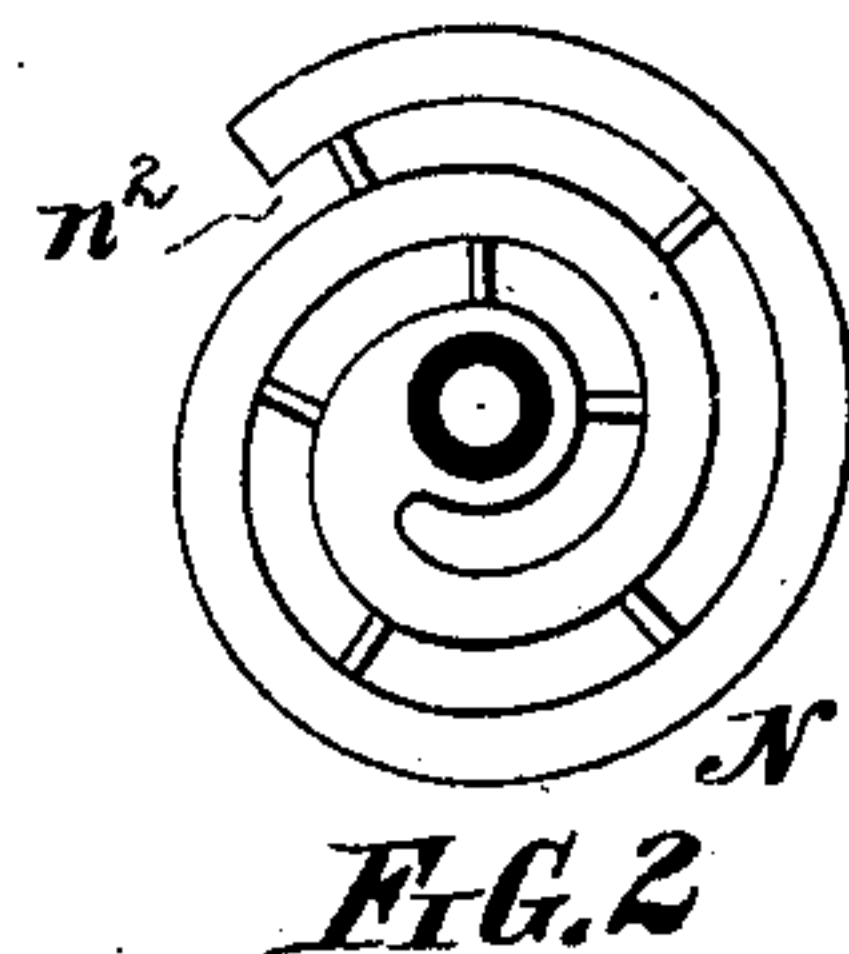


C. E. BALL.
AMALGAMATOR.

Patented Aug. 2, 1881.



INVENTOR
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UNITED STATES PATENT OFFICE.

CHARLES E. BALL, OF PHILADELPHIA, PENNSYLVANIA.

AMALGAMATOR.

SPECIFICATION forming part of Letters Patent No. 244,973, dated August 2, 1881.

Application filed August 11, 1880. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. BALL, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented new and useful Improvements in Amalgamators, of which the following is a specification, reference being had to the accompanying drawings, wherein—

Figure 1 is a vertical longitudinal section of an amalgamator embodying my improvements, and Fig. 2 is a detail plan of electric brush-wheel.

My invention has relation to that class of amalgamators in which the ore is caused to travel by suction or exhaust through mercury.

My improvements have for their principal object to regulate the feed so that only a proper quantity of ore can pass into the amalgamating-chamber.

A further object of my invention is to reduce the ore before admitting it to the amalgamating-chamber to the proper degree of fineness, and at the same time to prevent the coarser particles of ore in the feed-receptacle from entering said chamber.

A further object of my invention is to produce a solidification of the mercury in the amalgamating-chamber, or to prevent said mercury from becoming "cut up" or disintegrated.

My improvements consist in the peculiar construction and combination of parts hereinafter set forth, having reference particularly to constructing the apparatus with two receivers, one for mercury and the other for ore, having communication in such manner that the ore shall pass from one to the other and thence to the amalgamating-chamber, said ore-receiver being located below said mercury-receiver and amalgamating-chamber, so that the ore is fed upwardly from the former to the latter, as hereinafter fully specified.

My improvements further consist in the provision of due appliances whereby an electrical current is sent through the mercury in the amalgamating-chamber, so as to obtain its solidification or prevent its disintegration.

My improvements still further consist in certain details hereinafter fully specified.

Referring to the annexed drawings, A indi-

cates a suitable frame-work on which the apparatus is sustained. B is a vertical shaft stepped on said frame-work at *b*, and having a top bearing at *b'*.

C is an ore-receiving tank or tub sustained on a screw-collar, *c*, whereby it can be elevated, said tank revolving with said shaft B, which passes through it. D is an inclined chute, whereby the ore is fed to said tank C. E is another tank which forms a mercury-holder, and is sustained in position above the ore-receiver C on standards *E'* *E'*. The bottom of tank E is formed with an annular trough, *e*, to which enters the lower edge, *f*, of a dome, F, forming, when mercury is placed in said tank, a mercury seal-joint.

G is the amalgamating or suspension chamber, consisting of a cylinder or equivalent vessel with open lower end and closed or dome-shaped upper end or top. Said chamber is sustained upon feet *g g*, which rest on the bottom of tank E, and it supports the dome F, which is secured to it in the position shown.

H H are hangers secured to the bottom of tank E and sustaining rings *h h*, affording bearings for the shafts of rollers I I, which rest upon or roll against the bottom of tank C.

K K are pipes which pass upwardly through the bottom of tank E and are secured thereto. These pipes are each made in two sections, the upper sections being straight and vertical, while the lower sections are curved and trend toward a common center.

L is a disk secured to shaft B, and having its under side insulated, as at *l*, except in the annular groove *l'*, where a contact-point, *m*, forming one terminal of an electrical circuit, M, rubs against the metal of which said disk is composed.

N is a circular brush, with depending metallic teeth *n*, which is secured to shaft B, and has a mercury-cup or annular trough, *n'*, on its upper side. To this cup enters the other terminal, *m'*, of the circuit M, which latter is completed when mercury in chamber G rises into contact with teeth of brush N, the back or body of latter being metallic. To permit ore, &c., to pass through disk L and brush N the former is provided with apertures *l²*, and latter with a volute-shaped opening, *n²*.

O is a draw-off air-pipe connecting dome F

with chamber G, as shown, and is provided with a valve, *o*, whereby communication may be closed.

P is the waste-discharge pipe having a flaring inlet, *p*, in which shaft B has its upper bearing. Said pipe extends outwardly through the side of chamber G and terminates in an ejector, Q.

R is a pipe for supplying water to dilute the waste when required.

The operation is as follows: Mercury in sufficient quantity is first supplied to vessel E, so that when elevated by suction it will rise at least as high as the teeth *n* of brush N and leave a seal in trough *e*. Ore diluted or in the form of pulp is fed to tank C, which is caused to rotate by a belt and pulley on shaft B. The ejector Q being started and valve *o* being opened, the air is exhausted from dome F through pipe O. This causes the ore to rush up through pipes K K, and as soon as the exhaustion of air from the dome is accomplished the valve *o* is closed. The mercury having been lifted by the exhaust into suspension-chamber G, the ore passes thereinto, taking the paths indicated by the arrows. As there are three pipes K K, the feed to the amalgamating-chamber is uniform, and as such feed is dependent upon the exhaust and cannot ascend into the space between outside of chamber G and inside of dome F faster than it is drawn off therefrom, there can at no time be an excess of feed to the amalgamating-chamber. So, too, the capacity of the discharge-pipe P being equal to the combined capacities K K K, the discharge will be as rapid as the feed. The pipes K K K, having their inlets near center of tank C and close to bottom of latter, will take up only the finer particles of ore deposited there from chute D along with sufficient water, while the coarser particles will tend by centrifugal force, due to revolution of tank C, toward the outer wall, *c'*, of said tank, and will be thus brought under the rollers I and reduced to the proper degree of fineness. The ore in its passage through the mercury suspended in chamber G will have its metals amalgamated, the waste (diluted, if required, to make it flow freely) passing off through discharge-pipe P. An electrical current being maintained through circuit M (a part of which is the mercury in chamber G) maintains the normal solidification of such mercury and pre-

vents latter from becoming "floured" or "cut up" by the action of the ore, &c., passing through it.

If desired, tank C may be stationary and rollers I caused to travel around in it.

What I claim as my invention is—

1. In a vacuum-amalgamator, an ore-receiver or feeding-tank located below the amalgamating-chamber and communicating with a supply-chamber surrounding the same by pipes, substantially as shown, whereby the feed to said chamber is upwardly and an excess of supply is prevented, substantially as set forth.

2. The combination of an amalgamating or suspension chamber G, a dome or inclosing-wall, F, forming an inclosed space around said chamber, an ore-receiver or feed-tank, C, located below said chamber, and communicating pipe or pipes K, substantially as shown and described.

3. The combination of tank or mercury-holder E, having seal-trough *e*, with the dome F and amalgamating or suspension chamber G, substantially as shown and described.

4. The combination of ore-receiver C, mercury-holder E, dome F, amalgamating-chamber G, and communicating-pipes K K K, substantially as shown and described.

5. In combination with ore-tank C and amalgamating-chamber located above the same, the pipes K, constructed and arranged substantially as shown, to trend toward a common center, for the purpose set forth.

6. In combination with amalgamating or suspension chamber G and dome or inclosing-wall F, the air-pipe O, having valve *o*, substantially as and for the purpose set forth.

7. The combination, with the suspension-chamber G, of the disk L and brush N, forming electrodes, as set forth, and a suitable electric generator, substantially as described.

8. The combination, with chamber G, of disk L and brush N, forming, respectively, the terminals of an electric circuit, M, substantially as shown and described.

In testimony that I claim the foregoing I have hereunto set my hand this 31st day of July, 1880.

CHAS. E. BALL.

Witnesses:

SAML. J. VAN STAVOREN,
CHAS. F. VAN HORN.