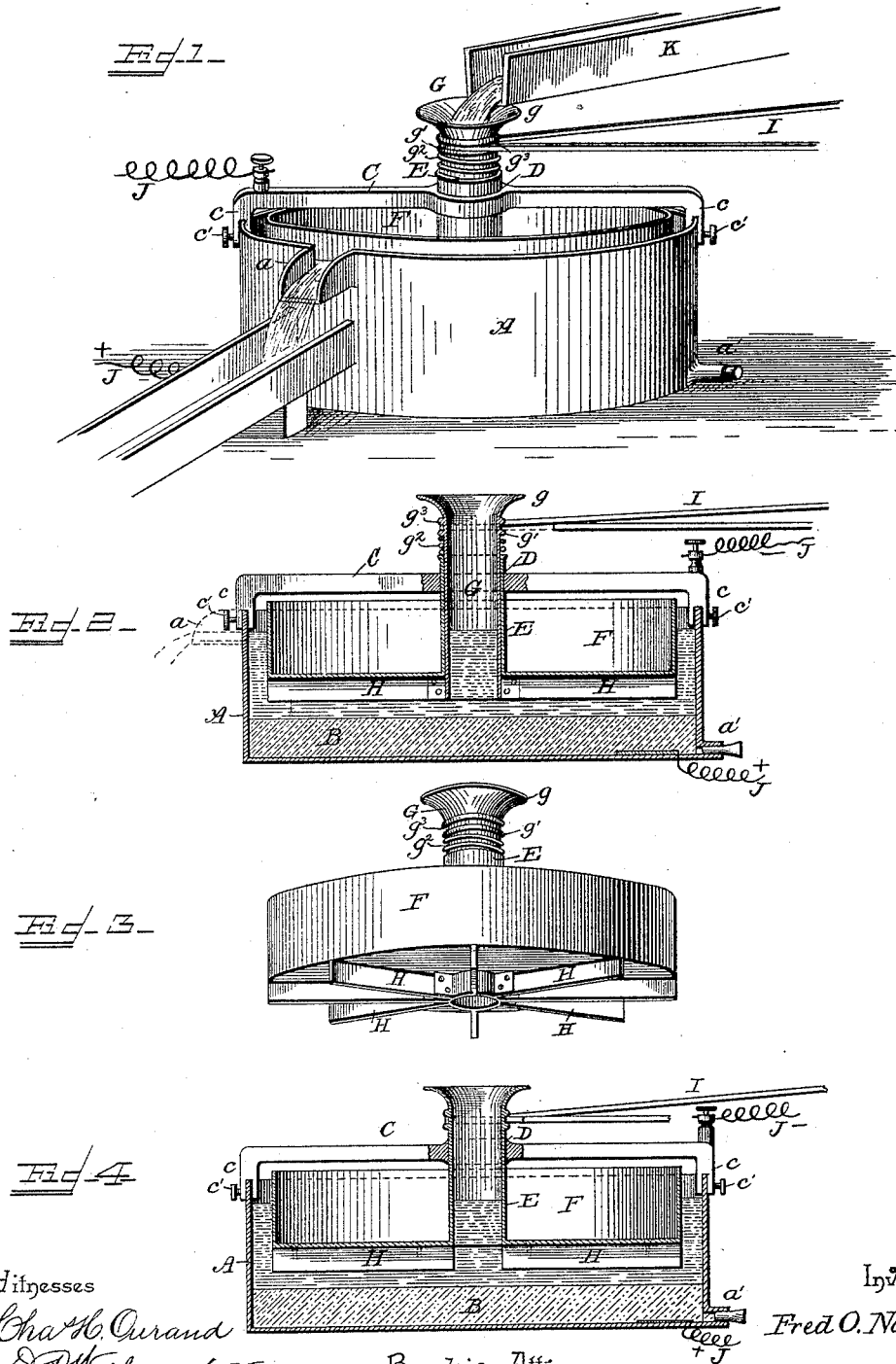


(No Model.)

F. O. NORTON.
ORE AMALGAMATOR.

No. 491,686.

Patented Feb. 14, 1893.



Witnesses

Chas. H. Curand
D. P. Wolhaupter,

Inventor

Fred O. Norton

By his Attorneys,

C. A. Snow & Co.

UNITED STATES PATENT OFFICE.

FRED O. NORTON, OF CLINTON, IOWA.

ORE-AMALGAMATOR.

SPECIFICATION forming part of Letters Patent No. 491,686, dated February 14, 1893.

Application filed December 31, 1891. Serial No. 416,728. (No model.)

To all whom it may concern:

Be it known that I, FRED O. NORTON, a citizen of the United States, residing at Clinton, in the county of Clinton and State of Iowa, have invented a new and useful Ore-Amalgamator, of which the following is a specification.

This invention relates to ore amalgamators used for separating metals from their ores by the process of amalgamation, and particularly for the separation of gold and silver from the ores in which they most frequently occur.

To this end it is the object of this invention to provide for the complete separation from the ore of the metal desired to be recovered, by employing simple and efficient means, whereby the accomplishment of this object is more readily and effectively attained than by the processes and apparatus ordinarily employed.

With these and other objects in view which will suggest themselves to those skilled in the art, as the nature of the invention is fully understood, the same consists in the novel method and apparatus for separating ores by amalgamation, as is hereinafter more fully described and claimed.

In the accompanying drawings;—Figure 1 is a perspective view of amalgamator constructed in accordance with my invention. Fig. 2 is a vertical sectional view of the same. Fig. 3 is a detail in perspective of the floating disk or pan and revolving tube therein. Fig. 4 is a vertical sectional view of the apparatus as modified for treating native ores.

Referring to the accompanying drawings;—A represents a preferably cylindrical amalgamating dish or vessel made of glass, earthenware or any non-conducting substance through which an electric current will not pass. The vessel A is provided at its upper edge upon one side thereof with a spout *a* over which or out of which the matter amalgamated within the same is designed to flow, and said vessel is designed to hold a quantity of mercury B that is placed in the bottom thereof and which may be readily drawn off through the plugged discharge opening *a'* located in one side and at the bottom of the

vessel A. A metallic cross bar or supporting arm C extends transversely across the open top of the amalgamating dish or vessel and is provided with the depending bifurcated arms *c* that take over the edges of said vessel and are secured thereto by means of the set screws *c'* as illustrated. The said cross supporting arm or bar is further provided with a central bearing D located directly over the center of the dish or vessel, and is adapted to receive and accommodate the open cylinder or sleeve E extending up from the center of the hollow float pan F, the sides of which are of a sufficient height to always be above the plane of the discharge spout *a*, and thus allow the amalgamated ore passing thereunder to overflow out of said spout while at the same time it is prevented from running into said pan.

The hollow pan F is constructed of suitable metal such as copper, cast iron &c. A supplemental receiving tube or cylinder G extends entirely through the open cylinder or sleeve E and is adapted to revolve therein. The said tube G is provided with an upper flared mouth *g* for receiving the pulp or the ore and water, from the wet ore crusher to direct the matter into the glass dish or vessel beneath the floating pan F that is designed to float within the watery mass. The said receiving tube G is also provided directly above the upper end of the sleeve E with a shoulder *g'*, against which bears the coiled spring *g''*, resting against the top of said sleeve and thus normally pressing the tube G upward and thereby holding the series of agitator blades H secured to the lower end thereof up in contact with the bottom of the floating pan F. The agitator blades H extend radially from their connections with the lower end of said tube G out to the edge of the pan, beneath which the same revolve and are designed not only to agitate, the pulp beneath the pan and between the same and the mercury, but also to scrape the bottom of said metallic pan and remove therefrom any oxidized matter which may have accumulated thereon. The tube G is provided with an annular groove *g'''*, above the top of the shoulder

g', which is designed to receive the operating belt I driven from any suitable and available power. Positive and negative wires J from any suitable source of electrical generation, are connected with the mercury B in the bottom of the amalgamating dish or vessel A and with the transverse supporting arm C respectively and thus establish an electric current between the floating pan and said amalgam, directly through the ore pulp which is placed within said dish or vessel.

The form of apparatus described is that used in connection with the separation of metal from silver, ores and all ores of the baser sort, such as sulphuret of silver, antimonial sulphide, &c. It is necessary in treating such ores that the metallic floating pan or vessel does not revolve but is only free to move vertically in its bearing that the matter which must necessarily be attracted to the pan in these impure ores can be easily scraped from the bottom of the pan by the agitator blades revolving thereunder, and therefore always keep the bottom of said pan clean and bright.

When the apparatus is used for amalgamating native ores of gold and silver, it is not necessary that the pan should revolve in order to allow the agitator blades H to revolve thereunder to clean the oxidations therefrom, and therefore the apparatus for such use is simplified as illustrated in Fig. 4 of the drawings, in which the revolving tube is dispensed with, and the agitator blades are secured directly to the bottom of pan F, which is revolved by means of the drive belt I as illustrated, by connecting said belt with the upper end of the sleeve E. It is of course understood that the agitator blades are of a non-conducting material so as to prevent any attraction of matter, from the separated pulp, thereto.

The ore to be amalgamated is first crushed and pulverized in the ordinary wet ore crushers and is conducted therefrom through an ordinary spout K into the central tube and sleeve G and E. The ore pulp runs beneath the floating pan, which rises thereon, and thus fills the space between said pan and the top of the mercury located in the bottom of the amalgamating dish or vessel. The continuous flow of the mass of ore causes the same to pass through the apparatus beneath the floating pan and out through the discharge spout a, in the meanwhile being of course subjected to the agitating and separating action of the electric current and the amalgamation with the mercury. The current of electricity which must necessarily pass through the watery ore pulp separates the same into its various elements, held in suspension, as well as decomposing the water of the pulp the metal amalgamating with the mercury while the other parts of the ore pulp either combine with the oxygen of the decomposed water or pass to the metallic floating pan. As noted the elec-

tric current decomposes a portion of the water of the pulp and thus constantly keeps a quantity of nascent hydrogen on the surface of the mercury which keeps the same bright, and under the induction of the electric current, always ready to induce or attract the separated metal, while the oxygen liberated unites with other elements as already stated. In connection with the separations, chemical charges may be used to facilitate the same by closing the spout, introducing the chemicals and running the electric current through the substances until the amalgamations and separations are complete. Repeating this from charge to charge, but this is an optional use of the apparatus.

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

1. In an ore amalgamator, a non-conducting amalgamating dish or vessel holding the mercury, a bearing arm mounted upon said vessel, a metallic float adapted to be supported upon the pulp within said vessel and having a sleeve free to move vertically in said bearing arm, the revolving agitator blades arranged under the pan and contacting with the bottom thereof and electrical connections with said float and the mercury in said vessel, substantially as set forth.

2. In an ore amalgamator a non-conducting mercury dish or vessel, a metallic float supported within said vessel, agitator blades located beneath said float, and electrical connections with said float and the mercury within said vessel, substantially as set forth.

3. In an ore amalgamator, a non-conducting mercury dish or vessel, a metallic float supported within said vessel, a revolving agitator having agitator blades working in contact with and beneath said float, means for revolving said agitator, and electrical connections with said float and the mercury in said vessel, substantially as set forth.

4. In an ore amalgamator, a non-conducting mercury dish or vessel, a transverse supporting arm supported upon said vessel and provided with a central bearing, a hollow conducting float pan having a sleeve working within said bearing, a revolving receiving and agitator tube working within said sleeve, a series of agitator blades radially secured to the lower end of said tube, and adapted to revolve beneath and in contact with the bottom of said float pan means for driving said tube, and electrical connections, substantially as set forth.

5. In an ore amalgamator, a non-conducting mercury dish or vessel, a transverse supporting arm supported over said vessel and provided with a central bearing, a hollow metallic float pan having a sleeve working within said bearing, a revolving receiving and agitator tube working within said sleeve and provided with an annular shoulder, a series of agitator blades radially secured to the lower

end of said tube, a spring interposed between the upper end of said sleeve and said annular shoulder, the same being adapted to hold said agitator blades in contact with the bottom of said float pan, means for driving said tube, and electrical connections, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

FRED O. NORTON.

Witnesses:

GEO. B. PHELPS,
S. E. HALLAM.