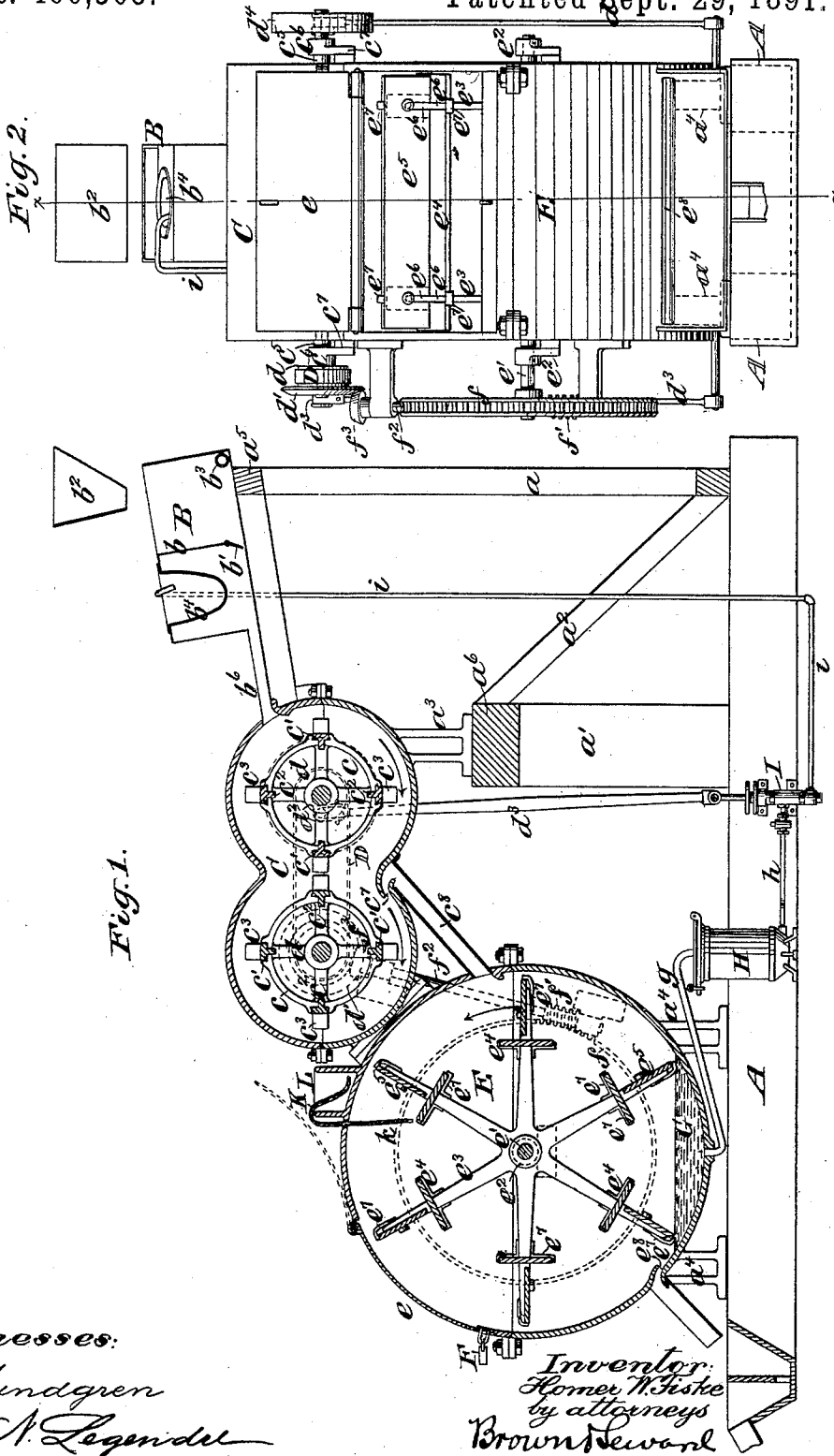


H. W. FISKE.
AMALGAMATING APPARATUS.

No. 460,305.

Patented Sept. 29, 1891.



Witnesses:

Chas. Sundgren
L. A. Legendel

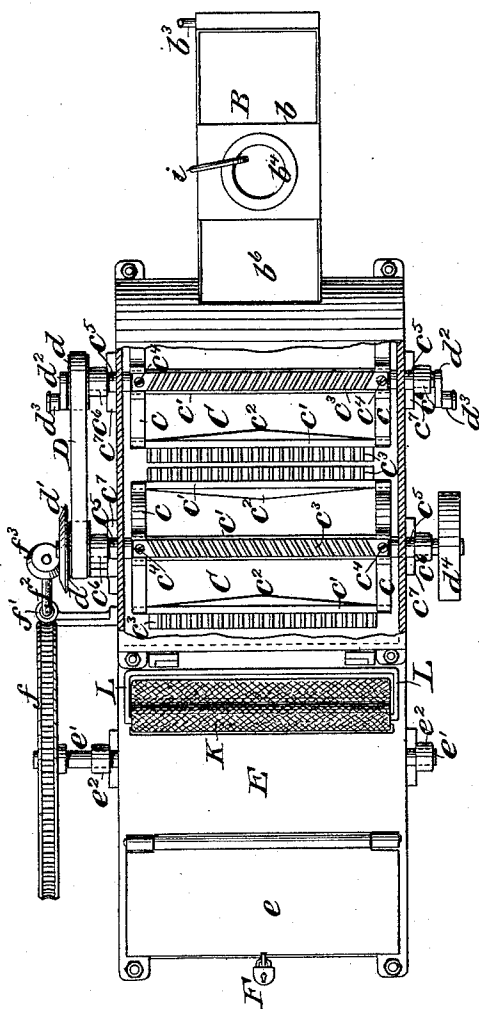
Inventor:
Homer W. Fiske
by attorneys
Brown & Howard

H. W. FISKE.
AMALGAMATING APPARATUS.

No. 460,305.

Patented Sept. 29, 1891.

Fig. 3.



Witnesses:

O. Sundgren
L. A. Legendre

Inventor:

Homer W. Fiske
by attorneys
Brown & Seward

UNITED STATES PATENT OFFICE.

HOMER W. FISKE, OF NEW YORK, N. Y.

AMALGAMATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 460,305, dated September 29, 1891.

Application filed January 15, 1891. Serial No. 377,789. (No model.)

To all whom it may concern:

Be it known that I, HOMER W. FISKE, of the city and county of New York, in the State of New York, have invented a new and useful Improvement in Amalgamating Apparatus, of which the following is a specification.

My invention relates to an improvement in amalgamating apparatus in which the mineral pulp, water, and quicksilver are fed to stirrers and mixers and thence to one or more moving amalgamated plates.

The object is to provide for a thorough and complete mixing of the pulp with the water and quicksilver, the automatic cleaning of the amalgamated plates, the free escape of the waste, the exclusion of oil, the incasing of the precious amalgam to prevent its unintentional removal, and a simple and light structure and arrangement of the parts, so that the apparatus as a whole may be readily transported.

With these ends in view my invention consists in certain features of construction and combinations of parts, as will be hereinafter described, and pointed out in the claims.

A practical embodiment of my invention is represented in the accompanying drawings, in which—

Figure 1 represents the apparatus in vertical longitudinal section, the plane of the section being denoted by line xx of Fig. 2. Fig. 2 is an end view, and Fig. 3 is a top plan view with a portion of the casing removed to show the stirrers and mixers.

A suitable supporting-frame consisting in the present instance of a base A and standards a , a' , braces a^2 , and brackets a^3 and a^4 and the necessary cross-beams a^5 a^6 and such other supporting-beams as may be found necessary, serve to support the receiver, the mixing-chamber, and the amalgamating-chamber in such positions with respect to one another that the mingled water, quicksilver, and pulp will flow by gravity from the receiver into the mixing-chamber, thence into the amalgamating-chamber, and thence to the waste-conduit and to the safe for the precious amalgam.

B denotes the receiver divided, preferably, into two compartments by a partition b , which, by a door b' at the bottom, establishes communication between the two compartments.

A discharge-spout b^2 is so located as to discharge the mineral pulp into one of the compartments, (here shown as the upper compartment,) because of the receiver being set at an inclination; and a pipe b^3 also enters this same compartment for the supply thereto of the necessary amount of water. The other compartment of the receiver B has set therein a mercury-bag b^4 , through which the mercury supplied to the bag is distributed into the mineral pulp and water as they flow along the bottom of the receiver from the compartment into which they are discharged. From the receiver B the mingled quicksilver, water, and ore pass through a conduit b^6 into the mixing-chamber C . The mixing-chamber C consists of two cylindrical-shaped portions, united along their adjacent sides so as to form a single chamber, and centrally within each one of these cylindrical-shaped portions there is located a revolving stirrer and mixer constructed as follows: A pair of end wheels or disks c are connected at their peripheries by longitudinal bars c' , which, for the purpose of securing lightness and strength, I provide on their inner sides with a rib c^2 , which gradually increases in depth from the ends to their central portions. The number of longitudinal ribs c^2 may be four, more or less. In the present instance I have shown four, located at equal distances apart and having removably secured to their outer faces a series of diagonal blades c^3 , projecting outwardly from the face of the bars. By making the series of blades removable, they may be renewed at slight expense as they become worn or broken. In the present instance I have shown the series of blades as fastened to the wheels or disks by end screws c^4 . (See Fig. 3.) Each succeeding series of blades is slanted in the opposite direction. The wheels or disks c are fixed to journals c^5 , which project through the ends of the mixing-chamber C and rest in suitable bearings c^6 in the ends of brackets c^7 , fixed to the outer faces of the ends of the chamber. A second stirrer, quite similar in its structure to that just described, is located in the opposite cylindrical-shaped portion of the chamber C , and the two stirrers are connected to rotate together, in the present instance by means of a band or belt D ,

which engages pulleys d , fixed to the ends of the journals c^5 . One of the journals c^5 is also further provided on its outer end with a beveled faced friction-wheel d' for transmitting motion to the amalgamating-plates, as will hereinafter appear. Motion is transmitted from a suitable source of power (not shown) to one of the journals c^5 , a pulley d^1 being fixed thereto for such purpose. It is obvious that the journals c^5 may be either fixed to the wheels or disks c separately, or they may form parts of a single shaft extending transversely through the chamber C. The journals c^5 , at the opposite ends of one of the stirrers, are provided outside of the casing with cranks d^2 , which by suitable connecting-rods d^3 serve to work a pump for purposes which will hereinafter appear.

Intermediate between the two cylindrical-shaped portions of the chamber C and at its lower side and a short distance above the bottom of each there is located an opening c^7 , through which the mixed ore, quicksilver, and water after they have been thoroughly agitated by the stirrers escape into a conduit c^8 , which leads downwardly to the amalgamating-chamber E. The latter is made of cylindrical form, and access to the interior thereof is gained by a door e , hinged at one side and provided with a suitable lock F, by which it may be kept closed, and access to the interior of the amalgamating-chamber is obtained only by the person holding the key to the lock. Within the amalgamating-chamber E there is a rotary shaft e' , the ends of which project through the ends of the chamber E and are journaled outside of the chamber in suitable brackets e^2 . On the shaft e' , within the chamber E, spider-wheels provided with radial arms e^3 are fixed, the corresponding arms of said wheels forming supports for copper plates e^4 . The arms e^3 project outwardly beyond the plates e^4 , and are adapted to support the copper plates e^5 edgewise toward the axis of the wheels and at right angles to the plates e^4 in a position resembling that of the paddles of a paddle-wheel. The plates e^4 and e^5 are removably secured to the ends of the supporting-arms in any suitable manner—for example, by grooves e^6 , into which they may be slid at their ends, and secured therein by catches e^7 . The arms e^3 are of such length that the plates e^5 will be supported with their outer edges in proximity to the inner wall of the chamber. Motion is communicated to the shaft e' and hence to the plates e^5 by means of a worm-wheel f , fixed on the shaft e' , and engaged by a worm f' on a shaft f^2 , the opposite end of said shaft being provided with a beveled friction-wheel f^3 , the face of which engages the bevel-face of the wheel d' , fixed to one of the journals c^5 , as hereinbefore referred to.

An opening e^8 is provided in the side of the amalgamating-chamber E at a point above the bottom thereof for the discharge of the tailings or waste as it accumulates upon the

surface of the mercury G, deposited in the bottom of the chamber. An outlet-pipe g for the precious amalgam leads from the bottom of the chamber E upwardly to a point on a level with the point at which it is desired to sustain the mercury G within the chamber and thence downwardly into the safe H, which may be of any well-known and approved structure. The free mercury from the safe H passes through a pipe h of a force-pump I, of any well-known and suitable construction, from which it is forced through a pipe i up into the mercury-bag b^4 to be again deposited in the receiver B to mingle with the ore and water. The pump I is driven by the connecting-rods d^3 , engaged with the cranks d^2 , as hereinbefore referred to. As the plates e^5 are moved continuously through the mercury G at the bottom of the chamber E and accumulate upon their faces the precious amalgam, they are automatically wiped and cleaned by contact with the depending end k of a wiper K, which leads from a tank L, containing a solution of cyanide of potassium. The wiper K is of such absorbent material that it will hold in suspension a constant supply of the cyanide of potassium from the tank, and as it is drawn across the faces of the plates so wipes and cleans them that they will be in condition for retaining a maximum amount of the precious amalgam. The plates e^4 stand in such relation to the plates e^5 that they will receive the drippings therefrom, and thus materially increase the capacity of the amalgamator. As the plates become loaded they may be removed as they pass opposite the door e and fresh ones substituted therefor, so that the process may go on continuously.

By the above arrangement the ore, either wet or dry, may be constantly fed and thoroughly mixed with the water and quicksilver before it reaches the amalgamating-chamber, and when in the amalgamating-chamber it is constantly agitated and brought into contact with the collecting-plates, so that a very complete removal of the precious amalgam is effected, while any residue of precious amalgam is transmitted to the safe H. The work of keeping the amalgamated plates bright and clean and in condition to take up their heavy load is automatically accomplished in a very simple and effective way while the several parts of the apparatus are so lightly constructed and so compactly arranged that they may be transported conveniently over rough roads.

The apparatus also has a further merit of being simple and inexpensive, and the journals being located entirely without the chambers the oil is not liable to get into the chambers and disturb the amalgamation. By doing away with any grinding action there is no liability of flouring the mercury, and the loss commonly entailed by such flouring is avoided.

What I claim is—

1. The combination, with the inclosed amal-

gamating-chamber and the series of removable collecting-plates having a movement successively through the amalgam within the chamber, of the flexible porous wiper depending within the chamber in the path of the plates, and the receptacle for supplying the wiper with a cleaning substance, one end of the wiper resting within the receptacle, substantially as set forth.

1.5 2. The combination, with the ore, water, and quicksilver supply, of the mixing-chamber in communication therewith, and the two rotary mixers located within the chamber and having a series of removable blades secured to the peripheries of the rotary frames, substantially as set forth.

20 3. The combination, with the amalgamating-chamber having an opening in its side for the discharge of tailings, and a series of moving collecting-plates within the chamber, of a safe and a closed pipe leading from the bottom of the chamber to the safe and ex-

tending to a point above the bottom of the chamber to determine the height of amalgam within the chamber, substantially as set forth. 25

4. The amalgamating apparatus comprising the receiver in which the ore, water, and quicksilver are received, the inclosed mixing-chamber located below and in communication with the receiver, the rotary stirrers within the mixing-chamber, the inclosed amalgamating-chamber located below and in communication with the mixing-chamber, the revolving series of removable collecting-plates within the amalgamating-chamber, and the wiper 30 in the path of the plates, the safe in communication with the bottom of the amalgamating-chamber, and the pump for returning the free mercury to the receiver, substantially as set forth.

HOMER W. FISKE.

Witnesses:

FREDK. HAYNES,
L. N. LEGENDRE.