(No Model.)

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AMALGAMATING APPARATUS.

No. 389,858. Patented Sept. 18, 1888.

Fig. 1.

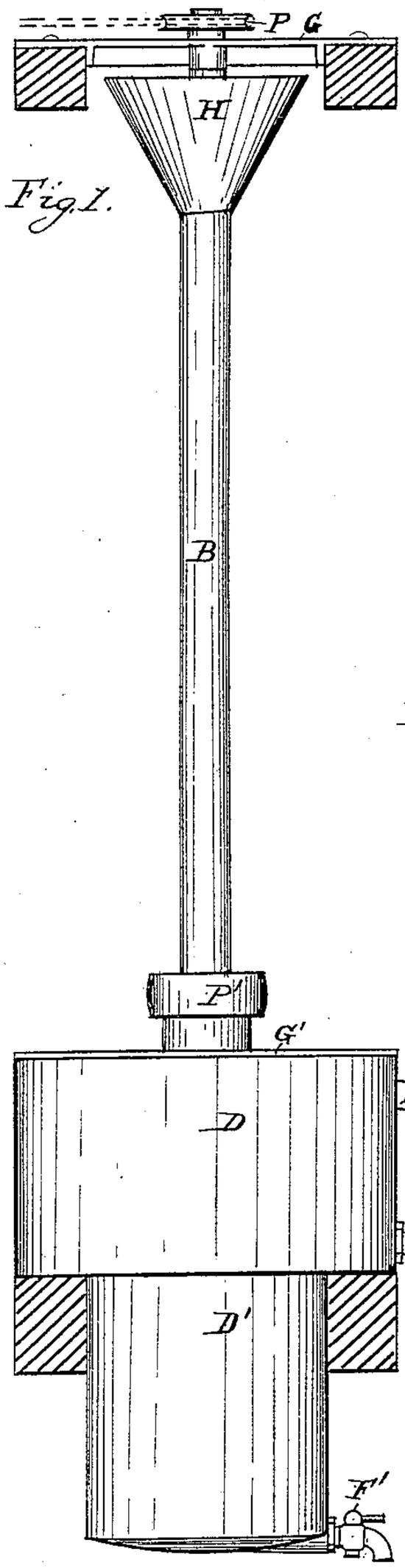


Fig. 3.

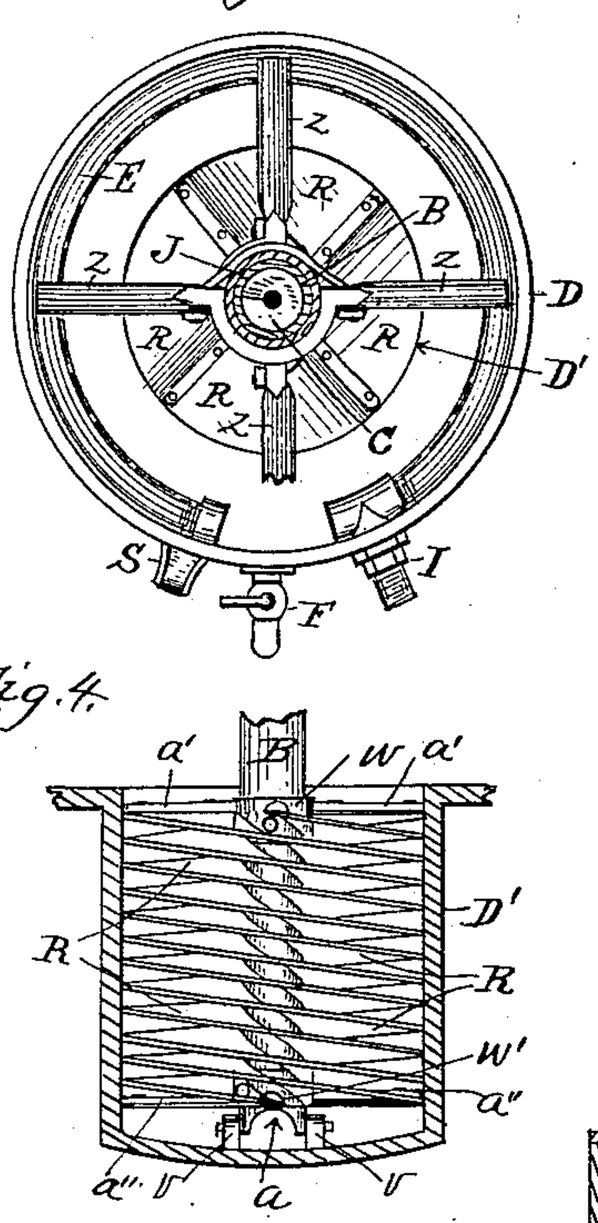


Fig. 4.

Fig. 5.

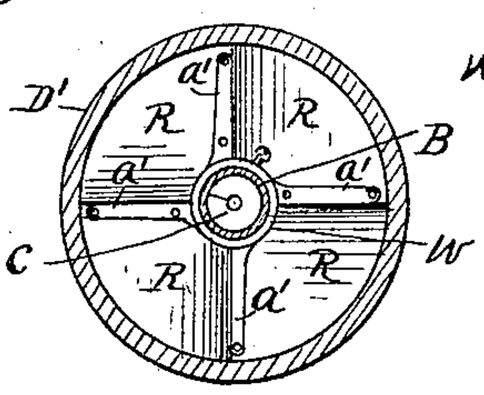
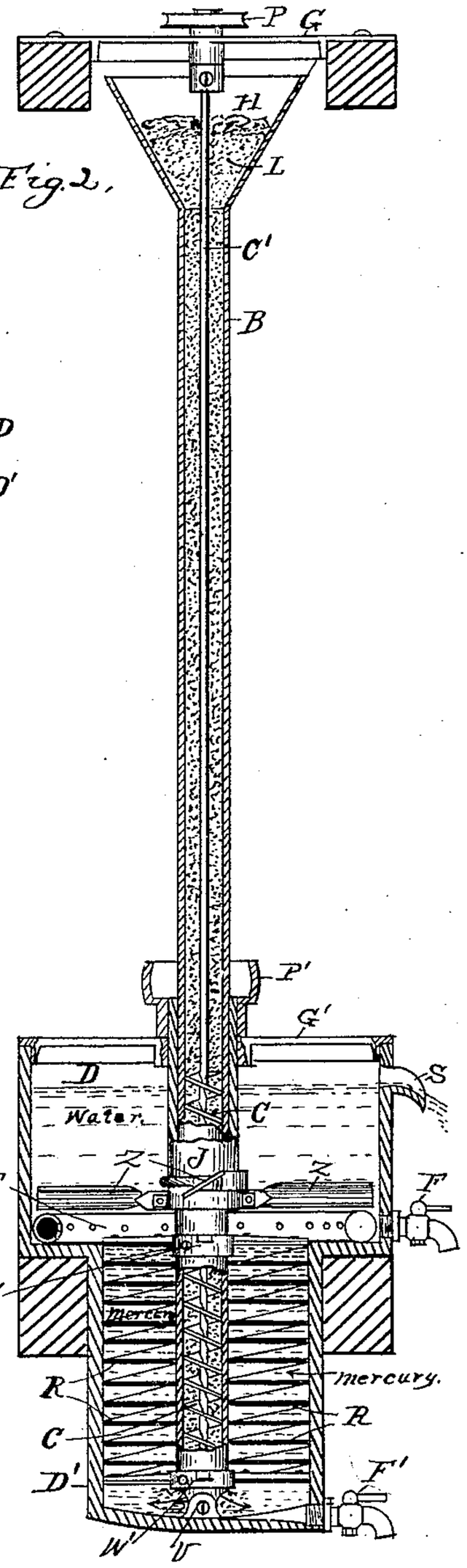


Fig. 2.



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AMALGAMATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 389,858, dated September 18, 1888.

Application filed July 18, 1887. Serial No. 244,586. (No model.)

To all whom it may concern:

Be it known that we, AUSTIN D. SEARLS, Sr., of Seward, Kendall county, DEWITT CLINTON SEARLS, of Troy, Will county, and AUSTIN D. SEARLES, Jr., of Channahon, Will county, of the State of Illinois, citizens of the United States of America, have invented certain new and useful Improvements in Amalgamating Apparatus, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to certain improvements in an amalgamating apparatus, the construction and operation of which are fully set forth and explained in the following specification and claims, reference being had to the accompanying drawings, and the letters and figures of reference marked thereon, which form a part of this specification, in which—

Figure 1 is an exterior side elevation of the amalgamating apparatus. Fig. 2 is a central vertical sectional view of the same. Fig. 3 is a top plan view looking down into the washing-pot of the apparatus, showing the ore feed-pipe and agitator-sleeve in cross-section. Fig. 4 is a vertical cross-sectional view of the mercury-pot of the apparatus and a side view of the spiral floors and a portion of the ore feed-pipe within said pot; and Fig. 5 is a top plan view of the spiral floors of the mercury-pot of the apparatus, showing the mercury-pot and ore-feed pipe in cross-section.

Referring to the drawings, D and D′ represent a vessel forming the body of the apparatus, into which the pulverized ore is injected and wherein the metallic portions of the ore are separated from the gangue, the lower reduced portion, D′, of said vessel being what we term a "mercury-pot" and the upper larger portion, D, being what we term a "washing-pot."

B represents a dry-ore-feed pipe arranged standing in an upright position in the bottom of pot D′ between lugs V V, (see Figs. 2 and 4,) and held by pins or set-screws, as shown in said figures, and also boxed within sleeve J in girth G′ at the top of said vessel. (See Fig. 2.) Within said pipe the portion thereof within said vessel is a screw conveyer, C, suspended from its shaft, which extends up through said pipe and is boxed in girth G above said pipe, and also has secured thereon at its upper end resting on said girth a belt-pulley, P, about which is passed a belt (see dotted lines in Fig. 1) to drive said shaft and operate said screw conveyer.

R, R, R, and R represent a series of spiral floors arranged within the mercury-pot D′, as shown in Figs. 2, 3, 4, and 5, closely fitting the space in said pot about pipe B, the surface of said floors forming a series of inclined planes, and, as illustrated, they commence their circuit at each quarter of the circumference of said pot, ascending from near the bottom of said pot to or near the top of said pot in such manner as to be about equidistant from each other.

W W′ represent a pair of collars having radial arms *a′ a″*, (see Figs. 4 and 5,) and are sleeved on pipe B, one near the bottom and one near the top, within the mercury-pot D′, and held secured in proper position by means of set-screws, and are for the purpose of properly supporting said spiral floors within said pot by means of securing said floors to said radial arms, as shown. The pitch of said spiral floors is governed within certain limits by means of adjusting one of said collars on pipe B—viz., the greater distance said collars are apart the greater distance said floors will be apart; hence they will have greater pitch, and vice versa. Also in construction the length of said floors may regulate their pitch.

E represents an annular water-pipe arranged in the bottom of and next the outer wall in the washing-pot D, and has a series of perforations therein facing pipe B, and a feed-connection, I, arranged through the wall of said pot, as shown in Figs. 1 and 3, through which water is constantly supplied to said pipe E and discharged through the perforations toward pipe B with considerable force.

J represents a sleeve arranged over pipe B, within the washing-pot D, and is properly supported therein by being boxed in girth G′, as shown in Fig. 2, and has secured on its upper end a belt-pulley, P′, the hub of which rests upon said girth. In the lower end of said sleeve are secured a series of agitating-arms, Z Z Z Z, as shown in Figs. 2 and 3, formed with inclined faces and arranged to rotate within said pot immediately above pipe E, for

the purpose of agitating the water in said washing-pot. A belt passing about pulley P′ will cause said arms to thus rotate.

S represents an overflow-spout of washing-pot D for conducting the washings from the apparatus.

F represents a faucet inserted in pot D at its base, and is for the purpose of drawing off the water from the apparatus, and F′ is a similar faucet inserted in the mercury-pot D′ at its base for the purpose of drawing off the mercury from the apparatus.

In operation the pot D′ is nearly filled with mercury. Water is let into pipe E, and, as before stated, with considerable force, in order that water-jets from the perforations in said pipe will agitate the body of water immediately above and resting upon the mercury. Arms Z are also given motion for the same purpose, and their form is such as to cause substances in the water to be thrown to the surface, where the overflow-current will draw any such substance off through spout S. Dry pulverized ore is placed in hopper H at the top of pipe B, and falls down into said pipe on the screw conveyer, which is at such time rotated and feeds the said ore in a uniform manner down in said pipe, discharging it from the base of said pipe at either side at *a* (see Fig. 4) beneath the surface of the body of mercury in pot D′ and beneath the spiral floors R, as shown by the arrows at base of pipe B in Fig. 2. At such place the dry pulverized ore is first brought in contact with the body of mercury and its only escape is through said mercury. As gold weighs about two thousand pounds per cubic foot, and mercury but about eight hundred and forty-eight pounds per cubic foot, and gangue but about one hundred and sixty-nine pounds per cubic foot, thus the process of separating the metallic substances is as follows: A space is left in pot D′ beneath floors R, and in this space in the bottom of said pot will collect all the separate and heavier particles of metallic substances, owing to the fact that the gold is much heavier than the mercury, and as the gangue is much lighter weight than the mercury it will rise to the surface of the mercury and float, and as the ore enters into said pot in a mass only the outer particles of the metallic portions are free to lodge in the bottom of said pot; but as the ore separates, the metallic particles are constantly leaving the gangue, permitting it to rise to the surface. As the heavier metallic particles of the ore separate from the gangue it begins to rise to the surface of the mercury, carrying with it such particles of the metallic substances as have not yet been exposed to the mercury; but during its ascension through the mercury all the ore is separated and exposed, so that no metallic particles are carried off with the gangue, and the purpose of the spiral floors R is to prevent too fast ascension of said particles of ore, but to retard their progress, causing them to pass up under the lower surfaces of said floors, thus giving greater distance of travel and more time to become thoroughly separated; and during such ascension, as the metallic substances separate from the gangue, they collect on the upper surfaces of said floors, permitting the gangue to pass on to the surface. The greater the number of said floors in said pot the better will the ore be spread against their surfaces, as a less quantity will be against each one than were but one or two used; and, further, the greater the number of said floors used the less mercury is required, as they not only increase the distance of travel of the ore and gangue, but help to fill the pot. As the gangue reaches the surface of the mercury it is taken up by the agitation of the water in pot D by means of the water-jets and operation of arms Z and discharged through spout S with the discharge-water. For the reason that the ore is so light weight compared with mercury, it requires a forced feed to cause the ore to be ejected beneath such body of mercury, and to produce a forced feed in this apparatus it is necessary to apply weight upon the ore immediately above the screw conveyer sufficient to compel it to take feed and force it down; and to produce such weight, pipe B is extended above the vessel to a considerable height, as shown in Figs. 1 and 2, thus forming a stand-pipe above said screw conveyer, which is constantly kept filled with dry pulverized ore from the hopper H above, and thus said column of dry pulverized ore forms the weight by means of which the feed is forced.

When the apparatus has been operated for a time and the mercury in pot D′ becomes loaded with the metallic substances from the ore, the water, together with all substances above the mercury, is drawn off through faucet F, the feed discontinued, and after which the mercury, together with its load of metallic substances, is drawn off through faucet F′, and the metal is then separated from the mercury by means of evaporation in the ordinary manner. The process is continued by introducing a fresh supply of mercury in pot D′ and water in pot D and continuing the feed, as stated.

The principal new features in this invention consist of the feed having a screw conveyer and caused to be a forced feed by means of said pipe being arranged as a stand-pipe, and holding a column of ore above said screw conveyer, wherein the pulverized ore is introduced beneath the body of mercury in a dry or plastic state—preferably dry; but in some instances, where the ore is of such nature as to not fall freely within a pipe, then we prefer to mix it with water sufficiently so it will fall freely, and also in supplying the mercury-pot with one or more spiral floors, for the purpose of increasing the distance of travel of the ore through mercury. The distance of travel of the ore may be regulated by the length of said spiral floors, and the speed in which it travels may be regulated by the pitch of said floors. Thus the length of time that the ore is held in the mercury is regulated by the spiral floors in the mercury-pot, and the pitch of

said floors is great enough so that the tendency of the gangue to float will cause it to move along upward under said floors.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is as follows, to wit:

The combination of vessel D, having the portion D′ of less diameter than vessel D and arranged below and concentrically therewith, forming an offset between said vessel and lower portion, the open-bottom feed-pipe B, arranged to stand centrally in said vessel, the driven screw conveyer C, arranged stepped within said feed-pipe, the rotatable sleeve J, arranged on feed-pipe B within vessel D and having the radial agitator-arms Z secured on its lower part, the annular perforated pipe E, arranged on the offset, and the spiral floor R, arranged within portion D′ and filling the space between its side walls and said feed-pipe, substantially as and for the purpose set forth.

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