(No Model.) 2 Sheets—Sheet 1.

J. L. HAYWARD & A. W. ROBINSON.

AMALGAMATOR.

No. 523,400. Patented July 24, 1894.

FIG. 1.

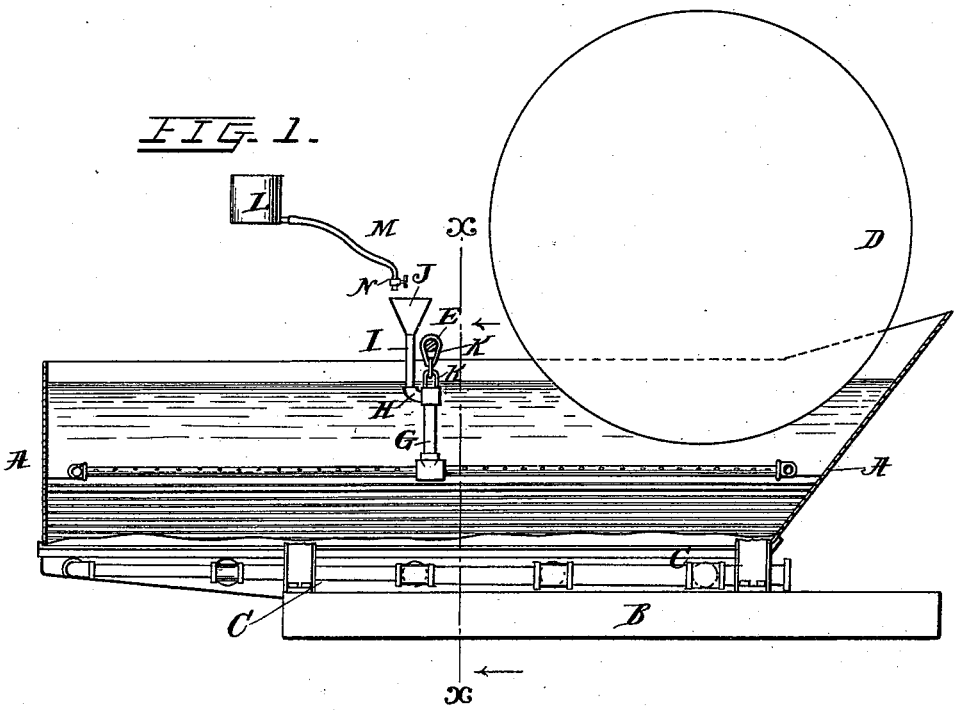


FIG. 2.

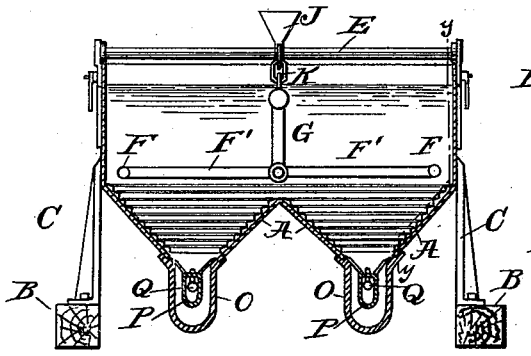


FIG. 4.

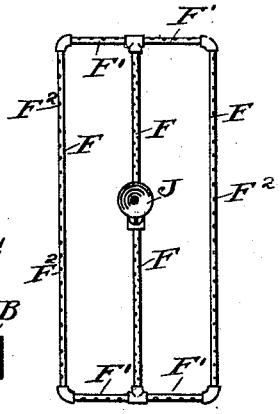
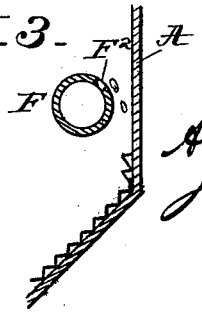


FIG. 3.



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(No Model.) 2 Sheets—Sheet 2.

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FIG. 5.

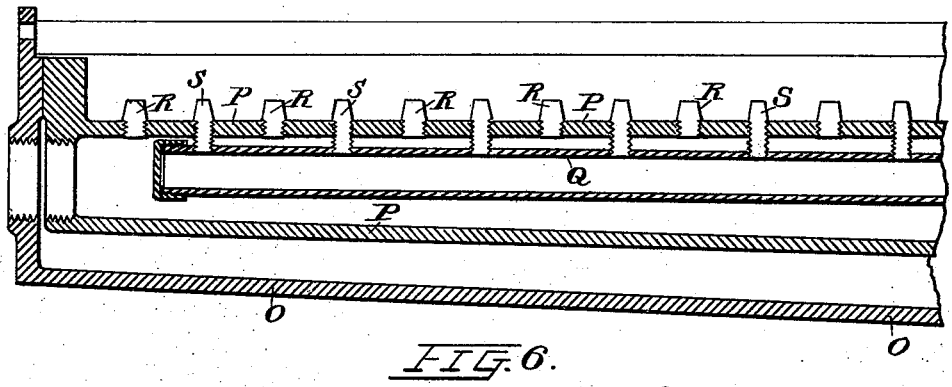


FIG. 6.

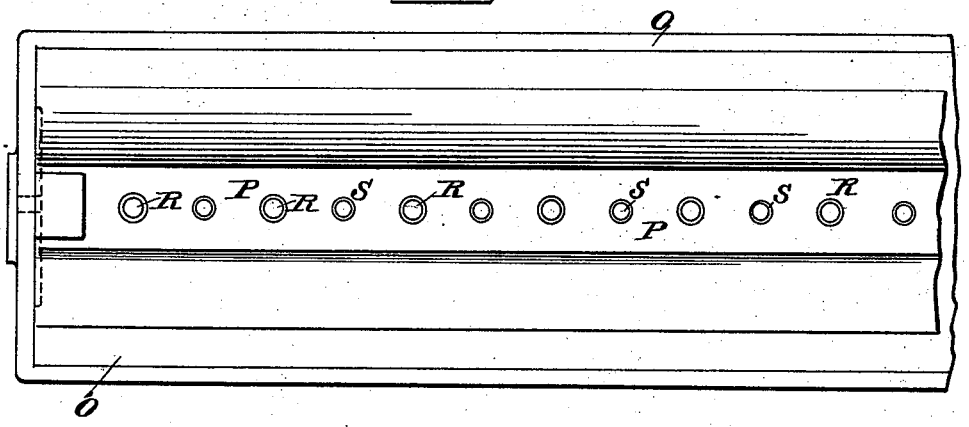
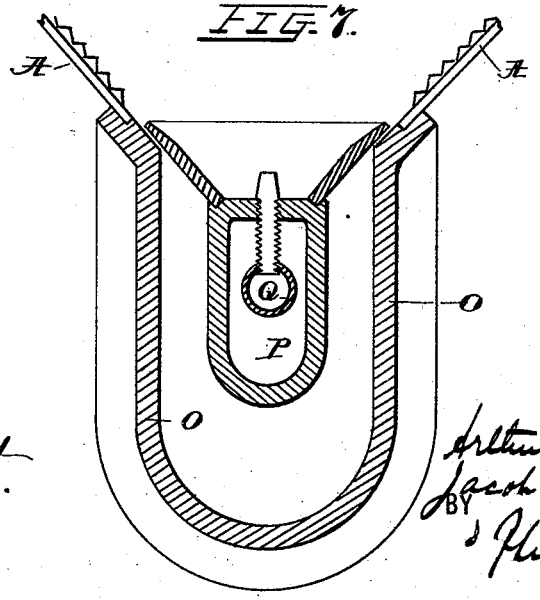


FIG. 7.



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UNITED STATES PATENT OFFICE.

JACOB L. HAYWARD, OF WADEVILLE, NORTH CAROLINA, AND ARTHUR W. ROBINSON, OF MILWAUKEE, WISCONSIN.

AMALGAMATOR.

SPECIFICATION forming part of Letters Patent No. 523,400, dated July 24, 1894.

Application filed June 20, 1893. Serial No. 478,252. (No model.)

To all whom it may concern:

Be it known that we, JACOB L. HAYWARD, of Wadeville, North Carolina, and ARTHUR W. ROBINSON, of Milwaukee, Wisconsin, both citizens of the United States, have jointly invented certain new and useful Improvements in Amalgamators, of which the following is a specification.

Our invention relates to improvements in ore amalgamators and it consists, first, in improved devices for supplying the mercury to the plates or steps of the amalgamator, and second, to improved devices for agitating the sand or crushed ore within the amalgamator, whereby it will be brought repeatedly into contact with the amalgamating plates or steps of the machine.

Machines of this character are too well-known to require detailed description or illustration. We will therefore confine this specification and the drawings hereof to the parts which especially constitute or are embraced in our invention, giving the general outline only of the rest of the machine, and in fact leaving off altogether, many parts thereof.

In the drawings, Figure 1, is a longitudinal sectional view of the machine, parts of it, however, being shown in elevation. Fig. 2, is a transverse section on the line *x x*, of Fig. 1. Fig. 3, is a detail, somewhat enlarged as compared with the other figures, of one of the pipes for supplying the mercury, showing also in section, the adjacent part of the tank. Fig. 4, is a plan of the framework of pipes, through which the mercury is supplied upon the plates or steps of the machine. Fig. 5, is a longitudinal vertical section of the most forward end of one of the troughs in the bottom of one of the valleys of the machine, showing the mercury trough, the water pressure pipe and the air pressure pipe, all in section. Fig. 6, is a plan view of that which is shown in Fig. 5. Fig. 7, is a cross-section on the line *x x* of Fig. 6. In it are shown broken off portions of the sides of one of the valleys of the machine, which are not shown in Figs. 5 and 6.

A, is the body of the tank, supported upon any suitable base, B, by means of uprights or other equivalent supports, C.

D, is the revolving screen.

E, is a cross bar or rod. We prefer it to be a stiff section of pipe, preferably steel, so as to be strong and preferably somewhat rigid.

F, F, is a framework of pipes, all of which are connected together by cross pipes F′ F′, and with couplings as shown.

G, is a vertical section of the pipe, which has an elbow at H, and it connects with another vertical section, I, having a hopper or funnel, J, upon its upper end.

K, are links whereby the framework of pipes, just described, is supported upon the cross bar or rod, E. It has free swinging movement by reason of the said links.

L, is a tank, supported upon any suitable support above the elevation of the funnel J.

M, is a pipe which may be flexible, if desired, adapted to extend from the tank to and immediately over the funnel J, and just at its end it is provided with a stop-cock, N, or it may be adapted to have a plug or cap fastened on the end, or a valve of any preferred construction.

The operation of the device is as follows: The mercury is put into the tank L, and is allowed to flow from it, into the funnel until the entire system of pipes, F, F, and F′, F′, &c., are filled with the mercury. Then further mercury is admitted, which over-flows the pipes, F, F, escaping through the small holes F^2, F^2, &c., (see particularly Fig. 3,) until the proper amount has been applied to the plates or steps of the amalgamator. Thereupon the machine is put in operation and the process proceeds as usual. When, however, it becomes desirable to add more mercury, all that is necessary is for the operator to open the valve N, in the end of the tube M, and allow a small quantity of mercury to enter the funnel, which, under the action of gravity, immediately causes a drop or globule, one or more as desired, to escape at each of the openings, F^2, in the entire system of pipes which are perforated. Thus simultaneously and in small quantities as desired, the mercury is supplied and replenished upon each of the plates or steps with exact uniformity and in exactly the desired quantity.

It will be specially observed that the holes F^2 in the pipes F, are in the upper part of

the pipes, therefore the pipes will normally remain practically full, and that whatever the position of the machine may be or whatever its movements may be under the jar or oscillations incident to its operation, that the frame-work of pipes will always remain truly horizontal, automatically adjusting themselves to that position, because of their being pivotally suspended. And it will be further observed that on the two outside pipes of the framework F, F, &c., the holes are on the upper and outer side of the pipe only, so as to discharge the mercury upon the plates or steps on the side of the machine only, whereas in the middle pipe, they are on both sides of it, in its upper arc, because that pipe has to supply the inner sides of the two valleys of the machine with the mercury. Of course if the machine is a single valley machine, the frame-work of pipes and its arrangement will be correspondingly adapted.

Referring now to Figs. 5, 6 and 7; O, is the amalgamator trough, located as is well understood at the bottom of each of the valleys; it is preferably a casting running the entire length of the machine. Within it is placed the water pressure pipe P, and within the water pressure pipe is placed an air pressure pipe Q. The water pressure pipe is provided with nipples, R, which, as usual, project upwardly at the very bottom of the valleys, from the top of the water pressure pipe, P, and these nipples may be made adjustable so as to direct the water in any preferred direction as is known in this art, and in between each of the water nipples R, we place other nipples S, S, which connect through the upper side of the water pressure pipe P, with the interior of the air pressure pipe Q. This part of our invention is designed to economize in the use of water.

In a fairly large sized machine about eight hundred gallons of water a minute at a pressure of twenty pounds per square inch, is required to properly agitate the sand or crushed ore and bring it into repeated contact with the amalgamator plates or steps, and it frequently happens that it is difficult, expensive, and sometimes almost impossible to obtain this supply and pressure of water. We have discovered that very much less water will serve the purpose well, provided it can be supplemented by the churning or upheaving action of innumerable air bubbles which, of course, during their forcible upward movement through the water, create an upheaving effect similar to boiling, within the tank. Moreover, the air jets may be set at different angles, and they may be arranged in pairs, one pointing in one direction and the other in another direction, so as to more perfectly secure the result desired. We do not illustrate this special form, because it would tend to complicate the drawings.

The air is forced into the air pressure pipe by a suitable blower or equivalent device.

The operation of the part of our invention last above described is obvious without further explanation.

We do not limit ourselves to the details of construction shown and specified, because it will be obvious to those who are familiar with this art, that various modifications may be made therein and still the essentials of our invention be employed.

We specially note that it is not necessary to employ the tank L, with its pipe M and valve N. The mercury may be ladled into the funnel J. We prefer, however, the other construction. Also the framework of pipes for supplying the mercury may be supported in any other preferred manner and instead of the air pressure pipe, Q, being within the water pressure pipe, P, it may be outside of it and it may be above it, within the valley or valleys of the machine. Also the perforations need not be upon the upper sides of the several pipes for supplying the mercury, and the pipes need not necessarily be submerged, they may be arranged above the sides of the tank, out of the water and may be supported otherwise than as shown, it not being essential, under all circumstances that the pipes should be horizontal.

We claim—

1. The combination in an amalgamating machine, of an amalgamating tank, steps on the inside of the tank a series of horizontal pipes within or above the tank and arranged over the steps of the same, having perforations in them, and means whereby the pipes may be supplied with mercury, substantially as set forth.

2. The combination in an amalgamating machine of an amalgamating tank, steps on the inside of the tank, a series of pipes provided with perforations, at or near their upper arc, arranged over the steps of the tank, and means whereby mercury may be simultaneously supplied to all of the pipes, substantially as set forth.

3. The combination in an amalgamating machine, of an amalgamating tank, steps on the inside of the tank a series of pipes having perforations in their upper arcs, means to supply mercury to the said pipes, said pipes being hung upon a superposed pivotal support, substantially as set forth.

4. The combination in an amalgamating machine of an amalgamating tank provided with steps, a series of pipes provided with perforations located above the steps, means whereby mercury may be supplied to the system of pipes, and a reservoir or tank for the mercury provided with a boss or pipe and valve, whereby the mercury may be supplied to the pipes without carrying it unconfined, substantially as set forth.

5. In an amalgamating machine, an amalgamating tank provided with steps, a pipe for supplying mercury to the steps having a series of holes in its upper arc, and upon the side of

the pipe, which is adjacent to the steps, substantially as set forth.

6. The combination in an amalgamating machine of an amalgamating tank, a mercury trough, a water pressure pipe, placed within the mercury trough, an air pressure pipe, placed within the water pressure pipe, and nipples connecting respectively the water pressure pipe, and nipples connecting respectively the water pressure pipe and the air pressure pipe, with the interior of the tank, substantially as set forth.

7. The combination in an amalgamating machine, of an amalgamating tank, steps on the inside of the tank, a series of pipes, having perforations in them, arranged over and adjacent to the steps of the tank, means to supply mercury to said pipes, a mercury trough at the lower part of the machine, a water pressure pipe, an air pressure pipe and nipples connecting the said pipes respectively with the interior of the tank, substantially as set forth.

8. The combination in an amalgamating machine of an amalgamating tank, steps on the inside of the tank a pivotally supported frame of pipes having perforations in them, said pipes being located above and adjacent to the steps of the machine, means to supply mercury to the said pipes, a mercury trough at the lower part of the machine, a water pressure pipe, and an air pressure pipe, and nipples connecting said pipes respectively with the interior of the tank, substantially as set forth.

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Witnesses:
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SMITH W. BENNETT.