M. LAFLIN.

PROCESS AND APPARATUS FOR REDUCING ORES.

No. 181,003. Patented Aug. 15, 1876.

*Fig. 1.*

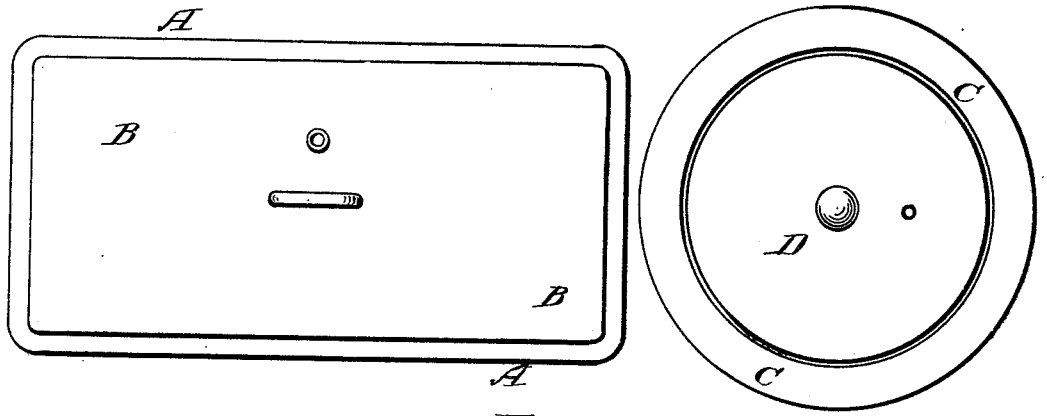
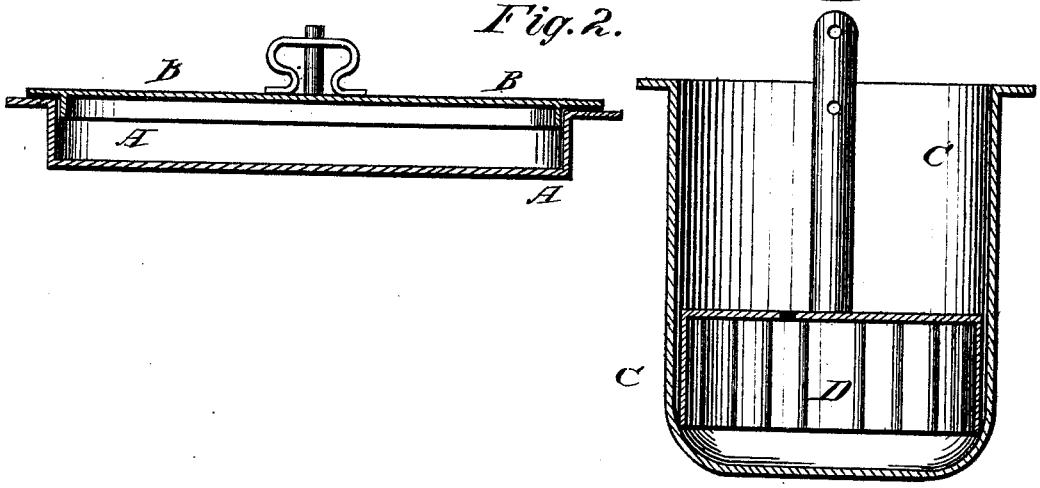



*Fig. 2.*

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## IMPROVEMENT IN PROCESSES AND APPARATUS FOR REDUCING ORES.

Specification forming part of Letters Patent No. **181,003**, dated August 15, 1876; application filed February 8, 1876.

*To all whom it may concern:*

Be it known that I, MATTHEW LAFLIN, of the city of Chicago, Cook county, State of Illinois, have invented new and useful Improvements in Reducing Ores, and Collecting Gold, Silver, and other Metals therefrom, of which the following is a full description, reference being had to the accompanying drawings, in which—

Figure 1 is a plan view; Fig. 2, a cross-section.

The object of this invention is to improve the process and the machinery for reducing ores and extracting metal by the alkaline process or processes patented to me on the 22d day of July, 1873, and on the 23d day of March, 1875; and its nature consists in the process and devices hereinafter described and claimed as new.

The ore to be operated upon is first reduced to a fine or impalpable powder, and alkali should be applied with water to the ore in a suitable pan, in which the material can be made to boil. The boiling is continued until the ore is thoroughly permeated with the alkali—say for ten minutes, more or less. When the materials are boiled down or dried, the pan is covered with a lid, so as to prevent the ore from coming in contact with the air, in order to prevent oxidation and volatilization of the metals. When the material comes to a red heat, remove the lid and stir the contents of the pan until the alkali has neutralized the sulphur and such other foreign substances as admit of an alkaline neutralization. If the composition or material tends to slag, sprinkle in powdered charcoal and mix well. At this stage the composition is ready for amalgamation. If the ore is free from lead it can be boiled in water, with quicksilver mixed with powdered charcoal; or the metals collected can be treated by any of the methods in use. If the ore contains lead it can be worked in a blast-furnace, in which case it may be necessary to slag it in the pan; or the ore can be worked through molten lead by the devices hereinafter described.

In preparing the alkali for the pan I use about eighty-seven gallons of caustic soda to a ton of ore. To prepare the caustic soda I make it of a strength of 24° Baumé to one hundred pounds of soda-ash, thoroughly melted or dissolved in water; add sixty pounds of unslaked lime, and boil hard for about five minutes; then let it settle for about five hours, and dip out or draw off the clear liquor. Other alkaline solutions, however, may be used in place of this, and their preparation will be varied somewhat, according to the alkalies used, and the character of the ore and amount of sulphur combined therewith, and all of them will vary according to the kind of ore; and for the purpose of the improvements herein described it is not necessary that the ores be roasted in a close vessel or retort, if roasted, and the ores need not be previously roasted at all.

In the drawings, A represents the pan, made of cast-iron, of about three by eight feet in dimension, and eight inches in depth; B, its cover, made of cast or sheet iron, with flanges, so as to fit the pan. It is about an eighth of an inch less in diameter or dimension than the pan, in order to prevent sticking by expansion, and is provided with a vent-hole in the top, to which a pipe is attached, which carries off all the evaporation or vaporization into a vessel containing water, which water can be used to boil the next charge. This lid or cover B is provided with a rim, and may be stiffened with bars to prevent warping and facilitate handling. C is the kettle for the lead-bath, which is made about four feet in diameter, and cylindrical for eighteen inches in its depth, in order that its lid may rise and fall. D is the lid for the lead-bath kettle. This lid is about one-half inch less in diameter than the interior diameter of the kettle, and is provided at its periphery with a close flange, which descends about eight inches. Its interior is provided with a number of teeth or projections placed about half an inch apart. These teeth are most conveniently made of wire, cut to descend to the lower line of the rim, and so placed in the mold as to be cast into its cap or top plate. The cap is provided with a small vent-hole in the top to allow the escape of the air, and when the air has escaped the hole is then stopped by a plug of any suitable description. The lid should weigh, when completed, about seven hundred pounds.

In operation, take the ore hot from the pan

A, and put it into the kettle C, containing molten lead, and, if necessary to prevent oxidation of the lead, cover it with fine charcoal to a sufficient depth to practically exclude the air; then place the lid D in position, and force the ore down into the lead. For a kettle containing three and a half tons of lead, as is designed in the kettle shown, a pressure of about six hundred to seven hundred pounds will be required for this. When the ore is down revolve or agitate the lid D, so as to bring all of the ore in contact with the lead, first letting the lid remain on the kettle C long enough to become heated before bringing it in contact with the lead. When sufficient time has elapsed, remove the lid D slowly, and reciprocate or revolve it at the same time it is being raised, so as to let the lead settle down out of the ore.

To facilitate the operation of the device a counter-balance or gearing may be applied. When the lid has been removed, remove the débris or tailings from the top of the lead, leaving about an inch and a half to prevent oxidation; then repeat the operation until the lead has absorbed all the metal it can hold. The contents of the kettle then, being bullion, can be separated by any of the ordinary methods.

The process herein described is not only applicable to ores containing gold and silver, but also to metals, such as copper, zinc, lead, and others, combining with sulphur.

What I claim as new, and desire to secure by Letters Patent, is as follows:

1. The process of treating ore, which consists in boiling the same, in form of a fine powder, in a solution of caustic alkali, until it is thoroughly permeated, substantially as described.

2. The process of treating ore, which consists in boiling the same, in form of a fine powder, in a solution of caustic alkali, until it is thoroughly permeated, and the materials boiled down or dried and covered, to prevent oxidation and volatilization, substantially as and for the purpose set forth.

3. The process of treating ore by boiling the same, in form of a fine powder, in a solution of caustic alkali, until it is thoroughly permeated, the materials dried and covered, to prevent oxidation and volatilization, and the materials then agitated until the alkali has neutralized all foreign substances that admit of an alkaline neutralization, substantially as and for the purpose set forth.

4. The lid D, provided with teeth or projections, in combination with the kettle C, containing molten lead, substantially as and for the purpose specified.

5. The pan A, in combination with the lid B, provided with a pipe or tube connected with a water-bath, for holding any metals that may be vaporized, substantially as described.

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Witnesses:

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