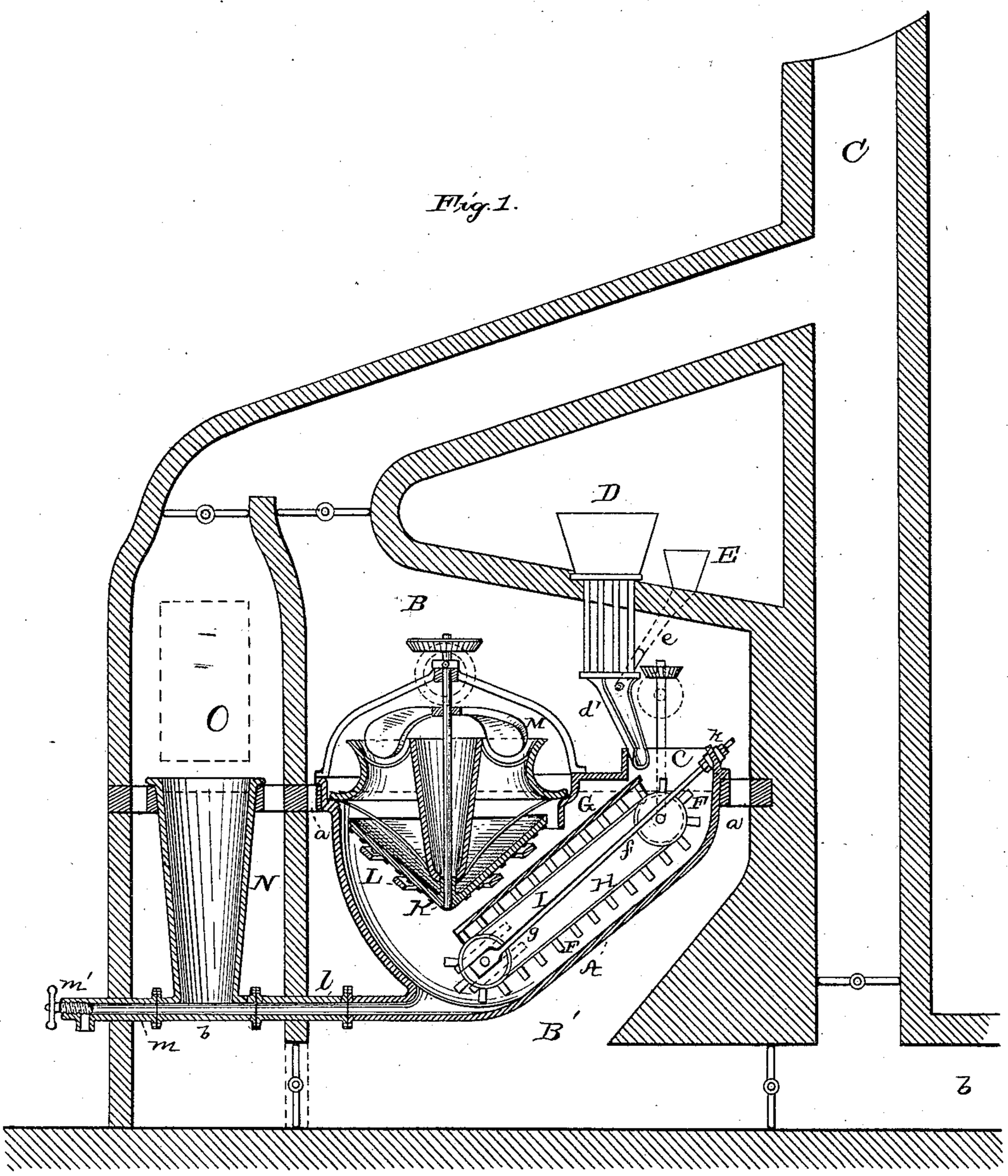
(No Model.) 2 Sheets—Sheet 1.

W. HAMILTON.

METAL EXTRACTING APPARATUS.

No. 306,825. Patented Oct. 21, 1884.

Fig. 1.



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A. D. Lindsey

INVENTOR:

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(No Model.) 2 Sheets—Sheet 2.

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Fig 2.

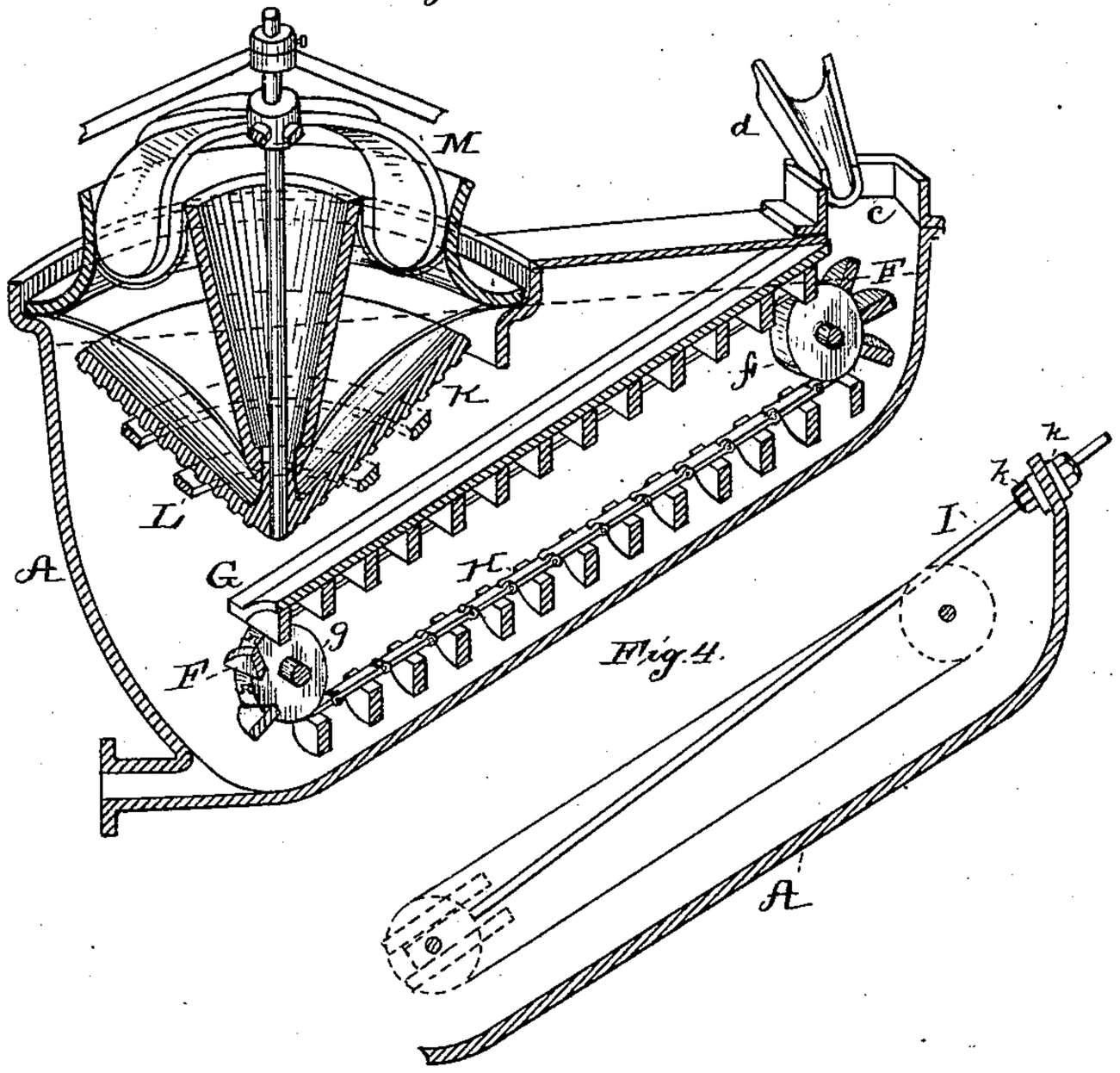


Fig 4.

Fig 6.

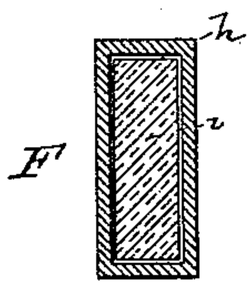


Fig 3.

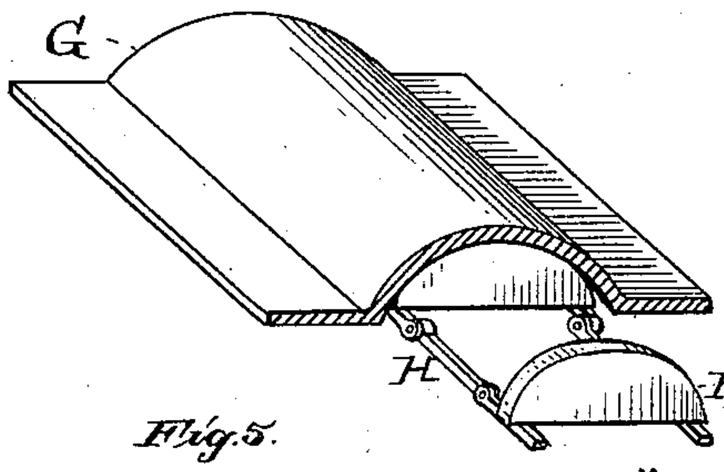
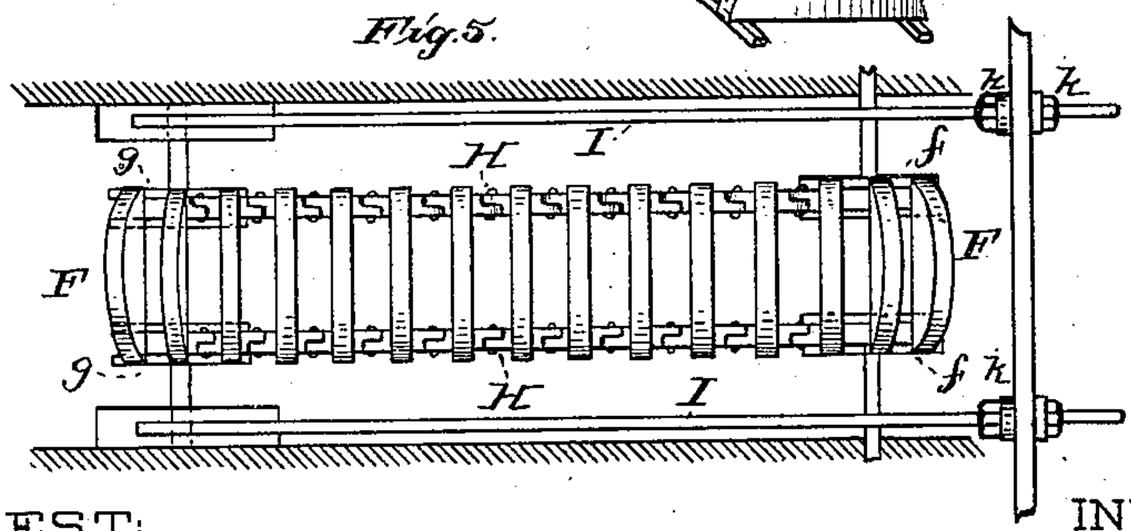


Fig 5.



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UNITED STATES PATENT OFFICE.

WALTER HAMILTON, OF NEW YORK, N. Y., ASSIGNOR TO THE HAMILTON LEAD BATH COMPANY, OF SAME PLACE.

METAL-EXTRACTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 306,825, dated October 21, 1884.

Application filed January 19, 1884. (No model.)

To all whom it may concern:

Be it known that I, WALTER HAMILTON, of New York city, in the county and State of New York, have invented a certain new and useful Improvement in Metal-Extracting Apparatus, of which the following is a specification.

My invention relates more especially to apparatus for the extraction of the precious metals by the process of alloying with lead; but it is also applicable, wholly or partially, to the extraction of the precious metals by amalgamation, and generally to the extraction of materials by immersion in liquid having a greater specific gravity than the material acted upon.

The invention consists, principally, in means for conveying the material to the bottom of the liquid body, and there releasing it and permitting it to rise through the liquid and be acted upon in its ascent by the distributing and scattering devices, such means being of simple and efficient construction and acting positively upon the material; in means for feeding the liquid to the kettle and regulating its height therein, which will prevent all scoria and impurities from entering the kettle, and will permit of their ready separation from the liquid, and in means for supplying charcoal-dust at the proper point for incorporation with the ore, all as fully hereinafter explained.

In the accompanying drawings, forming a part hereof, Figure 1 is a vertical section of apparatus embodying my invention; Fig. 2, a sectional perspective view of the main kettle and the devices carried thereby; Fig. 3, a separate perspective view of a portion of the endless chain of scrapers and the scraping-surface; Fig. 4, a sectional elevation showing means for tightening the endless chain; Fig. 5, a top view of the same parts, and Fig. 6 a cross-section of one of the scrapers.

Like letters denote corresponding parts in all the figures.

A is the main vessel or kettle of the apparatus, which may be of any suitable form. It is located in a heating-chamber divided into two parts, B and B′, by the kettle, openings *a*, connecting the two parts of the chamber together at a number of points around the kettle. The heat is supplied by a flue, *b*, from a furnace or fire-box, (not shown,) and suitable dampers are provided, as shown, to cause the products of combustion to pass directly up the stack C or through the chamber B B′. The kettle A has a receiving-chamber, *c*, at one end, into which the finely-divided ore is delivered by a spout, *d*, from a feeding-heater, D. The supply of ore to the kettle is regulated by a suitable valve. The feeding-heater D projects down into the upper portion, B, of the heating-chamber, and hence is heated by the same fire that serves to keep up the temperature of the molten lead. The peculiar feeding-heater shown, however, not being of my invention, I make no claim to it. Into the spout *d* enters an auxiliary spout, *e*, from a hopper, E, for delivering charcoal-dust to be incorporated with the finely-divided ore after the ore has passed through the heater and just prior to immersion in the molten lead. The flow of charcoal-dust is regulated by a suitable valve. The function of the charcoal is to prevent oxidation of the lead, which it does effectually. This improvement in the process is fully described and claimed in another application for patent made by me, the present application relating wholly to apparatus.

The means for conveying the material to the bottom of the liquid-body consists of scrapers F, which are buoyant in the liquid of the kettle, and work against an inclined scraping-surface, G, secured to the walls of the kettle. The scrapers are mounted upon endless chains H, running over wheels *f g*, fixed to the shafts, located one near the top of the kettle just below the receiving-chamber *c*, and the other near the bottom of the kettle. The endless chain of scrapers is operated by any suitable connection with the power, shafts and gearing being shown for applying the power to the shaft of the upper chain-wheels. The scrapers are made buoyant by making them of a material having a less specific gravity than the liquid, or by making them hollow, or providing them with a filling of lighter material than the liquid.

For the lead-bath process, I prefer to construct each scraper with a shell, *h*, Fig. 6, of some suitable metal—such as steel—and to fill the shell with material, *i*, lighter than molten lead, for which purpose a fire-brick is pref-

erably used. The inclined scraping-surface G extends down to a point about opposite the chain-wheel shaft at the lower end of the endless chain of scrapers, the material being forced beyond the lower end of the surface by the moving scrapers, and being freely discharged at that point, from whence it rises upwardly through the liquid body. As the scrapers have open spaces between them, the material is buoyed up by the liquid of the kettle, and after it passes the lower end of the inclined scraping-surface is immediately borne upward.

The height of the liquid in the kettle is indicated by the dotted lines in Figs. 1 and 2. The scrapers rise through the surface of the liquid in chamber *c*, and take the material from the surface of the liquid to the inclined scraping-surface, down which it is forced. The buoyancy of the scrapers keeps them in good contact with the scraping-surface, preventing the escape backward of the material.

To provide for the tightenting of the endless chains, the lower chain-wheel shaft is mounted in sliding bearings connected by rods I, which are adjustably held by nuts *k* to the top of the kettle.

It is evident that the scraping-surface could be extended circumferentially until it becomes a complete cylinder or pipe, through which the scrapers in their downward movement will pass, and the scrapers may still be of the semicircular form shown, or they may be piston-scrapers.

Devices for distributing and separating the material as it rises through the body of liquid and for discharging the refuse are shown, but they are not claimed herein or particularly described, since they are not of my invention. Such devices are the revolving cone K, acting in conjunction with the stationary annular plates L, and the revolving discharge-propeller M.

N is an auxiliary kettle, which is located in a division, O, of the heating-chamber, and which, while of the same height as the main kettle, has a very much smaller capacity. This auxiliary kettle is connected at its bottom with the bottom of the main kettle by a pipe, *l*, while a draining-pipe, *m*, extends from the bottom of the auxiliary kettle and through the furnace-wall, and has a suitable valve, *m'*, therein. The pig-lead is placed in the auxiliary kettle and is melted therein, all scoria and impurities rising to the top of the auxiliary kettle and being removed therefrom. In this way only the pure metal enters the main kettle. The height of the molten lead in the main kettle can also be properly regulated by observing the height of the lead in the auxiliary kettle, by having access thereto, or by a float connected with an indicator external to the furnace.

The draining-pipe is used to draw off the molten lead from both kettles at the completion of the extracting process.

In my Patent No. 260,389 is shown and described a tube connected with the bottom of the amalgamating-kettle and inclosed by the stack of the furnace and containing an elevator or conveyer, so that the lead flows from the kettle into the tube, and is carried up by the elevator and heated during its passage, and is then emptied into a vessel, from which it is returned to the kettle. This, it is evident, is a very different device from the auxiliary feeding-kettle which I now claim, in which the lead is put to be melted, and from which such lead is fed into the amalgamating-kettle.

What I claim is—

1. In extracting apparatus of the character described, the combination, with the kettle, of the inclined scraping-surface, and one or more moving scrapers for immersing the material, such scrapers having open spaces between them, substantially as set forth.

2. In extracting apparatus of the character described, the combination, with the kettle, of an inclined scraping-surface, and one or more buoyant scrapers for immersing the material, substantially as set forth.

3. In extracting apparatus of the character described, the combination, with the kettle, of the inclined scraping-surface and the inclined endless chain of scrapers buoyant in the liquid in the kettle for immersing the material, substantially as set forth.

4. In extracting apparatus of the character described, a buoyant scraper for the purpose set forth, composed of a metallic shell and a filling having less specific gravity than the liquid-extracting body, substantially as set forth.

5. In extracting apparatus of the character described, the auxiliary feeding-kettle, substantially as set forth.

6. In extracting apparatus of the character described, the combination, with the spout for feeding the ore to the kettle, of the auxiliary spout for feeding a reducing agent, substantially as set forth.

This specification signed and witnessed this 15th day of January, 1884.

WALTER HAMILTON.

Witnesses:

BERNARD J. KELLY,

EDWARD H. PYATT.