

(No Model.)

B. G. NOBLE.

APPARATUS FOR THE EXTRACTION OF PRECIOUS METALS FROM ORES.

No. 259,709.

Patented June 20, 1882.

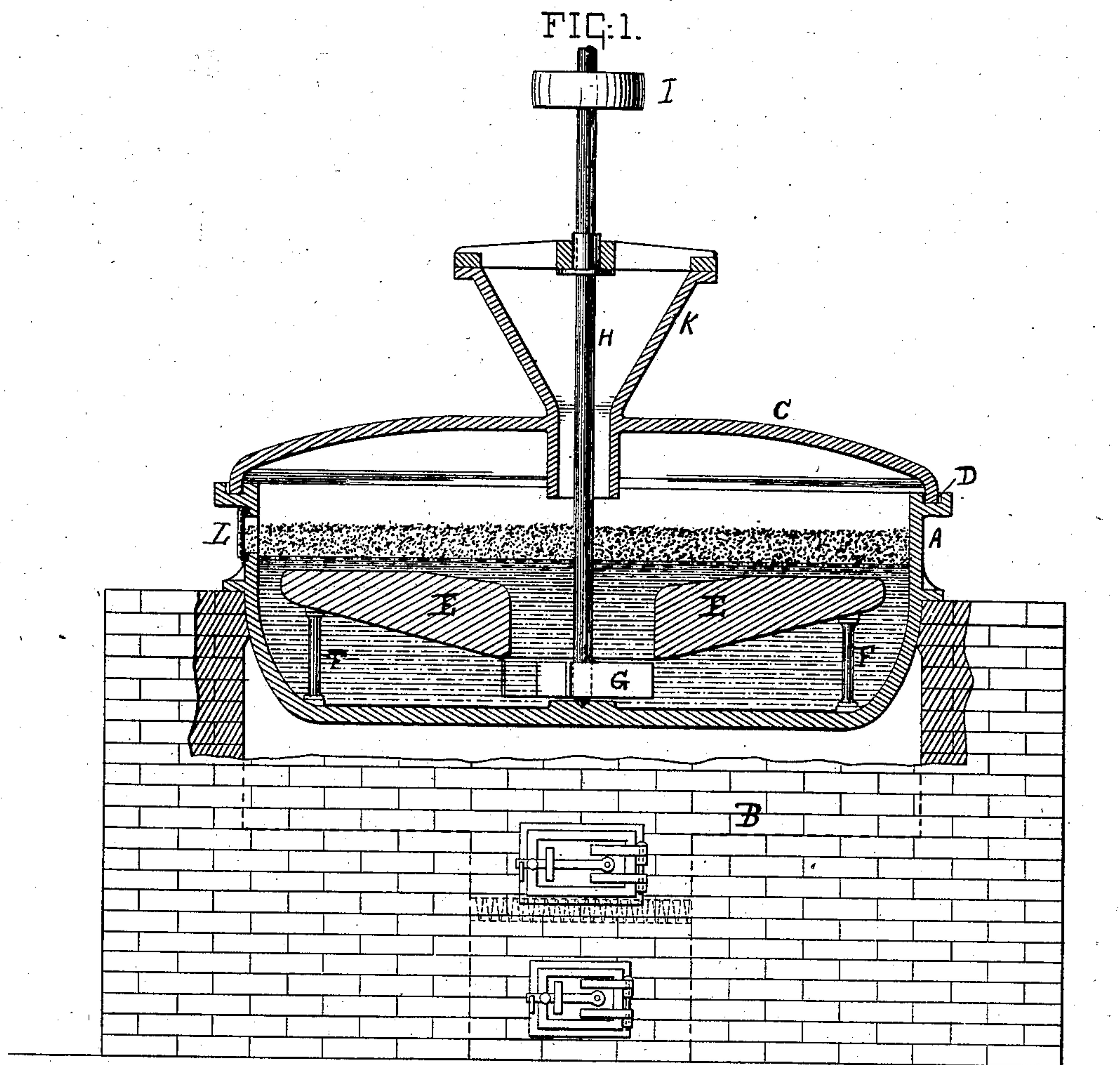
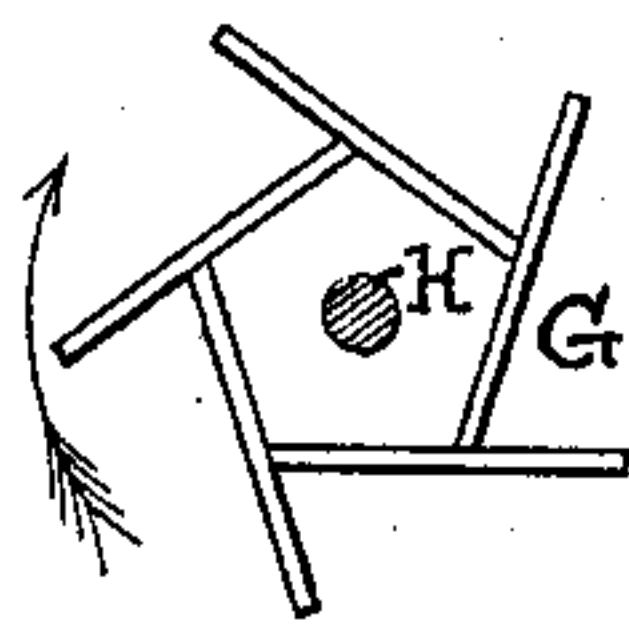


FIG. 2.



WITNESSES:

Robt H. Duncan

J Paul Kirscheimer

INVENTOR:

Burt G. Noble

UNITED STATES PATENT OFFICE.

BUTLER G. NOBLE, OF BROOKLYN, NEW YORK.

APPARATUS FOR THE EXTRACTION OF PRECIOUS METALS FROM ORES.

SPECIFICATION forming part of Letters Patent No. 259,709, dated June 20, 1882.

Application filed October 19, 1881. (No model.)

To all whom it may concern:

Be it known that I, BUTLER G. NOBLE, of the city of Brooklyn, county of Kings, State of New York, have invented a new and useful
5 Apparatus for the Extraction of the Precious Metals from Ores, of which the following is a specification.

My invention relates to an apparatus for treating finely-powdered ores for the extrac-
10 tion of their contained gold, silver, or other precious metals by the employment of lead in a molten state.

The apparatus is constructed as follows: A flat-bottomed pan, made of iron or other suitable material, is set in an arch and provided with a tight cover. Through the center of this cover passes the hopper. The depth of the pan preferably is about one-fourth of its diameter. A stationary circular block, of iron or
20 other suitable material, is anchored or attached by supports to the interior of the pan, as shown in Figure 1 of the accompanying drawings, leaving a space beneath it sufficient to permit the rotation of a wing-wheel or displacer.
25 Through the center of this block is a hole or well with vertical sides, preferably curving outward at the top. Through this well passes a vertical shaft driven by any suitable pulley, or otherwise, and carrying the displacer at its
30 lower end. This shaft runs on an iron step in the center of the bottom of the pan. It is also supported by a bar or spider across the hopper. The shaft, instead of passing through the hopper, may pass through a collar in the center of the cover, and the hopper may in such
35 case be placed off of the center of the cover. The wing-wheel or displacer has four or more wings, as shown in Fig. 2, and its circle of movement or travel need extend but little beyond the sides of the well. The shape of the well-block is circular in plan view, with a central opening through it, and is preferably shaped, in section, as represented in Fig. 1 of the drawings. The under side should be in-
45 clined upward from the center, as shown.

This apparatus is fully illustrated in the accompanying drawings, in which—

A is a pan, of any desired diameter, mounted over a furnace, B.

50 C is the cover, made to shut tightly down into the groove D.

E is the well-block, supported by the standards F F within the pan.

G is the wing-wheel or displacer, mounted on the shaft or spindle H, and driven by a pul- 55 ley, I; and K is the hopper.

L is a door in the side of the pan for the removal of the ores after they have been treated.

The employment of molten lead for extracting the precious metals from ores or earthy
60 matters is old and well known. All fire-assays and smelting or other modes where heat is employed depend largely for their success on the absorbing power of lead and its capacity to alloy with and retain gold and silver. Many
65 methods of using lead for this purpose have been the subject of patents. All the modes with which I am familiar provide for the submersion of dry powdered ore in a bath of molten lead, and rely upon the specific lightness of the
70 ore to bring it to the surface. This exposure of the ore to the action of the lead is made more perfect in many cases by the use of deep lead baths, and by various devices for retardation while the ore is rising to the surface. A
75 single immersion has hitherto been deemed sufficient. Experiment clearly demonstrates that these methods are defective.

When the ore is introduced by force it is usually formed into masses, and while sub-
80 merged these masses remain without complete disintegration and rise to the surface in that condition. It is obvious that the interior portion of these masses of ore is not brought in contact with the lead. One of the requisites of
85 success is to secure the introduction of the ore-powder separated, diffused, and with all its particles as widely asunder as possible, and to keep them in constant motion while beneath the surface of the lead. This result the dis-
90 placer described above accomplishes perfectly. When the lead is melted its surface should be slightly above the well-block. The displacer is now started, and by its rotation a vortex is formed within the well by which the lead, or
95 the lead with the ore floating on its surface, as the case may be, is caused to flow into and down through the well. The powdered ore, dry and preferably heated, is introduced through the hopper, and the inflow carries the ore down
100 through the well. Here the action of the wings throws the ore outward into the surrounding

lead, not in masses, but completely separated and diffused. The motion of the displacer produces a rotation of the whole body of molten lead beneath the well-block, while the lead above the well-block remains comparatively quiet, and this favors the steady inflow of the ore into the vortex of the well, and each particle of ore, while rising by its specific lightness, is carried around and around many times beneath the well-block before it reaches the surface. Meanwhile the continuous rotary under-current caused by the action of the displacer prevents any aggregation of the ore into masses by constantly sweeping over the under surface of the well-block and the sides of the pan. The interior of the pan and the under side of the well-block should be smooth to prevent any lodgment of the ore. At the surface, being freed from pressure, the ore appears in its original pulverulent condition, and is immediately drawn again into the vortex and submerged by the inflow, and thus continuously a given charge is passed and repassed through the lead until the lead has absorbed and alloyed all the contained gold or silver. When a given charge has been run the displacer is stopped and the tailings or exhausted ore are removed from the surface through an opening at one side of the pan. An arrangement of sweeps or scrapers attached to the shaft can be employed for this purpose, if desirable. When the lead is enriched as much as practicable by repeated charges of ore it is tapped off and run into bars, or the precious metals may be parted by cupellation, or treated by other methods.

The use of a containing-vessel in the form of a shallow pan permits the employment of a

lead bath of little depth, so that my displacer can be run at a high speed with but little power, and the centrifugal action of the rotating mass of melted lead enables me to secure a long submergence and a great lateral diffusion of the ore particles.

I am aware that Letters Patent No. 37,185, granted December 16, 1862, describe an amalgamator consisting of a pan provided with a revolving muller with a central opening arranged to operate in connection with a fixed muller, and that a current is established by the proximity of the adjacent surfaces of the mullers, the ore being caused to pass between the mullers toward the wall of the pan, and thence down through the opening in the upper muller. It is readily seen that the apparatus of Letters Patent No. 37,185 is essentially different in construction and operation from that described and claimed in my patent.

What is claimed as new is—

1. In combination with a pan or other vessel for containing a bath of molten lead, a stationary block provided with a central vertical opening, and means for producing a vortex within such opening, substantially as and for the purpose described.

2. In combination with a pan or other vessel for containing a bath of molten lead, a well-block having the under surface inclined from the edge of the well upward toward the periphery of the block, and a displacer secured to a shaft passing through the well, substantially as and for the purpose described.

BUTLER G. NOBLE.

Witnesses:

ROBERT H. DUNCAN,
J. PAUL KÜRSTEINER.