S. CHARLES.

QUICKSILVER FURNACE.

No. 186,542. Patented Jan. 23, 1877.

Fig. 1.

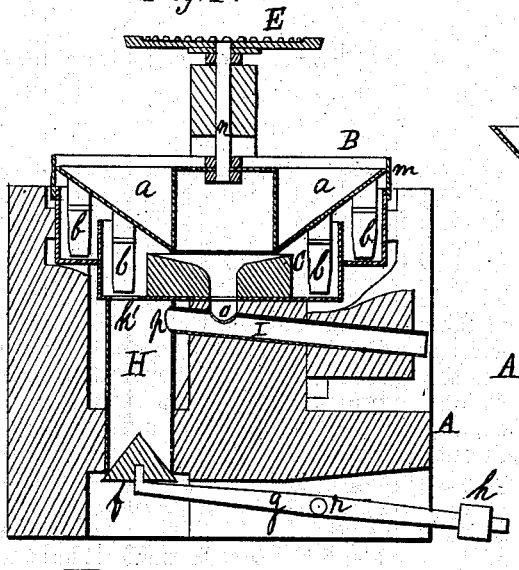


Fig. 2.

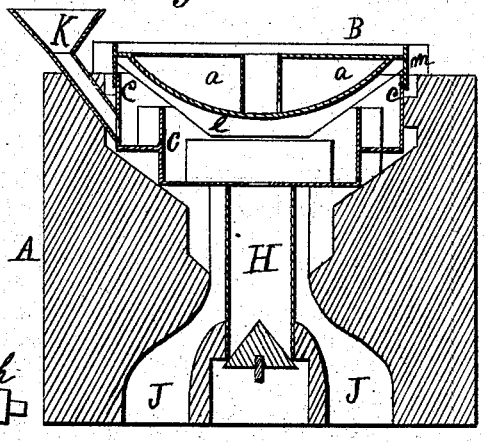


Fig. 4.

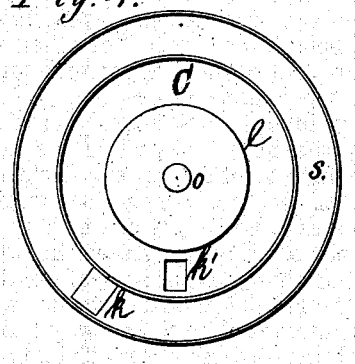


Fig. 3.

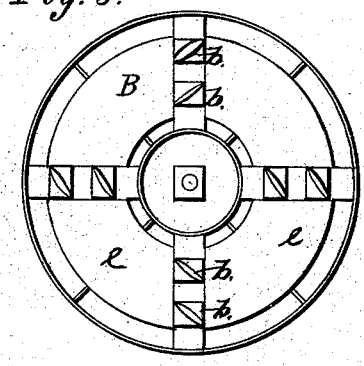
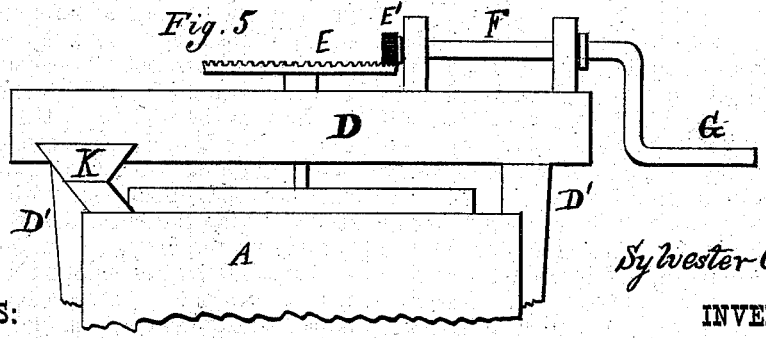


Fig. 5



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SYLVESTER CHARLES, OF HEALDSBURG, CALIFORNIA.

IMPROVEMENT IN QUICKSILVER-FURNACES.

Specification forming part of Letters Patent No. **186,542**, dated January 23, 1877; application filed July 19, 1876.

To all whom it may concern:

Be it known that I, SYLVESTER CHARLES, of Healdsburg, in the county of Sonoma and State of California, have invented certain new and useful Improvements in Furnaces for the Reduction of the Ores of Quicksilver and other metals; and I do hereby declare that the following is a full, clear, and exact description thereof, that will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

The same letters and figures of reference are used to indicate the corresponding parts.

After describing the invention, its nature and extent will be shown in the claims.

The object of my invention is to provide a furnace for reducing quicksilver and other ores.

Among the new features of my invention may be mentioned the teeth which revolve horizontally in annular grooves or channels in the ore-chamber. These teeth disintegrate the ore and thus bring the heat in direct contact with every particle of the cinnabar or other ore, and in this manner the quicksilver or other ore is vaporized and driven to the condensers.

The chamber for the refuse ore is provided with a device by which it discharges itself automatically.

Figure 1 is a vertical sectional view taken through the center. Fig. 2 is also a sectional view, showing the hopper by which the furnace is fed with the ore. Fig. 3 is a view of the bottom of the rotary disk. Fig. 4 is a top view of the receiving-chamber; and Fig. 5 is a side view of the top of the furnace.

A is the body of the furnace; B, the rotary disk; and C, the receiving-chamber for the ore. K is the hopper which feeds the ore to the furnace. D′ D′ are two uprights fastened to the side of the furnace, across the top of which is placed the cross-piece D. Passing through the center of the cross-piece D the shaft *n* is rigidly fastened to the disk B. At the top of the shaft *n* is fastened the wheel E, which engages with the shaft F and handle G. The disk B is provided with a flange, *m*, on its periphery, which projects slightly above and below the disk itself. *a a* are recesses or depressions in the disk B. The disk B is also provided with a lining, forming the air-chamber *e*, and it is further provided with the teeth *b b*, which revolve in the cylindrical grooves of the receiving-chamber C. *k* is an opening through which the ore passes from the groove *s* to the groove *l*; and *k′* is an opening through which the ore passes from the groove *l* to the chamber H for refuse ore. *o* is the orifice through which the mercurial or other vapor passes through the pipe I to the condenser; and *p* is an outlet from the refuse-chamber H to the condenser-pipe I. *g* is a lever pivoted at *r*, on one end of which is the weight *h*, and on the other end is the conical bottom *b*. To the hopper K is attached a blower, which effectually keeps the mercurial or other vapor from passing out of the hopper and forces it down into the condenser-pipe I.

When my invention is in operation I place the ore in the hopper K, while the shaft is moved by hand or other power. This causes the disk B to revolve, carrying the teeth *b b* in the grooves *s* and *l* of the chamber C. This motion of the teeth disintegrates the ore, and is one of the chief advantages of my invention. In the reduction of the ore the latter is usually disintegrated in some way before it is placed in the ore-chamber. This, in practice, is a distinct and independent operation, and must be performed before the ore is placed in the furnace for smelting. In my furnace it is shown that both the disintegration and smelting are performed by one operation.

Through the opening *k* the ore passes into the groove *l*, and from thence through the opening *k′* into the refuse-chamber H. When the chamber H becomes so full that the weight of the refuse exceeds that of the weight *h* at the end of the lever *g* the refuse drops out automatically, after which the bottom *f* quickly resumes its place. Fires are made in the fire-pots J J, the heat and smoke passing up under the receiving-chamber C and through the peculiarly-shaped apertures of the furnace, and finally passing out of the smoke-pipe. The peculiar shape of the flues in my furnace prevents the lodgment of any ashes or soot to clog them up. All the ashes and other

refuse matter which do not pass out of the smoke-exit fall back into the fire-pot. The air forced into the chamber C by the blower drives all mercurial or other vapor through the orifice *o* into the pipe I, which leads to the condenser; and any vapor which may fall with the refuse ore into the chamber H is drawn by a strong draft through the orifice *p* into the pipe I. The rotary disk or cap B, provided with the flange or raised edge *m*, contains a quantity of water, which is made to overflow and fill the circular groove around the receiving-chamber C. Thus a water-tight joint is made between the disk B and the receiving-chamber C. The depressions or recesses *a a*, being filled with water, serve to keep the disk B from being heated. The teeth *b b* are firmly screwed to the bottom of the depressions or recesses *a a*, which, being filled with water, keep the teeth comparatively cool.

Some of the advantages of my invention are that the rotary shaft *n* is removed from the fire and will not twist off. The ore does not need to be pulverized, as in furnaces now in use. My furnace pulverizes as well as roasts the ore. The metallic vapor does not pass over cold ore, and thus produce premature condensation. The fire is directly applied to the ore-chamber, passing under and around it. The flues and fire-walls being very steep, all the ashes and débris slide down into the ash-box. As the fire passes around the ore-chamber there is no premature condensation therein. My furnace may be fed without intermission.

Having now described my invention, and pointed out some of its chief advantages, what I claim, and desire to secure by Letters Patent, is—

1. In a smelting-furnace, the disk or cap B, provided with the depressions or recesses *a a* and the flange *m*, substantially as described, and for the purposes set forth.

2. The disk B, provided with the lining *c*, and thus forming the air-chamber *e*, and also provided with the teeth *b b*, screwed to the under side of the floor of the recesses *a a*, of the disk B, substantially as described, and for the purposes set forth.

3. The ore-chamber C, provided with the annular grooves *s* and *l*, the openings *k k'*, and a raised circular disk, depressed in the center to form a concave basin, in the center of which is the exit *o*, substantially as described, and for the purposes set forth.

4. The disk B, provided with the shaft *n*, depressions *a a*, beneath the floor of which are screwed the teeth *b b*, and the flange *m*, in combination with the ore-chamber C, provided with the grooves *s* and *l*, openings *k* and *k'*, and the refuse-chamber H, exit *p*, and weighted lever *g*, provided with the discharging-cone *f*, substantially as described, and for the purposes set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 31st day of May, 1876.

SYLVESTER CHARLES.

Witnesses:
E. L. WHIPPLE,
L. S. NORTON.