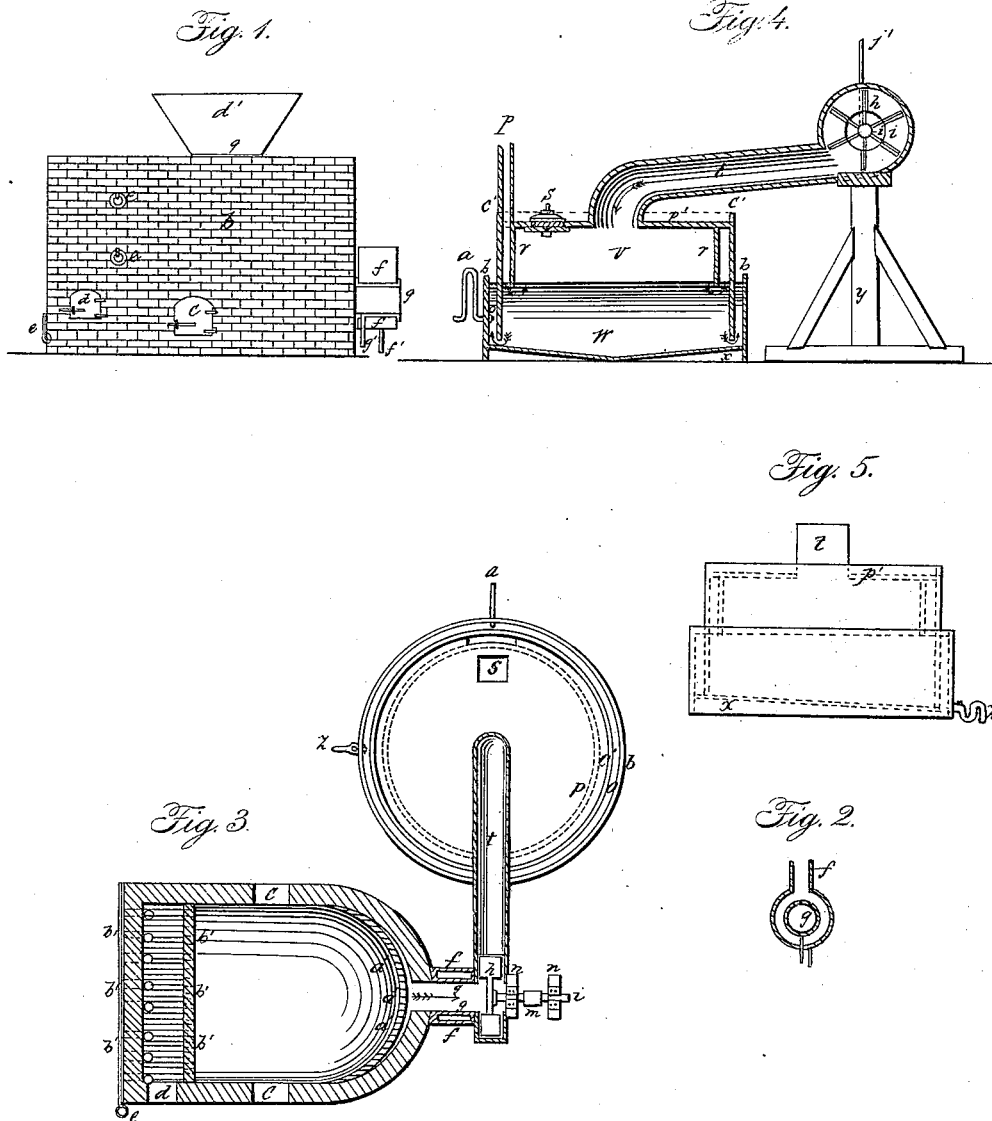


# COULT & ROACH.

Furnace for Separating Volatile Metals from Ores.

No. 53,951.

Patented Apr. 17, 1866.



Witnesses:

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# UNITED STATES PATENT OFFICE.

JOSEPH C. COULT AND JOHN ROACH, OF SAN FRANCISCO, CALIFORNIA.

## IMPROVED APPARATUS FOR SEPARATING VOLATILE METALS FROM ORES.

Specification forming part of Letters Patent No. 53,951, dated April 17, 1866.

### *To all whom it may concern:*

Be it known that we, JOSEPH CALTON COULT and JOHN ROACH, of the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Concentrators and Condensers for Concentrating and Condensing all Volatile Metals, called "Coult & Roach's Concentrator and Condenser;" and we do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the drawings making part of this specification, in which the same letters indicate like parts in each of the figures.

Figure 1 is a side elevation of a furnace; Fig. 2, sectional view of the condensing-pipe; Fig. 3, a ground plan of condenser and furnace; Fig. 4, section of the condensing apparatus and flue. Fig. 5 is an elevation of the condenser.

The nature of our invention consists of a furnace in which the ore is placed. Heat being applied, the metal ascends in a volatile form, and is drawn from the furnace-chamber, by means of a suction-fan, into a condensing-chamber, the fumes and smoke passing into water, where the metal falls to the bottom of the condenser, and the smoke or other substance is forced out of a chimney leading from the condenser.

To enable others skilled in the art to make and use our invention, we will proceed to describe its construction and operation.

Fig. 1, *b* represents the furnace; *c*, discharge-door; *d*, fire-door; *d'*, hopper through which the ore is fed; *E E E*, dampers; *f f*, water-tank; *f'*, water-pipe leading to supply-tank; *g'*, water-pipe leading to flue *g*; *q*, slide regulating the feed to furnace.

Fig. 2, *f* represents outside of water-tank; *g*, fire-flue leading from furnace.

Fig. 3 represents a discharge-siphon; *a' a'*, air-chamber; *b*, outside portion of condenser; *b' b' b' b' b' b'*, air and fire openings. *c c* are discharge-doors; *c'*, air-chamber leading to chimney; *d*, fire-door of furnace; *e*, damper; *f f*, water-tank surrounding flue *g g*; *h*, suction-fan; *i*, fan-shaft; *m*, pulley; *n n*, bearings; *o*, water-space or partition in condenser; *s*, man-hole; *t*, induct-pipe leading from fan to condenser; *z*, goose-neck to discharge mercury or metal.

Fig. 4 represents a siphon or water-discharge pipe; *b b*, outside ring of condenser; *c' c'*, minor ring of condenser; *h*, fan; *i*, fan-shaft; *j*, water-pipe; *o o*, space between the outer and inner ring of condenser; *P*, smoke-pipe; *P'*, reservoir on top of condenser; *r r'*, inner ring of condenser; *s*, man-hole; *t*, induct-pipe from fan to condenser; *v*, air-chamber; *w*, water; *x*, bottom of condenser; *y*, frame for supporting fan.

Fig. 5, *P'* represents reservoir-top of condenser; *t*, view of induct-pipe from fan to condenser; *x*, bottom of condenser; *z*, goose-neck.

The ore being introduced into the furnace through the hopper *d'*, by drawing the slide *q*, fire is introduced at the door *d*, the dampers *E E E* opened, and the fan set in motion by means of the pulley *m*, creating a strong inward draft, which forces the heat under the furnace, and up through the grate against the bridge-wall, and from thence through the perforations above the bridge-wall into the furnace-chamber, from thence drawing the fumes or volatile portion of the metal and smoke through the perforated back wall of the furnace-chamber into a flue, *g*, connected to the fan. A stream of water is caused to pass through the flue by means of an outside chamber and pipe, *f'*, and may be allowed to flow over the top *f* if necessary.

The pipe *g'* admits the water directly into the flue *g*, coming into immediate contact with the fumes and smoke of the metals. It also serves to keep flue *g* cool. A strong draft being kept up by the fan, the water and fumes are drawn into it, passing through another stream of water, admitted through the pipe *j'*, and cold air being constantly drawn in by the fan through the opening in the opposite side of the fan-chamber, the whole passing through the pipe *t* into the air *v* in condenser, (shown at Fig. 4,) the pressure of the fan being sufficient to force the fumes into the water *w*, where they are separated from the metal, and pass up in the direction of the arrows into the adjoining space, and out at the discharge-chimney *P*, while the surplus water passes into the outer space of the condenser and is drawn out by means of the siphon *a*, which works upon a center to graduate the height of the water in the condenser. (Also shown at Fig. 4.)

The water on top of the condensing-chamber

P' acts in a double capacity—first, as a cooler; second, as a weight to the condenser. (Shown at Fig. 5.)

The fluid metal contained in the bottom of the condenser is withdrawn by means of a goose-neck or bent pipe, *z*.

Having thus described our invention so as to enable others skilled in the art to make and use the same without further invention or experiment, we will now proceed to state what we claim, and desire to secure by Letters Patent, to wit:

1. The combination and arrangement of the furnace *b*, substantially as described, and for the purposes set forth.

2. The water-tank *ff* and flue *g*, with their supply and cooling pipes *f'* and *g'*, arranged substantially as described, and for the purpose set forth.

3. The arrangement of the fan *h* for the purpose of drawing the fumes from the furnace upon one side and taking in cold air on the other side, and forcing the whole, with water, into the condenser, substantially as described, and for the purpose set forth.

4. The combination and arrangement of the condenser herein described, for the purposes set forth.

In witness whereof we have hereunto set our hands and seals this 1st day of September, A. D. 1865.

J. C. COULT. [L. S.]  
JOHN ROACH. [L. S.]

Witnesses:

C. W. M. SMITH,  
M. L. BALDWIN.