B. G. NOBLE.

Apparatus for Desulphurizing Ores.

No. 52,191. Patented Jan'y 23, 1866.

Fig: 1.

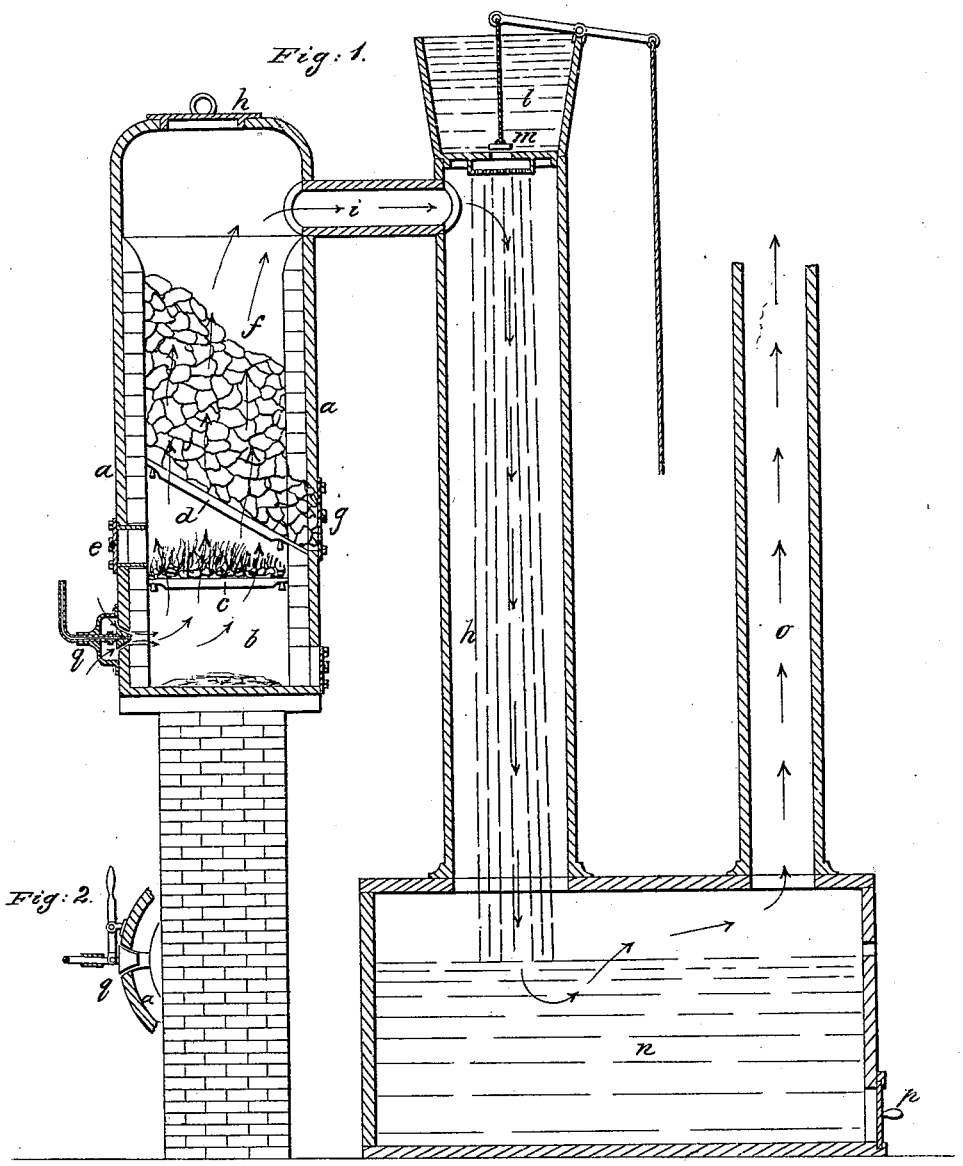

Fig: 2.

Witnesses:

Thos. Geo Hawes
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Inventor:

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UNITED STATES PATENT OFFICE.

BUTLER G. NOBLE, OF NEW YORK, N. Y.

IMPROVED APPARATUS FOR DESULPHURIZING ORES.

Specification forming part of Letters Patent No. **52,191**, dated January 23, 1866.

To all whom it may concern:

Be it known that I, BUTLER G. NOBLE, of the city and State of New York, have invented and made a certain new and useful Improvement in Desulphurizing Metallic Ores; and I do hereby declare the following to be a full, clear, and exact description of the said invention, reference being had to the annexed drawings, making part of this specification, wherein—

Figure 1 is a vertical section of my apparatus, and Fig. 2 is a sectional plan of the tuyere to regulate the fire.

Similar marks of reference denote the same parts.

Devices have heretofore been made for desulphurizing ores by heat. In most instances difficulty has been experienced in regulating the temperature, and also in saving the sulphurous fumes.

The nature of my said invention consists in an apparatus that brings the sulphurous fumes in contact with a shower of water, and thereby causes the condensation and saving of sulphurous fumes, and also of any light metallic particles, such as are sometimes driven off in roasting the ores. I also regulate the fire by the joint action of steam and atmosphere in such a manner that the ores are heated very gradually to prevent the injurious effects of subliming and burning the sulphur under a high temperature, and by this means prevent the ore from melting or running into slag by the heat in the presence of the sulphur while being desulphurized.

In the drawings, *a* represents a vessel of metal lined with fire-brick, in the lower portion of which is an ash-pit, *b*, grate-bars *c*, a fire-place and fuel-door, *e*, and inclined bars *d*, supporting the ore to be desulphurized in the upper portion, *f*, of said vessel *a*.

At the lower end of the inclined bars *d* is a discharge-door, *g*, out of which the ore is allowed to escape when it has been desulphurized, and *h* is a cover to be removed for charging the desulphurizing-chamber.

From the desulphurizing-chamber *f* the fumes and gases evolved from the ore by the heat pass, by the pipe *i*, to a vertical shower-chamber, *k*, at the top of which is a vessel, *l*, containing water, the escape of which through a finely-perforated plate is regulated by a valve, *m*. The water falls into the vat *n*, whence it may be pumped back again into the vessel *l*, if desired.

o is a pipe through which such of the gases as are not condensed in the shower-chamber pass away and escape.

p is a man-hole or opening through which the vessel *n* can be cleaned out.

In order to regulate the temperature of the desulphurizing-chamber *f*, I employ a tuyere, *q*, through which a jet of steam passes. Said tuyere is adjustable, so that an air-inlet space around the tuyere may be increased or lessened, as in Letters Patent granted to me July 25, 1865. By this device the fire can be checked by admitting but little air, the steam continuing to pass, in or the reverse.

The shower-chamber *k* promotes draft, the water passing down in the same direction as the gases, and the sulphurous fumes are condensed and can be utilized in any well-known manner, and any fine particles of ore are retained in the vat *n*. This apparatus prevents the escape of the highly noxious and deleterious vapors arising from the treatment of sulphurets, particularly of copper.

By this apparatus the ores are rendered soft and friable by the action of the heat and the sulphur being removed, and the door *g* may be opened and a portion of the ores removed and fresh ore supplied through the man-hole *h*, so that the operation shall be progressive.

What I claim, and desire to secure by Letters Patent, is—

1. The shower-chamber *k*, in combination with the desulphurizing-chamber *f*, substantially as and for the purposes set forth.

2. The mode of constructing the desulphurizing-chamber *f* with the inclined grate *d* and discharge-door *g*, as set forth, in combination with the shower-chamber *k*, as specified.

3. The adjustable steam-tuyere, in combination with the desulphurizing-vessel *a*, constructed as specified, so as to regulate the temperature, as set forth.

Dated September 25, 1865.

B. G. NOBLE.

Witnesses:

LEMUEL W. SERRELL,
CHAS. H. SMITH.