E. E. SLUDER.

METHOD OF SMELTING COPPER.

No. 184,988. Patented Dec. 5, 1876.

Fig. 1.

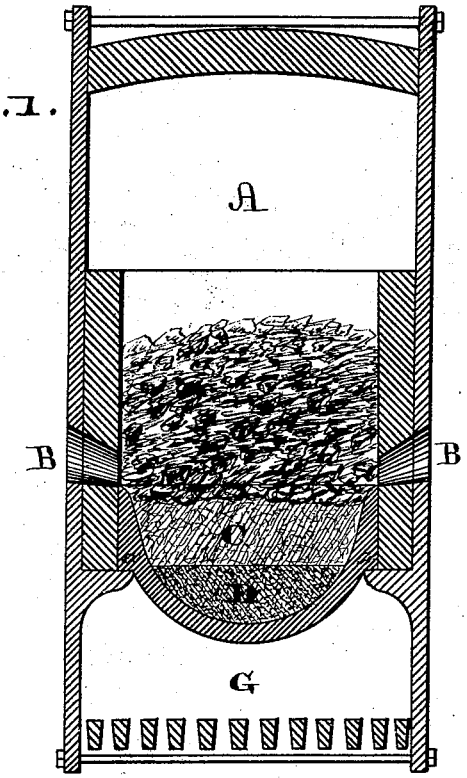
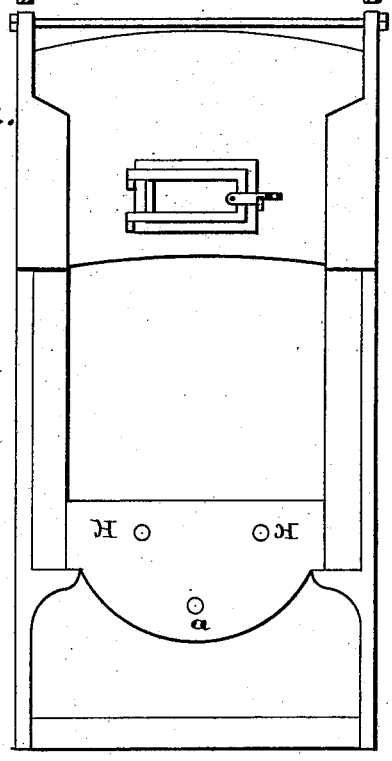


Fig. 2.



WITNESSES.

Charles Pickles.

Arml. V. Boyd

INVENTOR,

Edwin E. Sluder.

by Chas. O. Moody.

atty;

UNITED STATES PATENT OFFICE.

EDWIN E. SLUDER, OF ST. LOUIS, MISSOURI, ASSIGNOR OF SEVEN-TENTHS OF HIS RIGHT TO WM. L. REYNOLDS, WM. B. DEAN, CHARLES D. MOODY, AND SAMUEL S. BOYD, ALL OF SAME PLACE.

IMPROVEMENT IN METHODS OF SMELTING COPPER.

Specification forming part of Letters Patent No. **184,988**, dated December 5, 1876; application filed March 28, 1876.

To all whom it may concern:

Be it known that I, EDWIN E. SLUDER, a resident of the city and county of St. Louis, State of Missouri, have invented a new and useful Improvement in the Method of Smelting Copper, of which the following is a full, clear, and exact description.

Heretofore in smelting copper it has been commonly the custom to employ several distinct processes. The mixed ores were first roasted, the coarse metal then smelted, then calcined, fused, and roasted, when it was finally ready, for the "poling" process.

The present invention relates to an improved method by which all the ordinary kinds of copper can be smelted directly from the ores of a single or mixed varieties, and, by a single process only, made ready for the poling process.

The manner of conducting my method is as follows: I employ an open furnace of ordinary construction, such as is generally known as a forge-fire. A fire is built therein in the usual way, and then a small amount, say, forty (40) or fifty (50) pounds of ores, either mixed or of any single variety, suitably broken up, is spread thereupon, together with a proper flux, such as quicklime, and all making what is called a thin fire. An air-blast is introduced through tuyeres, arranged at suitable points so as to direct the blast to the lower part of the charge.

An intense white heat is maintained in the furnace. The ores are rapidly reduced to a molten bath, in which the copper is held in solution with the slag. This bath remains under the influence of the high temperature described for a period of, say, twenty minutes, during which the foreign substances are partially volatilized, and partially formed into a slag, which floats upon the bath of copper, which gradually separates and collects in the bottom of the furnace, whence it is drawn off through a proper opening.

The shallowness of the fire enables the volatile portion to readily pass off. The air-blast facilitates its passage, but is especially useful in maintaining the high temperature requisite, and at the proper point, viz., within the charge, and also in supporting the requisite amount of oxygen for the separation of the foreign substances from the copper.

Being an open furnace, the outer air can readily enter, the fire is not smothered, and the fire and charge can be readily reached, it being essential that the charge, especially in the line of the tuyeres, be loosened from time to time by the introduction of suitable implements.

All of the ordinary kinds of copper ores can be reduced by the above-described process, sulphuret of copper, copper pyrites, gray copper, as well as those free from sulphur, such as carbonate or oxide of copper.

The furnace I have found most convenient and efficient in operating my method is shown in accompanying drawings, in which—

Figure 1 is a vertical cross-section, and Fig. 2 a front elevation.

Like letters denote corresponding parts in each figure.

A represents the furnace, and B the tuyeres. The furnace is preferably provided with a detachable bottom and a fire-place, G, below the same, for preventing the chilling of the bottom. C represents a molten bath below the ores, in which the copper is held in solution with the slag, and D the bath of copper separated from the slag and collected at the bottom of the furnace. H H are the tedy holes for the slag, and *a* an opening, through which the copper is drawn off.

I lay no claim in this application to the furnace described and shown, since it forms the subject of a concurrent application for Letters Patent of W. L. Reynolds and myself.

I do not wish it be understood that I claim the broad invention of reducing all copper ores by a single process to a condition for poling; but

What I do claim as my invention, and desire to secure by Letters Patent, is—

The method described of producing copper ready for the poling process at a single operation, by introducing the ores, (either of the same or different kinds,) fuel, and flux in a mixed state into an open furnace, into which a current or currents of air is introduced, substantially as set forth.

EDWIN E. SLUDER.

Witnesses:

CHAS. D. MOODY,

SAML. S. BOYD.