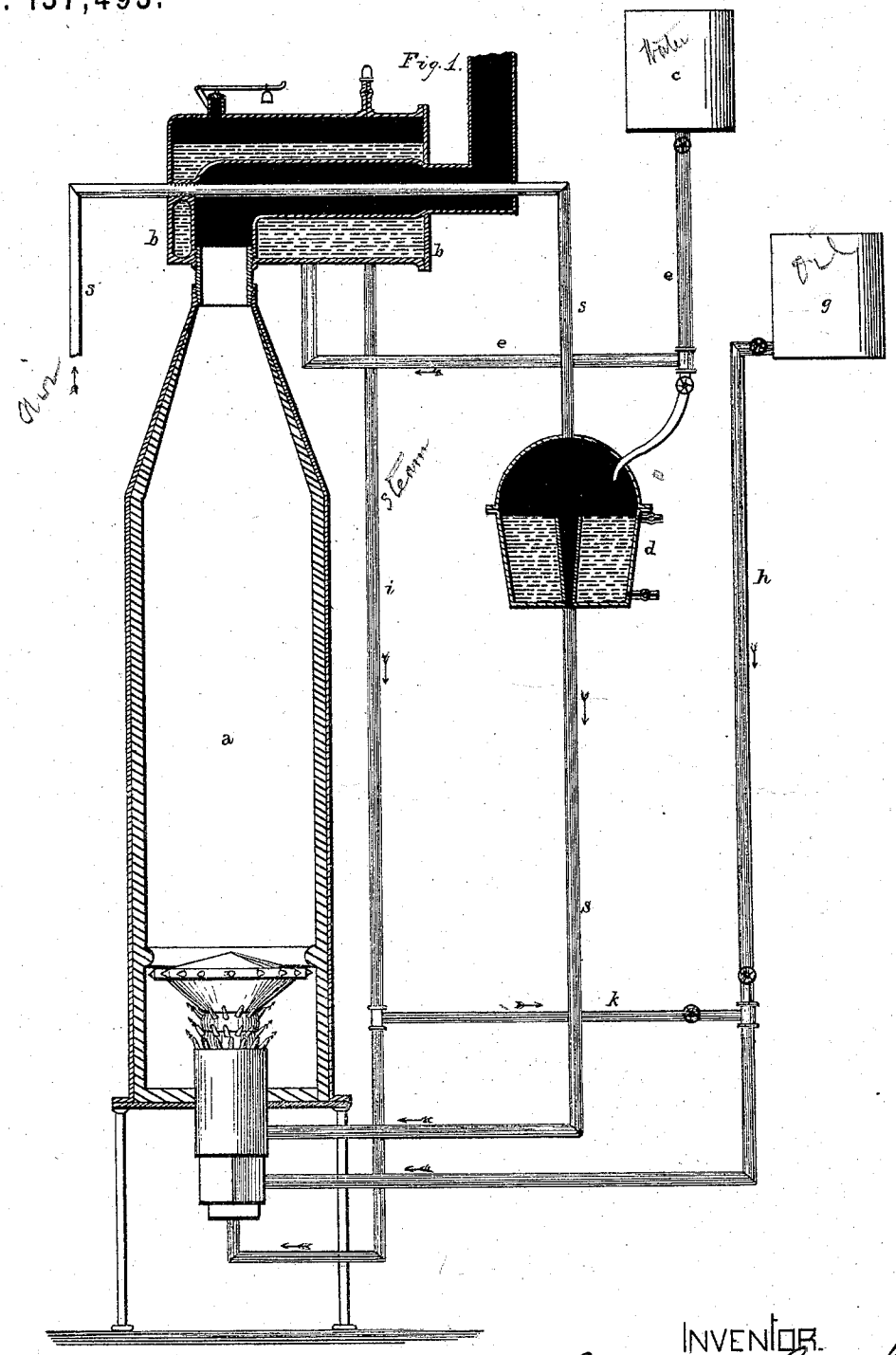
2 Sheets--Sheet 1.

B. M. SMITH.

Smelting Furnaces.

No. 137,493. Patented April 1, 1873.

Fig. 1.



Witnesses.

W. F. Dahamel

Alex Davidson

Inventor.

Byron M. Smith

Per H. J. Abbot

atty.

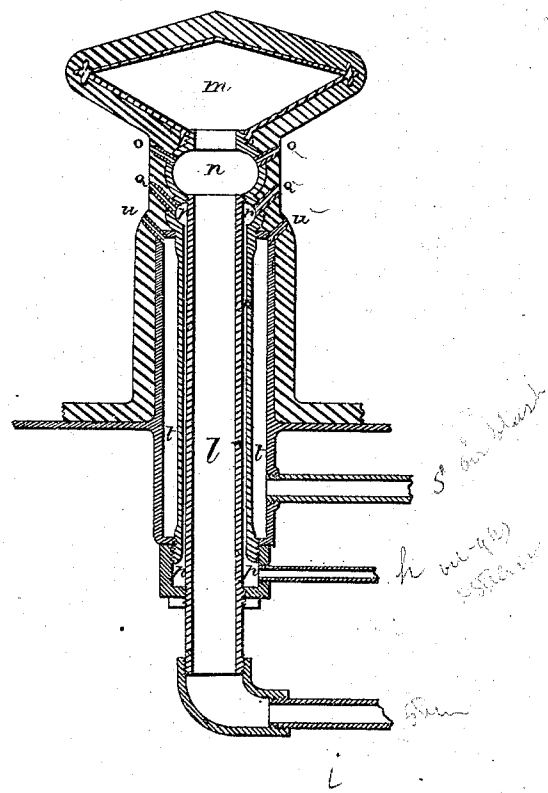
2 Sheets--Sheet 2.

B. M. SMITH.

Smelting Furnaces.

No. 137,493. Patented April 1, 1873.

Fig. 2.



WITNESSES.

W. F. Duhamel

Alex Davidson

INVENTOR.

Byron M. Smith

per H. S. Abbot atty.

UNITED STATES PATENT OFFICE.

BYRON M. SMITH, OF TOPEKA, KANSAS, ASSIGNOR TO ELIZA S. SMITH, OF SAME PLACE.

IMPROVEMENT IN SMELTING-FURNACES.

Specification forming part of Letters Patent No. **137,493**, dated April 1, 1873; application filed January 23, 1873.

To all whom it may concern:

Be it known that I, B. M. SMITH, of Topeka, county of Shawnee and State of Kansas, have invented certain new and useful Improvements in Smelting-Furnaces, of which the following is a specification:

The nature of my invention relates to the production of heat for smelting ore and generating steam, and consists in the devices by which the jets are generated and controlled, as will be more fully set forth hereafter.

In the accompanying drawing, Figure 1 is a vertical sectional view of furnace. Fig. 2 is a vertical sectional view of the "burner" or tubes through which the jets issue.

a represents a smelting-furnace, of suitable construction, to the top of which is secured a boiler or steam-generator, *b*, through the center of which the heated gases and products of combustion pass so as to generate steam. Situated at any suitable distance or height from the furnace is a water-tank, *c*, which supplies both the boiler *b* and moist-air chamber *d* with water through the pipes *e*, said pipes being provided with suitable cocks to regulate the supply, as may be desired. *g* is a second elevated reservoir, in which the oil of any suitable kind is placed for generating gas, and which is fed to the furnace through the pipe *h*, which is also provided with suitable regulating-cocks. Extending downward from the boiler is a steam-pipe, *i*, from which a branch pipe, *k*, extends outward so as to communicate with the oil-pipe *h*, not only for the purpose of keeping the pipe free and clear, but so as to mingle the steam and oil together and convert the oil into gas. The steam passes up into the bottom of the furnace *a* through the pipe *l* into the chambers *m n*, where it is superheated, and thence through the tubes or jets *o* into the furnace. The upper chamber *m* extends out laterally so as to form an overhanging projection, which protects the jets from the pressure of the ore and serves as a deflector for the gases. This chamber and the furnace are lined throughout with firebrick or clay, shown in Figs. 1 and 2, in the usual manner. The combined steam and oil or gas passes into the chamber *p* surrounding the steam-pipe *l* up into the chamber *r*, and thence into the furnace through the jet-tubes *q*. Through the pipe *s*, which passes through the top of the furnace or through the pipe through which the heated gases and products of combustion pass, there is driven a current of air, which, in passing through, becomes intensely heated before it reaches the moist-air chamber *d*. In this chamber it absorbs a part of the water contained therein, and then passes into the chamber *t*, and from thence into the furnace through the jet-tubes *u*. This air may be used either hot or cold, as desired. When the combined jets of air, steam, and gas are ignited, they produce a heat almost if not as intense as the oxyhydrogen blow-pipe, and which can be produced at a mere nominal cost.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The elevated water-tank *c*, when arranged to feed the boiler, and the moist-air chamber, substantially as described.

2. The superheater-chamber *m*, in combination with steam-pipe *l* placed in the lower part of the furnace, for the purpose of acting as a deflector for the gases and to protect the jet-tubes from the metal, substantially as set forth and shown.

3. The concentric pipes or chambers *l p t* for conducting the air, steam, and gas, into the furnace, when provided with suitable jet-tubes, substantially as shown and described.

4. The furnace *a*, boiler *b*, tank *c g*, and moist-air chamber *d*, when connected by the various pipes, in the manner and for the purpose set forth.

5. The moist-air chamber *d*, for moistening the air before its entrance to the furnace, as specified.

In testimony that I claim the foregoing as my invention, I hereunto affix my signature this 15th day of January, 1873.

BYRON M. SMITH.

Witnesses:

T. B. MILLS.

WM. HALL JENKINS.