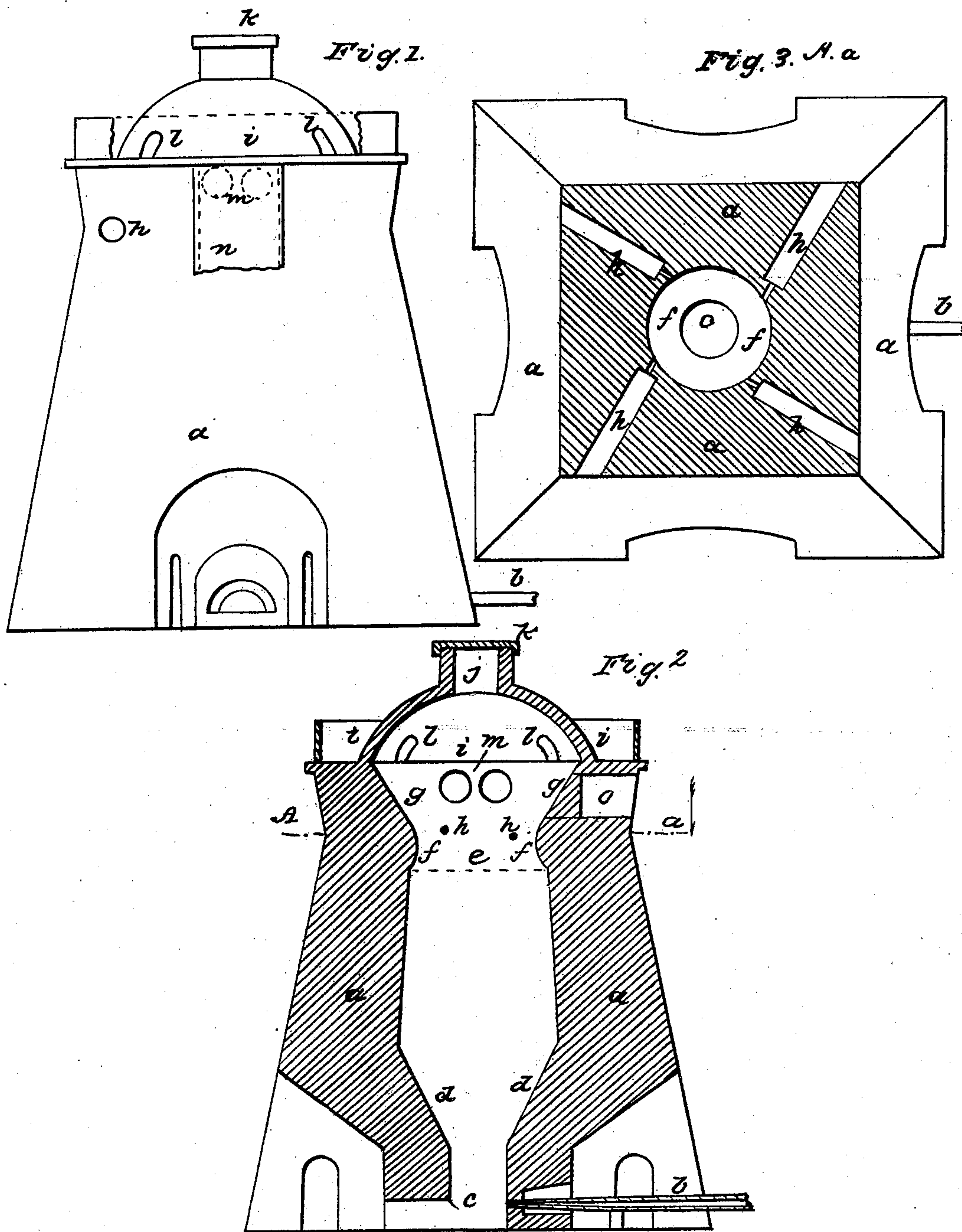


T. SELLECK.

Furnace for Reducing Ores.

No. 12,329.

Patented Jan. 30, 1855.



UNITED STATES PATENT OFFICE.

THADDEUS SELLECK, OF GREENWICH, CONNECTICUT.

IMPROVEMENT IN METHODS OF WORKING FRANKLINITE ORE.

Specification forming part of Letters Patent No. 12,329, dated January 30, 1855.

To all whom it may concern:

Be it known that I, THADDEUS SELLECK, of Greenwich, Connecticut, have invented a new and useful Improvement in the Process of Reducing Franklinite and Obtaining Iron and Zinc Therefrom, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is an elevation of the furnace employed in working out my improved process; Fig. 2, a vertical section, and Fig. 3 a horizontal section taken at the line A *a* of Fig. 2.

The same letters indicate like parts in all the figures.

Franklinite is an ore consisting, mainly, of iron, zinc, and manganese, and it has been deemed highly important to obtain some practical mode of reducing it, so as to separate and collect the zinc and to obtain the iron. This has been attempted, but without success, in the cupola or blast furnace employed for the smelting of ordinary iron ores. The body of the ordinary cupola or blast furnace varies from thirty-five to sixty feet in height from the bottom of the crucible to the throat or tunnel head, and gradually contracts from about twelve to eighteen feet diameter at the top of the boshes, to about three to seven feet at the throat, this form having been found the most efficient for smelting ordinary iron ores, the charge being filled in up to the throat. In attempting to reduce franklinite in a furnace of this construction it has been found that by reason of the presence of zinc in the ore the vapors of that metal, not having room to escape, accumulate in such quantities in the upper part of the charge, and also to adhere to the sides of the furnace as to prevent their escape along with the gases generated by the blast of air forced in at the bottom of the charge. The continued blast reoxidizes the iron and the vapors of zinc, which, together with the confined gases and the products in the upper part of the charge, "scaffold," as it is technically termed—that is, unite and form an obstruction at or near the top of the charge, which effectually stops the further escape of the vapors and gases, and hence the further active working of the furnace. I have also discovered that it is necessary to the effective reduction of this ore to work it under a lighter head, as well as with a greater

area for the escape of the vapors of zinc and gases from the upper part of the furnace than when working other kinds of ore.

Having discovered the reasons why this kind of ore cannot be worked practically in the same manner as the ordinary iron ores, as also the modes of avoiding the difficulties above referred to, my invention or discoveries for reducing franklinite ore to obtain iron and the white oxide of zinc therefrom consists in working it under a lighter charge or head, and in blast-furnace of greater proportional area at the throat or upper part of the charge, so as to allow a free discharge or escape for the vapors of zinc and ordinary gases through the upper parts of the charge, and thus avoid the difficulties heretofore experienced.

The furnace which I have adopted for working my improved process is of a construction for which I have claimed the grant of Letters Patent under a separate application, and is represented in the accompanying drawings, in which *a* represents the walls of the furnace constructed in the usual way, and *b* the tuyeres for introducing the blast below into the crucible *c*, which, together with the boshes *d*, are all constructed as in the ordinary cupola. The body of the furnace is nearly cylindrical, the upper end being about only one foot less in diameter than the lower end at the junction with the boshes. The charge should never be carried above the line *e*, and a short distance above this there is a sudden contraction, as at *f*, where the gases and vapors are concentrated, and above this contraction the walls spread out funnel-shaped, as at *g*, that the gases may have room to expand and mingle with atmospheric air when the latter is forced in through tuyeres inserted in holes *h* made for that purpose in the walls at or near the contraction, the tuyeres being placed in a tangential direction, to cause the air and vapors to take a whirling motion in the enlarged space above the contraction and within the dome *i*, which will insure a better admixture of the same. The tuyeres receive the blast of air by means of pipes, in the usual manner, from a blower, and the quantity of air may be regulated by a valve. The dome has a central aperture at the top *j*, for the draft when starting the furnace, and is provided with a cover or damper, *k*, to keep it closed when the furnace is working. Apertures *l* are made around the base

of the dome, through which the charge is introduced, the inclined surface or funnel-shape affording the means of properly distributing the charge over the entire surface in the body of the furnace. These apertures should be provided with doors or covers, so that they can be closed when not charging. Suitable apertures, *m*, should be made above the contraction, which communicate, by means of pipes *n*, formed in the wall or outside, with any suitable apparatus for collecting the white oxide of zinc and for separating it from the gaseous products of the furnace. Near the top a passage-way, *o*, is formed in the wall, and temporarily bricked up inside, so that in case of obstructions or repairs being wanted, it can be opened to give access to the inside. The charge is prepared and put in with the required flux in the usual manner of charging cupola or blast furnaces. The flux, of course, is to be regulated by the nature of the ore, at the discretion of the operator.

I do not deem it necessary to describe or represent the blowing apparatus and connecting-pipes, nor the apparatus for separating

the white oxide of zinc from the other gaseous products of the furnace and for collecting the same, as these make no part of my invention and are well known.

Having thus described and represented the construction of the furnace which I have devised for the working of my improved process, I wish it to be distinctly understood that I do not limit myself to the working of my said process in a furnace of the precise construction herein specified, so long as the same results are obtained by means substantially the same.

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

The process of reducing franklinite ore to obtain iron and the white oxide of zinc therefrom by working it under a lighter head in a vertical-walled low cupola-furnace, substantially as described.

THADDEUS SELLECK.

Witnesses:

CHAS. N. BAMBURGH,
H. C. BAUM.