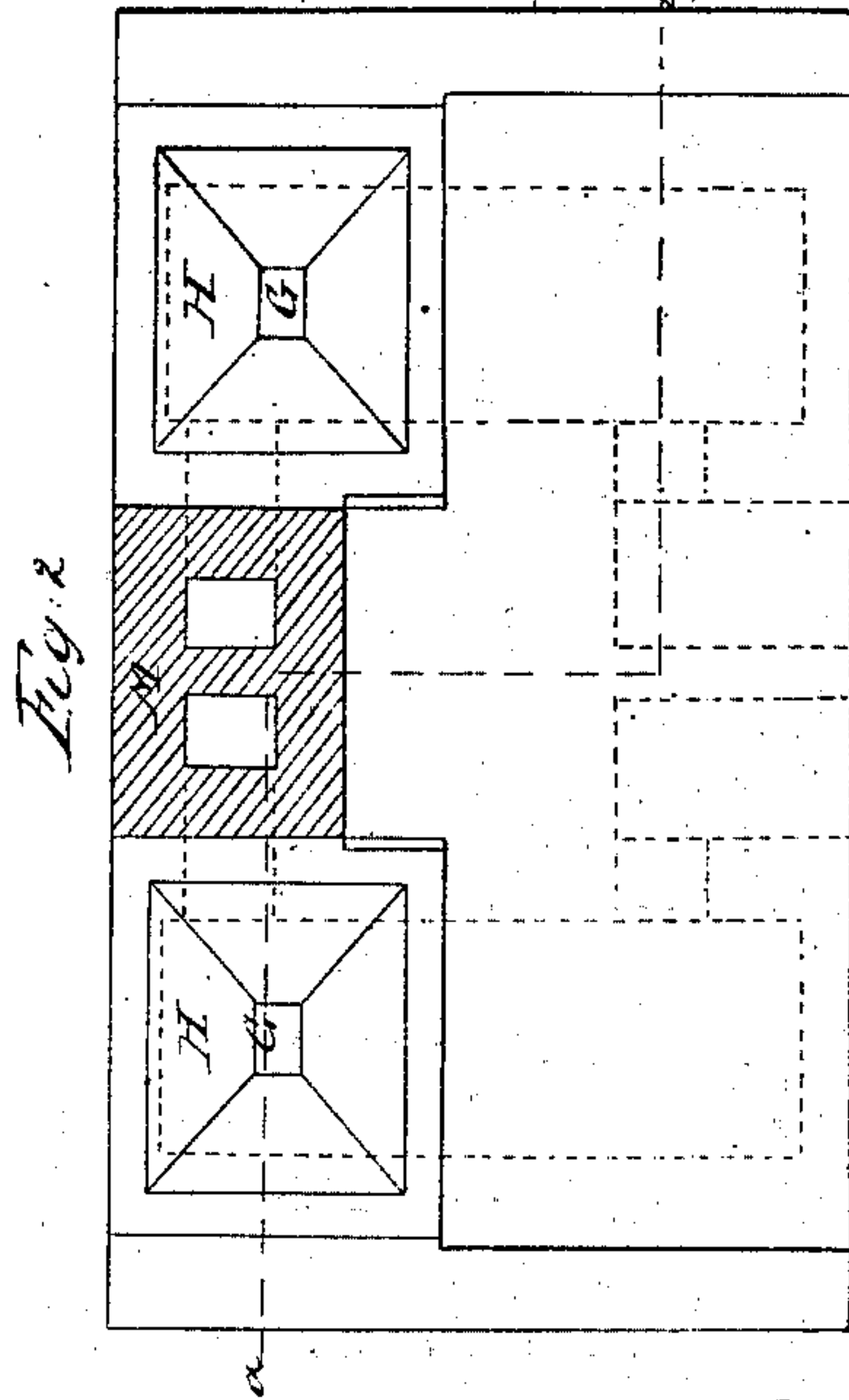
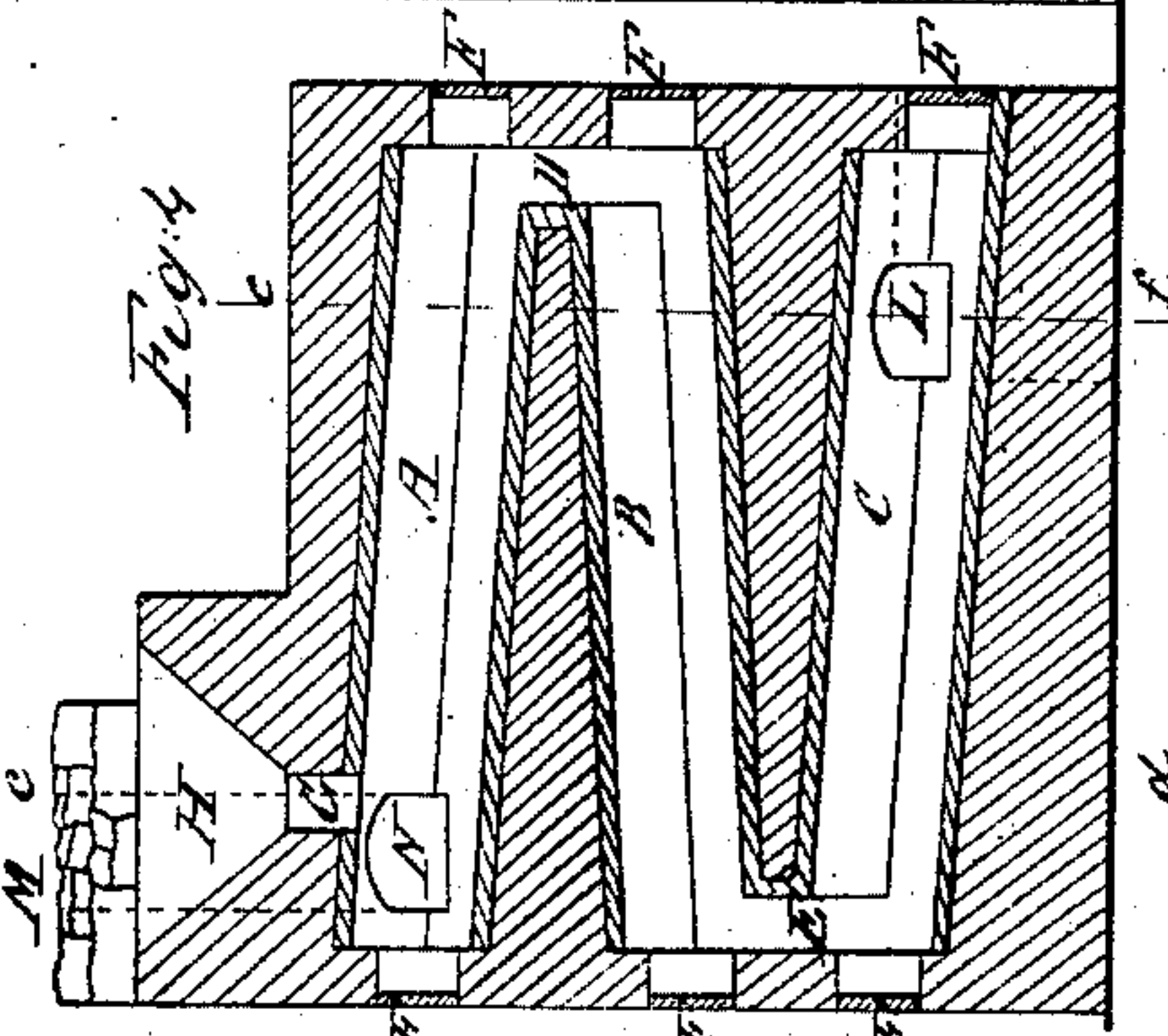
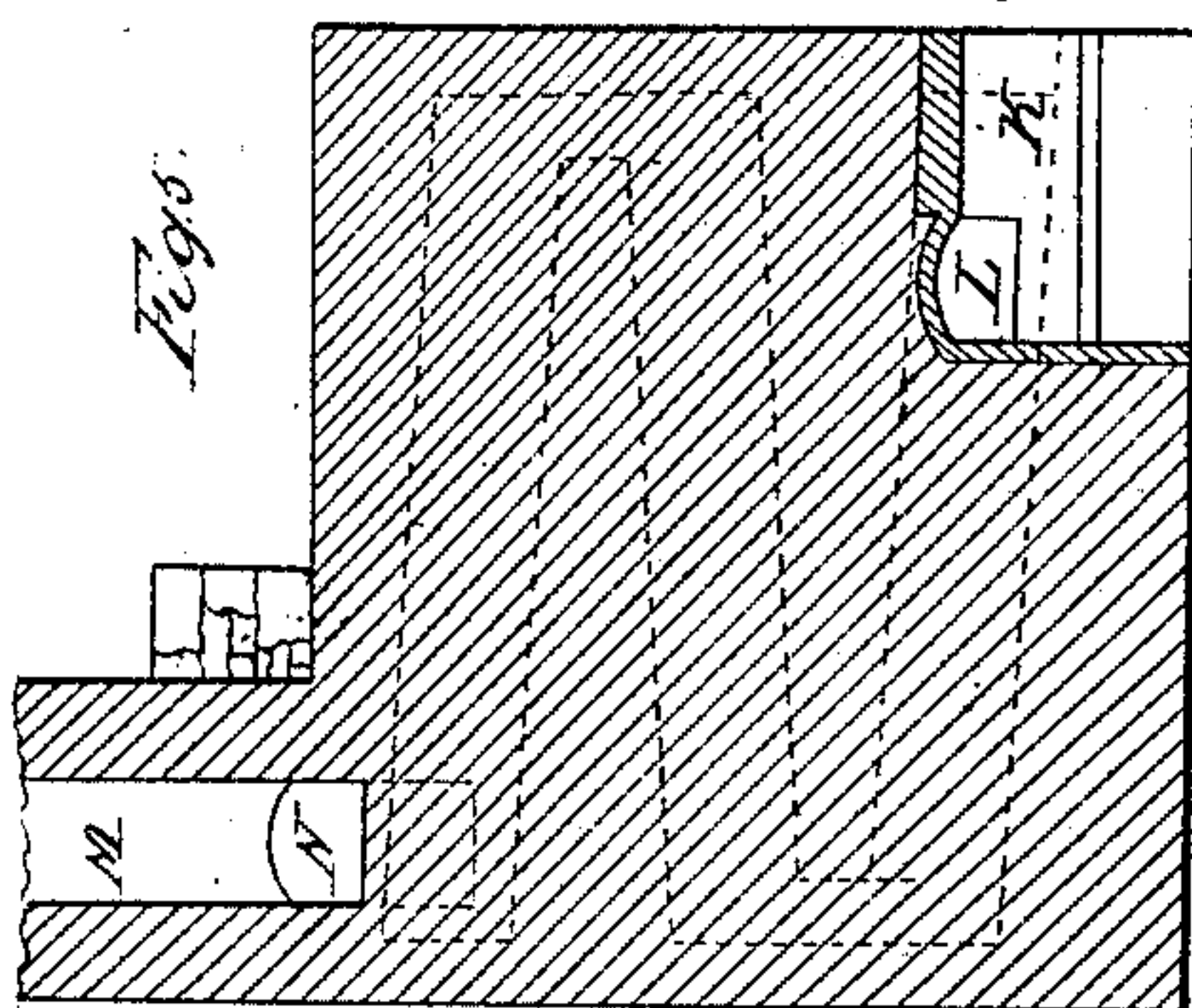
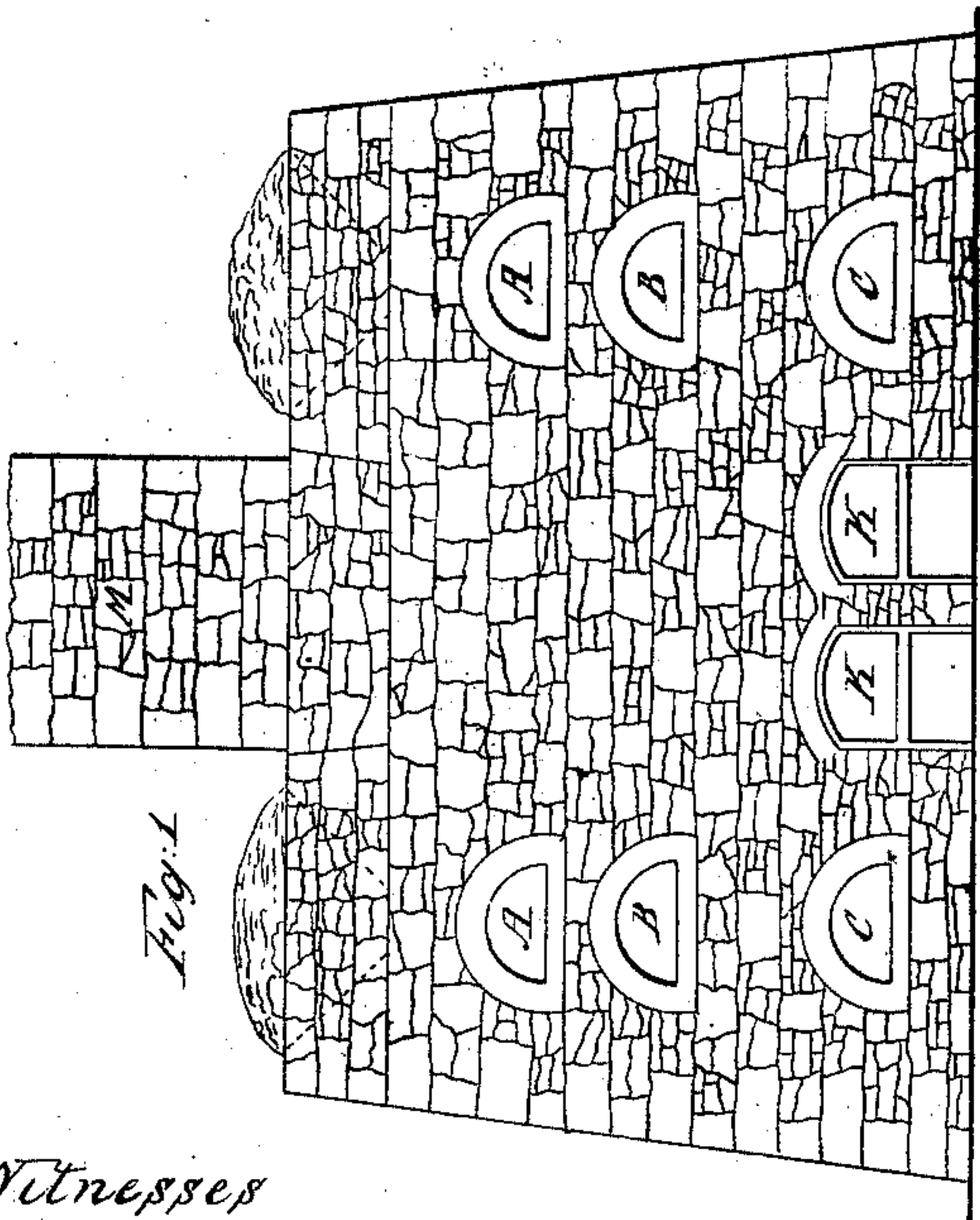
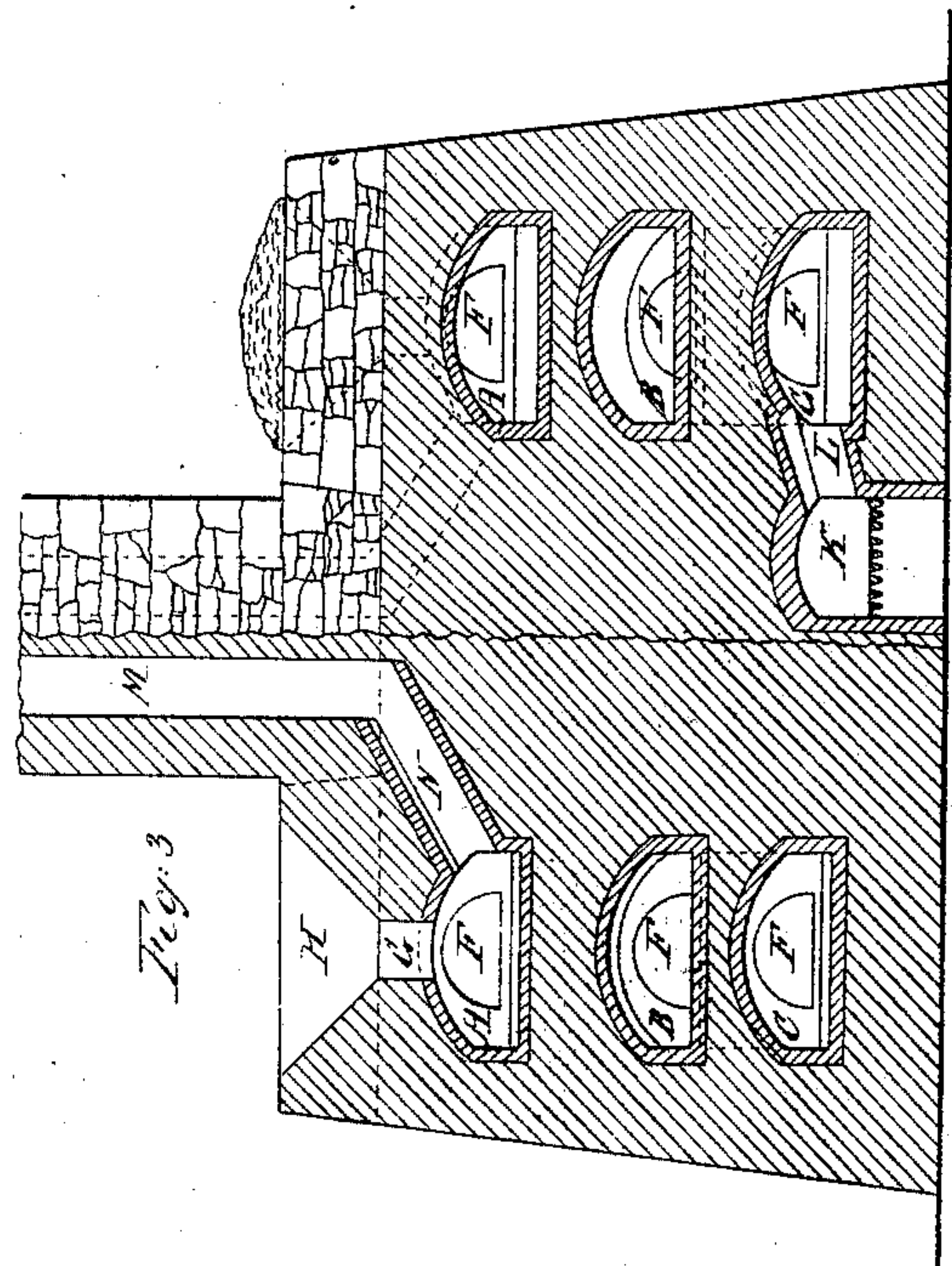


N. Bartlett,

Roasting Ores,

N^o 77,950.

Patented May 19, 1868.



Witnesses
John Cochran
Edwina Lyon

Inventor
Nathan Bartlett

UNITED STATES PATENT OFFICE.

NATHAN BARTLETT, OF CENTREVILLE, NEW JERSEY, ASSIGNOR TO HIMSELF
AND FRANKLIN OSGOOD, OF RICHMOND COUNTY, NEW YORK.

IMPROVEMENT IN FURNACES FOR ROASTING ORES.

Specification forming part of Letters Patent No. 77,950, dated May 19, 1863.

To all whom it may concern:

Be it known that I, NATHAN BARTLETT, of Centreville, in the State of New Jersey, have invented a new and useful Improvement in the Construction and Mode of Operating Ovens for Roasting or Desulphurating Ores; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the figures and letters marked thereon, and in which—

Figure 1 is a front elevation of a pair of my improved ovens with their furnaces and chimney; Fig. 2, a top view of the same; Fig. 3, a vertical transverse section of the ovens and one of the furnaces through the line *a b* in Fig. 2, the left-hand portion corresponding with a section through the line *c d* in Fig. 4, and the right-hand portion to a section through the line *e f* in the same figure; Fig. 4, a vertical longitudinal section through the center of one set of the ovens; Fig. 5, a vertical longitudinal section through the center of one of the furnaces.

In all these figures the same parts are indicated by the same letters of reference.

The ores of all metals, with a very few exceptions, require roasting, either for the purpose of producing higher oxidation or to expel injurious admixtures of volatile substances; but some ores require greater heat than others to effect the requisite degree of calcination, and some also require a peculiar treatment during the process.

For these purposes various forms of kilns and ovens have been essayed; but by none of such plans, as far as I am able to ascertain, can such a control of the operation be secured as will always produce a satisfactory result.

The object and nature of my invention are to effect a more thorough expulsion of those foreign substances that can be dissipated by the action of heat which are usually combined or associated with the metals in the ores than is accomplished by the present modes of operation and treatment, as well as to save labor and time and to lessen the quantity of fuel usually consumed in the process; also, to afford such control of the operation as will secure

the best result or most desirable degree of calcination in the various kinds of ore.

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

I construct my ovens usually in three sections—that is, an upper, lower, and middle section—which are all built between the same vertical planes, and are connected together alternately by their ends into a continuous oven, as shown at A, B, and C, Figs. 1, 3, 4.

Each section is about fourteen feet long, six feet wide, and two and a half feet high. The upper part or roof of each section is a flat or elliptical arch, as shown in Fig. 3. The sides are vertical for about twelve inches of the height, and the bottom or floor is flat. Each section has an inclination of about ten inches in its length. The upper section, as shown in Fig. 4, slopes downward to the front, where it connects, by means of the break or opening D, with the middle section, B. The middle section, B, slopes downward from this connection to the back, where it connects, by means of the break or opening E, with the lower section, C, and the lower section, C, in like manner, slopes downward to the front. Each section has two semicircular or otherwise shaped openings, one at either end, for the convenience of manipulation and inspection, and which, when not in use for these purposes, should be closed with doors or stoppers, as shown at F F F, Fig. 4.

At the upper back end of the top section A, and communicating with it by the opening G, there is a hopper-shaped funnel, H, constructed of masonry, as shown in Figs. 1, 2, 3, 4, through which the ore is passed to the upper or first section, A, of the oven.

On one side of the sections or oven I construct the furnace K, Figs. 1, 3, 5, and fit it with grate-bars and ash-pit, as shown. This furnace connects with the lower end of the bottom section, C, by means of the flue L, Figs. 3, 4, 5, and the heat and flame, after filling this section, pass up through the break or opening E into the middle section, and after filling it they pass up through the break or opening D into the top section, A, which, in

like manner, becomes filled with the heat and flame from the furnace, and which, after passing through all the sections of the oven and taking with it the gases that have been liberated from the ore, enters the chimney M through the flue N, Figs. 3, 4, 5.

The ore, being previously pulverized, is introduced to the first or top section of the oven through the aperture G in the funnel H. It is then raked forward, by manipulating through the openings at its ends, till it passes over and down through the break D into the upper end of the middle section, B. It is then raked backward, by manipulating through the openings in its ends, till it passes over and down through the break E into the upper end of the lower section, C. The ore should be spread evenly over the floors of all the sections to a proper depth.

All the sections being thus charged with ore, the flame and heat from the furnace K, entering at the lower end of the bottom section of the oven, soon fills it and the upper sections by passing up through the breaks or openings E and D, and by reverberating the heat downward upon the ore spread upon the floors the whole quantity of ore is evenly exposed to its calcining action.

By this arrangement of the sections and their inclined position, the manipulation of the ore is not only greatly facilitated and the draft of the furnace promoted by the upward direction of the current in passing through them, but the heat being greatest at the lower end of the bottom section of the oven and least at the upper end of the top section, where the ore is introduced, the ore is submitted to a greater heat as the quantity of volatile matter which it contains is diminished, which is important, for, in most cases, the liability of the ore to injury from the action of heat in the torrifving process is diminished by the expulsion of the volatile substances.

During the process of calcination the ore should be frequently stirred or raked, so as to submit every particle of it to the action of the heat, and on that in the lower section being fully roasted or desulphurated it should be immediately drawn out at the opening in the lower or front end of that section. The ore in the middle section is then to be drawn down through the break or opening at its lower end into the lower section and spread over its floor, and in like manner the ore from the top section is to be drawn down and spread over the floor of the middle section. The floor of the top section is then to be replenished and covered with raw ore from the funnel at its top end, and in this manner the operation is continued, making it a perpetual oven.

The degree of heat in the oven should be under immediate control, which may be done in various ways, such as by a damper in the

chimney, by doors to the ash-pit of the furnace, or by adjustable vents in the end doors of the sections.

An oven of three sections, and of the sizes herein given, will calcine or desulphurate about three tons of ore per day of twenty-four hours, as I have practically ascertained. The number of ovens should therefore be proportioned to the quantity of ore required for the daily consumption of the smelting-furnace.

The whole number of ovens thus required should be built in one block, but in pairs, as shown in the drawings, so as to have two furnaces and two sets of ovens together alternately, thereby retaining and economizing the heat as much as possible in the lateral direction of the ovens and furnaces, and so that one chimney-stack may answer for each pair of ovens, and the outer ends of such block of ovens should be fortified or secured by means of thick and heavy abutments or walls, so that the weight of the end masses may render lateral bracing unnecessary.

As a means of getting the pulverized ore to the side of the funnels, through which it is fed to the ovens, I construct all along the front of the block an elevated roadway or trestle-work, having an incline at either end for the ascent and descent of the wagons. By this means the ore is carted up and deposited on the top or roof of the ovens and in the immediate vicinity of the funnels, from whence it is conveniently shoveled into them, as required.

In the construction of these ovens any kind of stone or brick that will withstand fire or heat may be used, and the form, size, and number of the sections may be varied, as parties requiring such ovens may deem expedient for their purpose or for the kind of ore they are working. I therefore do not confine myself to the exact construction herein shown or described, but claim the right, under this patent, so long as the principle of my invention is retained, to vary the same as may be considered advisable or expedient, in view of the nature of the ore or the circumstances under which the ovens are to be constructed and operated.

Having thus described the construction and operation of my improved ovens for calcining or desulphurating ores, what I claim therein as my invention, and desire to secure by Letters Patent, is—

1. The sectional arrangement of the oven and the breaks or openings by which the sections are coupled or united together, constructed and operating substantially as described.

2. The combination of the sectional oven with a furnace and chimney, constructed and operating substantially as described.

3. A sectional oven, as herein described, in combination with openings or doors in both

ends of each section of such oven, for the purposes stated, constructed substantially as described.

4. Constructing a sectional oven with the sections alternately inclined to each other, for the purposes stated, arranged and operating substantially as described.

5. The arrangement and combination with

each other in pairs of the sectional ovens, the furnaces, and the chimneys, in the manner and for the purpose substantially as described.

NATHAN BARTLETT.

Witnesses:

JOHN COCHRANE,
EDWARD LYON, Jr.