

(No Model.)

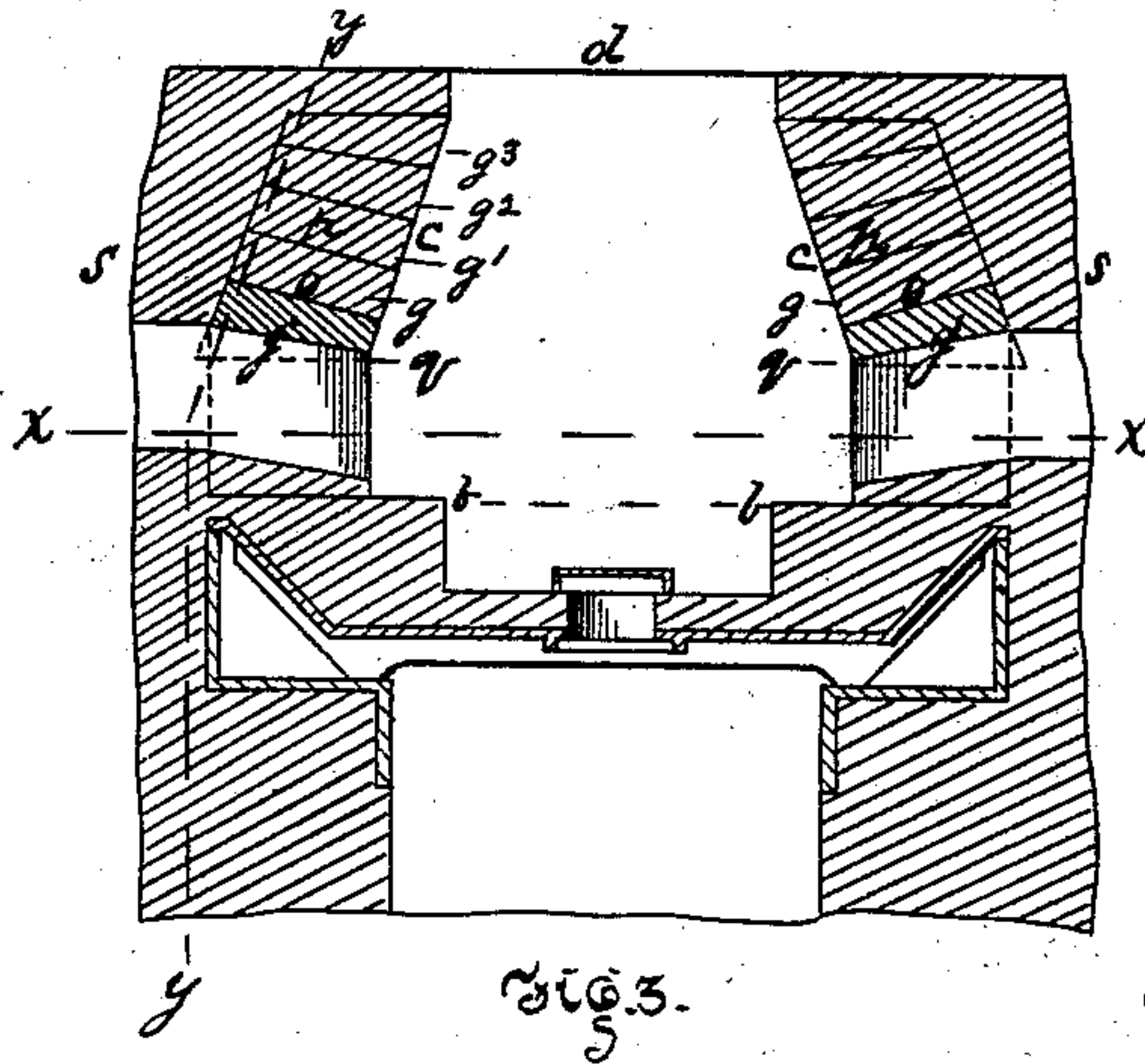
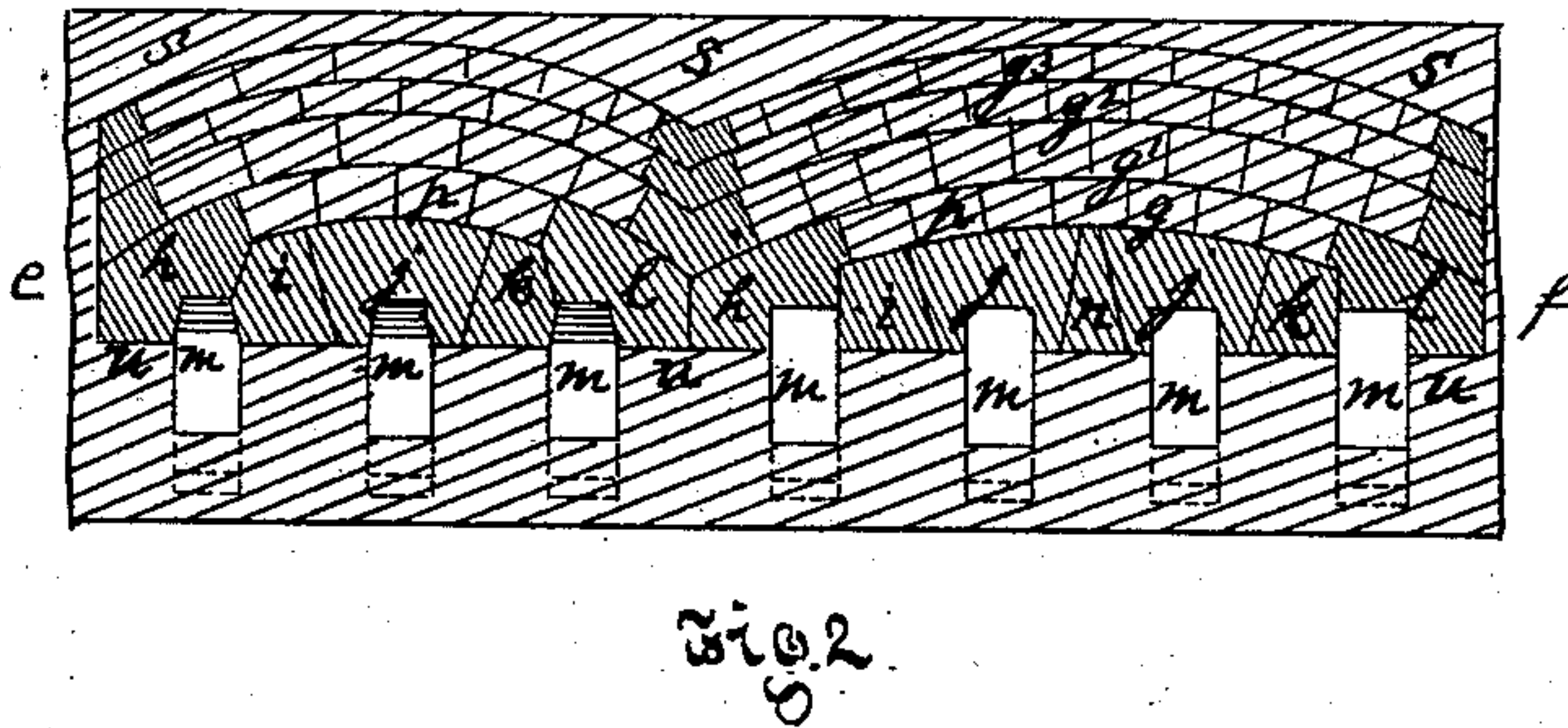
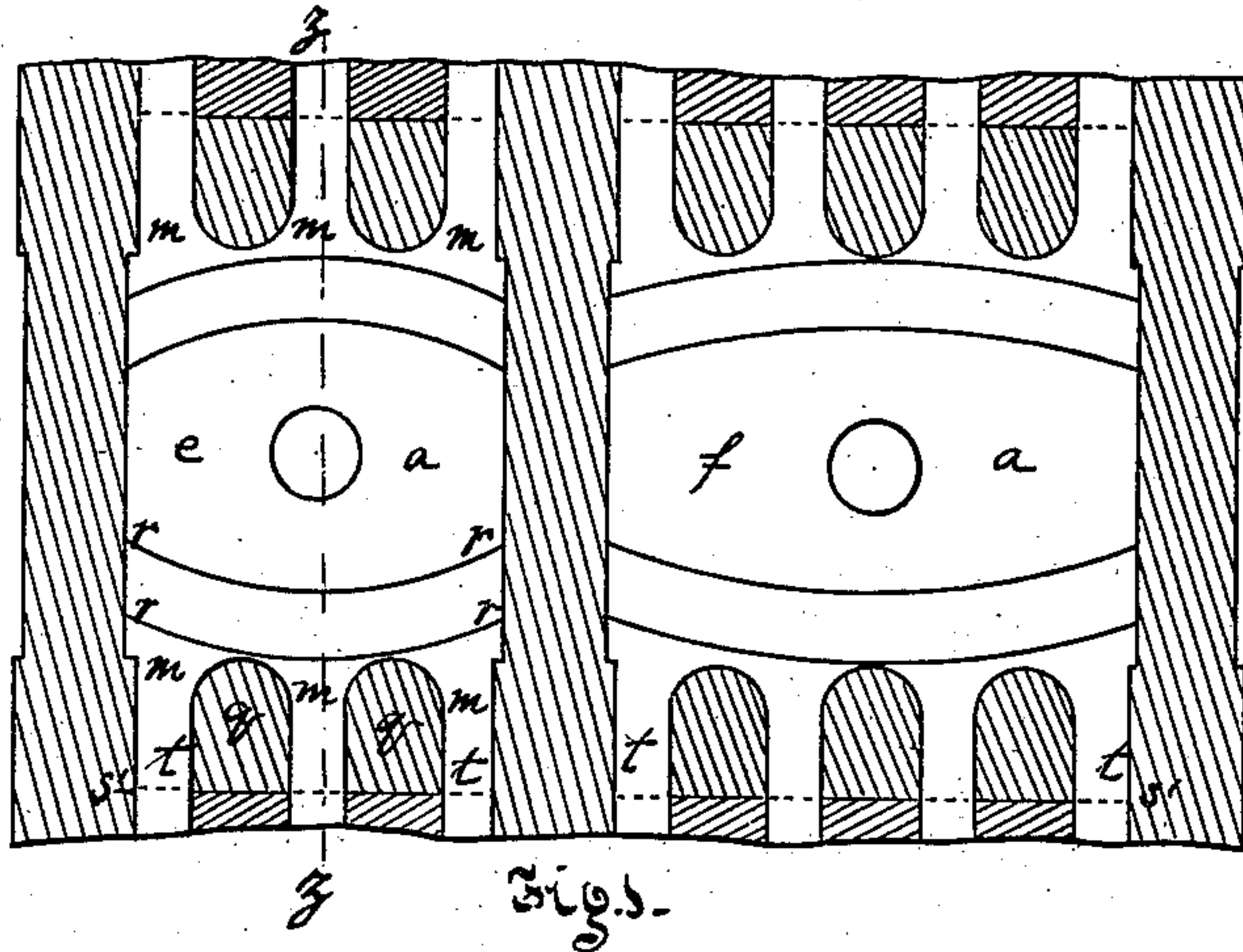
2 Sheets—Sheet 1.

H. SWINDELL.

CRUCIBLE FURNACE AND BRICK FOR CONSTRUCTING THE SAME.

No. 260,429.

Patented July 4, 1882.



Witnesses.
Jno. K. Smith
Geo. A. Bauer

Inventor,
Henry Swindell
by his attys
Bakewell & Kerr

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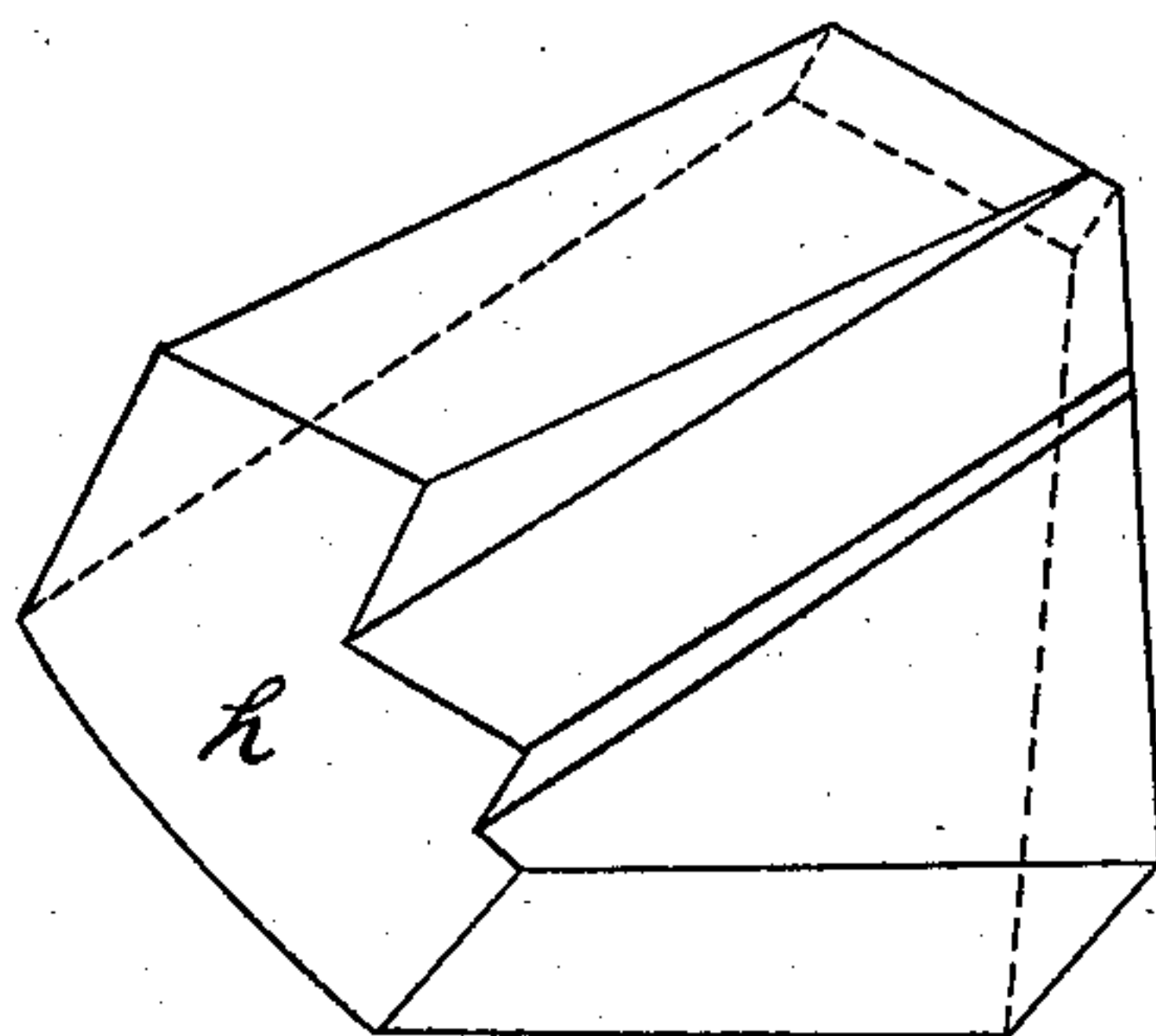


Fig. 4.

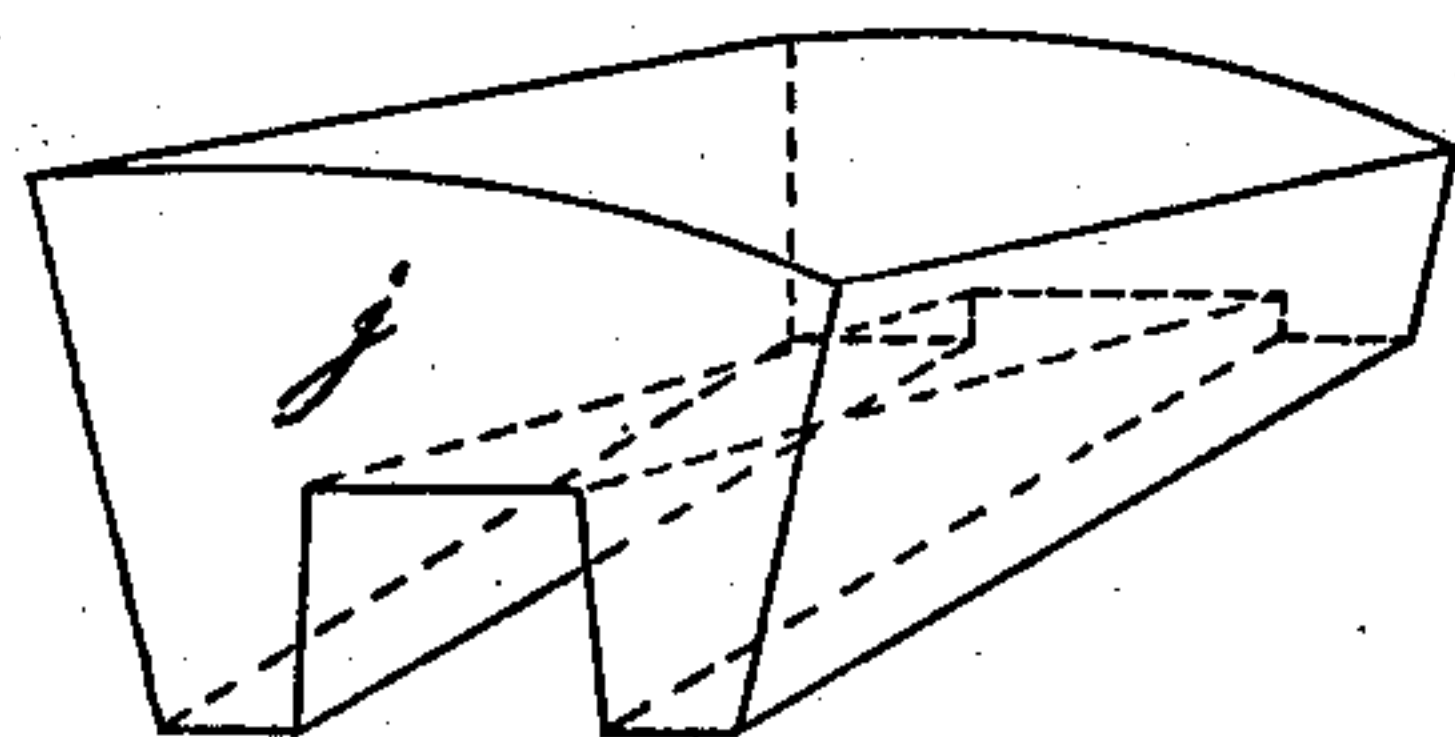


Fig. 5.

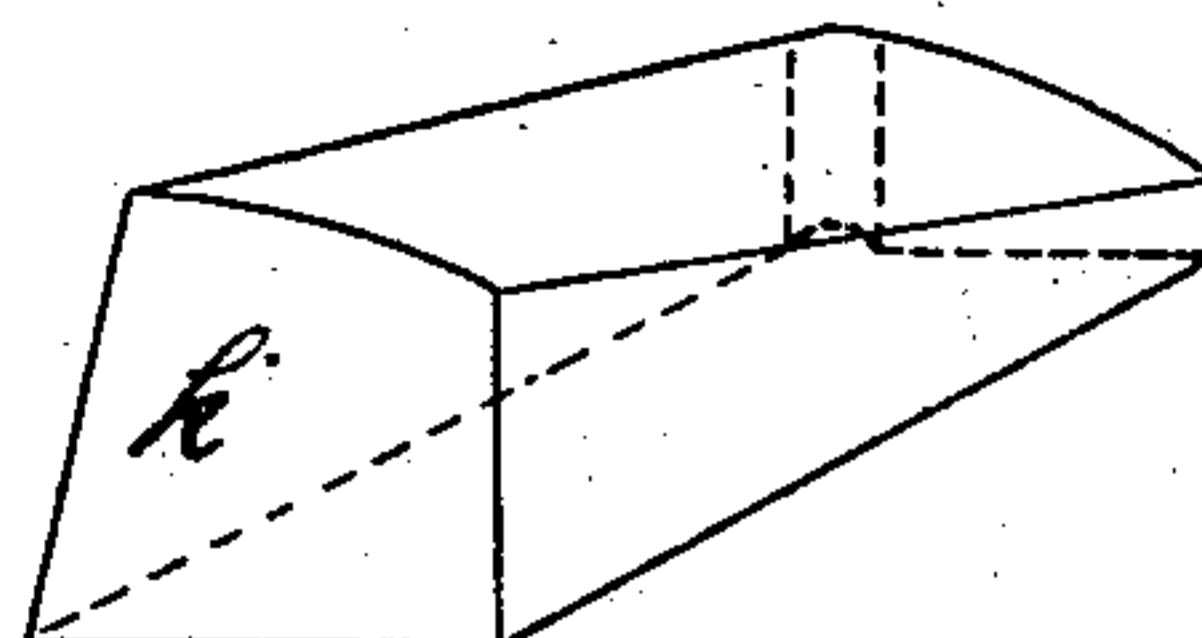


Fig. 6.

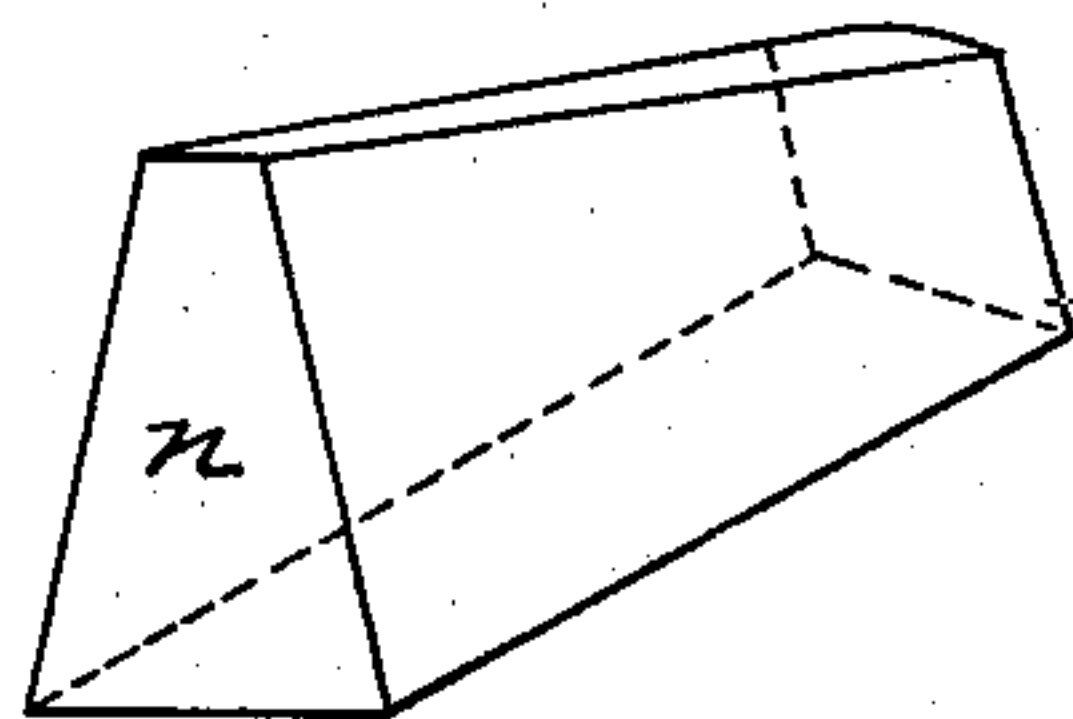


Fig. 7.

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UNITED STATES PATENT OFFICE.

HENRY SWINDELL, OF ALLEGHENY, PENNSYLVANIA.

CRUCIBLE-FURNACE AND BRICK FOR CONSTRUCTING THE SAME.

SPECIFICATION forming part of Letters Patent No. 260,429, dated July 4, 1882.

Application filed December 10, 1881. (No model.)

To all whom it may concern:

Be it known that I, HENRY SWINDELL, of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Crucible-Furnaces and Bricks for Constructing the Same; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a horizontal section of two crucible-furnaces constructed with my improved bricks, on the line *xx*, Fig. 3. Fig. 2 is a section on the line *yy*, Fig. 3. Fig. 3 is a vertical section on the line *zz*, Fig. 1. Figs. 4, 5, 6, and 7 are perspective views of the bricks.

Like letters of reference indicate like parts.

I have chosen for purpose of illustration a reversing furnace, wherein the air and gas from the regenerators meet in the common flues *m* of one side, are burned at the mouth of said flues, and the waste products pass from the furnace by the flues of the opposite side. The regenerators have not been shown, as they may be of the usual form and constitute no part of the present invention.

Crucible-furnaces which use gas as fuel are made with a central bed, *a*, usually filled to the dotted line *b b*, Fig. 3, with fine coke or similar material, upon which to rest the crucibles, flues entering through the sides, converging walls *c*, and a central opening, *d*, on the level of the floor, through which the crucibles are lowered into the furnace. The side walls are made of longitudinally-arched courses of bricks *g*. Heretofore it has been necessary to run the ends of the arched courses into the bed-walls, and to cut and fit irregular pieces of brick into the corners and ends in order to make a tight construction; but even then it has been found by experience that the joints thus made are weak spots and very liable to be cut through. The same is also true, but to a greater degree, in the construction of the flues. They are formed of bricks embedded in the bed-walls, and the joints between the bricks and those of the arches require to be formed by cutting and patching. Not only is this laborious and time-wasting, but it requires a skillful workman to make even a fair joint. The mouth of the flues, where combustion takes place, is the hottest

part of the furnace, and the joints should be very strong and good. Another objection has been the difference in the size of the flues, which makes a difference of temperature in different parts of the furnace.

My invention consists in the formation of the arch-supporting and flue bricks of such shape that they fit together and require only to be set to place as other bricks to give a firm support to the arches and make perfect joints. They are also so formed as to give a downward course to the flues as they enter the bed, and make the flues of uniform size.

The downward flue, though not novel in itself, cannot be advantageously formed with the bricks in common use for building this class of furnace.

One characteristic of my improved bricks which is common to all, whatever may be their shape in cross-section, is that they are longitudinally of tapering form—that is, thicker at the outer end than at the inner. This is to conform to the angle of inclination of the converging walls of the furnace, and is shown in Figs. 3 to 7. Figs. 1 and 2 show two furnaces, *e f*, placed end to end, *e* being a six-pot and *f* an eight-pot furnace. The arches are shown at *g g' g² g³*. My improved arch-supporting and flue bricks are shown at *h, i, j, k*, and *l*, and the flues at *m*. Where the number of flues is an even number, as in furnace *f*, a keystone-brick, *n*, is needed for the middle. The end flues are partially made in the inner side of the bricks *h* and *l*, the third side being formed by the bricks *i* and *k*. The intermediate flues are partially formed in the bottoms of the bricks *j*. The main portion of each flue is in the bed-walls *u*, the improved bricks being used to cap them and make the joints between the arches and the bed-walls.

The improved bricks are laid on the surface of the bed-walls and do not require to be built into them, as heretofore. The top surfaces of the improved bricks are curved to conform to the arches *g* and *g'*, (see Fig. 2,) and inclined longitudinally, as at *o*, so that when the ordinary rectangular bricks, *p*, which form the arches, are built upon them, the walls *c* will incline inward or converge toward each other. (See Fig. 3.)

The preferred form of the bed of these fur-

naces is an ellipse with truncated ends, as shown in Fig. 1, in which $q q$ are the portions of the bed-walls u (shown vertically in Fig. 2) upon which the improved bricks are built, and the lines $r r$ the curves of said walls. The inner line of the outer walls, s , is shown at $s' s'$. Formerly the corners $t t$ beyond the ends of the ordinary bricks then used were made by cut pieces of brick. The joints on the end flues thus made were defective and liable to leak. I make the end bricks, h and l , and the adjoining ones long enough to reach to the line $s' s'$ of the outer walls. Thus the flues are solidly and closely built in, and the improved bricks are set firmly against the outer walls, s .

These bricks are molded in suitable molds, and are made of refractory material and baked in the usual way. They give a firm support to and prevent the sinking of the arches. They can be built into the furnace by an ordinary mason without the exercise of any especial degree of skill, they can be built upon the level face of the bed-walls, the joints between them are tight, no weak spots are made by the formation of the inclined flues, and time and labor are saved in their use. The well-known advantage of the inclined flue is that it directs the current of gas and air to the base of the pots, and so effects the more perfect utilization of the heat; but the construction of such a flue with the old form of bricks would cut so many joints and require so much patching as to render it unsafe. The abutting of the outer ends of the bricks against the vertical

outer walls, s , saves cutting and patching at that point, and incloses the flues with firm solid walls having close joints. The great necessity for the close solid walls is that the leakage of gas at such points will cause combustion in the walls, which fuses or melts them down and soon necessitates rebuilding.

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

1. The within-described bricks for supporting the arches and forming the flue-caps of a crucible-furnace, said bricks being tapering longitudinally and curved on top to conform to the arches, substantially as and for the purposes described.

2. In a crucible-furnace, the combination of a hearth, walls inclosing and forming a heating-chamber above the same, said walls being provided with flues for the ingress of air and gas and the egress of products of combustion, flue-caps consisting of longitudinally-tapering bricks conforming to the shape of the hearth and heating-chamber in front, arches resting upon such flue-caps, and the outer wall of the furnace abutting against the rear of said flue-caps, substantially as and for the purpose specified.

In testimony whereof I have hereunto set my hand this 2d day of December, 1881.

HENRY SWINDELL.

Witnesses:

T. B. KERR,
L. C. FITLER.