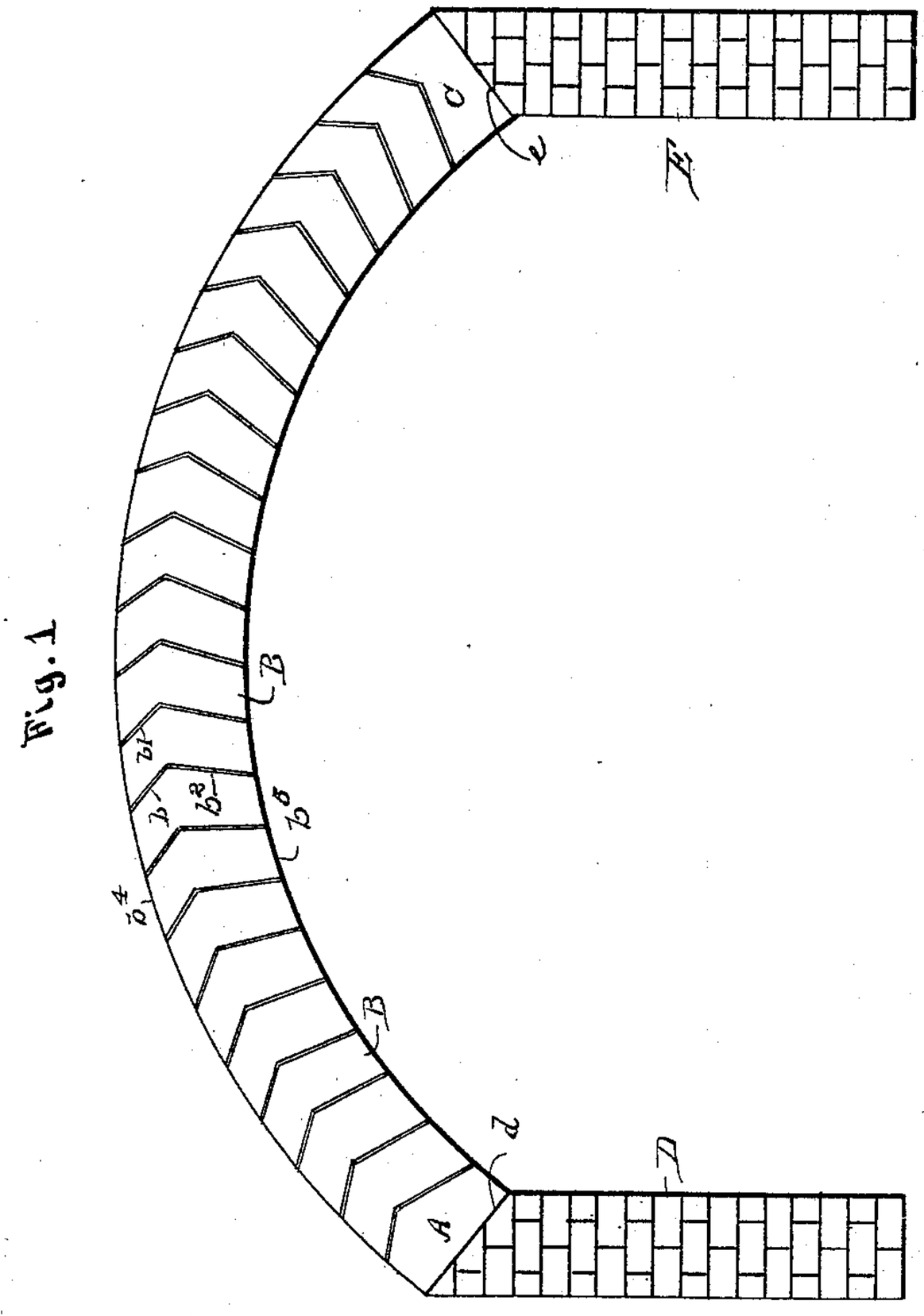
No. 624,270. Patented May 2, 1899.

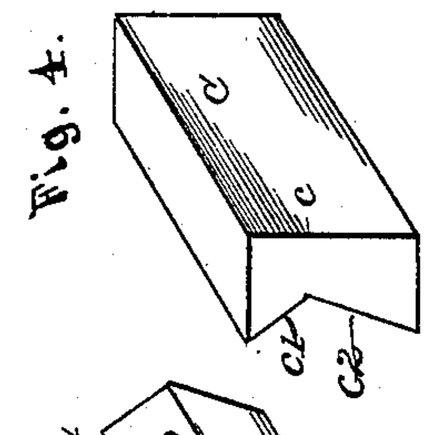
H. S. VROOMAN.

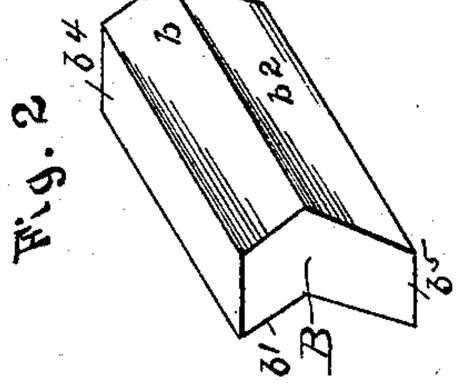
FIRE BRICK ARCH FOR FURNACES.

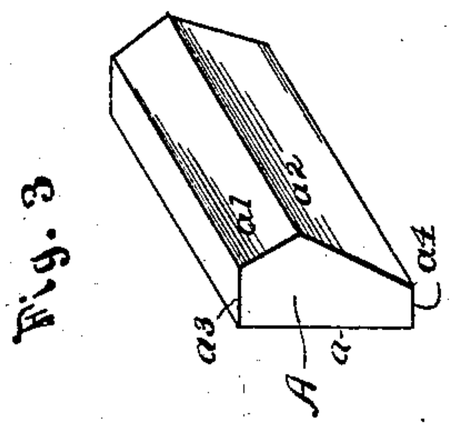
(Application filed Nov. 12, 1898.)

(No Model.)









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UNITED STATES PATENT OFFICE.

HARRY S. VROOMAN, OF CHICAGO, ILLINOIS.

FIRE-BRICK ARCH FOR FURNACES.

SPECIFICATION forming part of Letters Patent No. 624,270, dated May 2, 1899.

Application filed November 12, 1898. Serial No. 696,209. (No model.)

To all whom it may concern:

Be it known that I, HARRY S. VROOMAN, a citizen of the United States, and a resident of the city of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Fire-Brick Arches for Furnaces and Ovens, of which the following is a specification.

The objects of my improvements are to provide an arch of this character which shall be stronger than the arches composed of the common tapering or keystone-shaped brick, in which there will be no possibility of the brick dropping out of the arch when the latter expands or the bricks contract from changes of temperature or when the side walls spread, as they frequently do, in which there will be no diminution of wearing or burning surface as compared with the arch-brick ordinarily used in furnaces, and in which there will be increased binding or wedging exerted by the various brick composing the arch.

In carrying out the objects above set forth I employ fire-brick of peculiar conformation and adopt a construction the novel features of which are illustrated in the accompanying drawings, which form a part of this application, in which—

Figure 1 represents in elevation a furnace-arch constructed in accordance with my ideas. Fig. 2 is a perspective view of the fire-brick composing the body of the arch. Fig. 3 is a perspective view of the fire-brick set at one end of the arch, and Fig. 4 is a perspective view of the brick set at the opposite end of the arch.

The body of my improved arch is composed of a plurality of bricks B, the number employed depending on the span of the arch to be built. The diameter of the span and the rise of the arch also affect the variations in the cross-diameters of the upper or extrado edge of the brick and the lower or intrado edge of the brick composing the arch. The brick B may be of any suitable vertical or cross-diameters, and the proportions and degree of inclination of the angles shown in the drawings may be varied without departure from the principles involved in its construction. For ordinary purposes the brick B is preferably formed with its upper and lower edges parallel and with its upper inclined faces b b' about one-third the vertical diameter of the brick; but this may be varied. The cross diameter of the upper edge b^4 of the brick is greater than the cross-diameter of the lower edge b^5, and there is a gradual taper between said edges, which extends throughout the vertical diameter of the brick, thus giving a keystone or wedge-shape configuration to the sides of the brick.

The ends of the arch are formed with brick A and C, respectively. The brick A is formed with a straight face a, with outwardly-inclined faces a' a^2, and with its upper and lower edges parallel, and the cross-diameter of the upper edge a^3 is greater than the cross-diameter of the lower edge a^4, as shown in Fig. 3. The angle or inclination of the face a' is somewhat less than forty-five degrees and the angle of the face a^2 is greater than forty-five degrees in the brick shown; but, as above stated, these angles are varied in the construction of arches of different diameters. The brick C has its upper and lower edges parallel and said edges formed at approximately right angles to the side face c, which is straight. The opposite faces c' and c^2 are inwardly inclined, their proportions and the angles of inclination corresponding with the faces b and b^2 of the bricks B. The cross-diameter of the upper edge of the brick C is preferably slightly greater than the cross-diameter of the lower edge, as clearly shown in the detail of said brick, Fig. 4.

In the construction of my improved arch I place the brick A with its straight face a to the inclined face d at the upper end of the wall or abutment D and with its wider edge to the extrado face of the arch. I then set the bricks B in position to form the body of the arch, and at the opposite wall or abutment E, I set the brick C with its straight face to the upper end e of the wall, when the arch is complete.

It is proper to state that the normal plane of the side faces of the brick would be a straight line drawn from the upper right-hand corner to the lower right-hand corner and from the upper left-hand corner to the lower left-hand corner. From the latter plane there is a depression, which is formed by the inwardly-inclined faces, the widest point of which is at the place of meeting of said faces.

From the former plane there is an elevation or shoulder formed by the outwardly-inclined faces, the greatest cross-diameter of which is at the meeting of said faces, which, as shown and described, is at a point above the longitudinal center of the brick.

I have shown in the accompanying drawings an arch formed with brick in which the angle formed by the inclined faces meets at a point above the longitudinal center of the brick. The object in thus constructing the brick is to give it greater wearing-surface than would be possible if such angle was below or at the center. Thus the brick may be worn or burned away more than one-half of its vertical diameter and still be supported by the shoulder formed by the angular faces. A further advantage of having the converging line of the faces above the horizontal center is that the brick expand to a greater degree at their lower edges than at the top and the angle forms to a certain extent a pivotal point, on which they turn in the direction of their line of expansion. If this point was below the center, the upper edge of the arch would be expanded to a greater degree than with the point where it now is.

I am aware that brick for building purposes have been made or patented with angular shoulders and indentations; but such constructions for fire-brick are not practical, especially where they are required for use in an arch, and I do not broadly claim such construction.

From the construction shown it is apparent that in addition to the lateral bearing afforded by the tapering or wedge shape of the bricks B bearing is also maintained between the contiguous faces b and b' and between b^2 and b^3, the angular sides of which form shoulders which afford direct support to the superimposed bricks, the line of pressure being vertical to the axis of the circle of which the arch is a segment. Thus an arch may expand not only to the extent equal to the variation between the diameter of the upper edge of the brick and the lower edge (as in the common form of wedge-shaped brick) before a brick can fall out, but it may also expand to the extent of the diameter of the inclination from the vertical line of the combined faces b and b' before there is any possibility of the brick dropping out. The same condition applies when the brick shrink, as they always do after being exposed continuously to great heat.

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

1. A fire-brick arch comprising brick having their upper edges wider than their lower edges, and gradually tapering throughout their length between said edges, and having one side formed with two inwardly-inclined faces, and the opposite side formed with two outwardly-inclined faces, said inclinations extending from the upper and lower edges of the brick, respectively, and meeting at a point above the longitudinal center of the brick, substantially as set forth.

2. An arch comprising interlocking tapering brick, each having a shoulder on one of its side faces, and a corresponding depression on its opposite face, said shoulder and depression having their greatest cross-diameters at a point above the longitudinal center of the brick, and end brick having faces corresponding to the contiguous faces of the intermediate bricks, substantially as set forth.

3. An arch comprising one end brick having a plane face, and its opposite side formed with inwardly-inclined faces meeting at a point above the center of the brick, another end brick having a plane face and its opposite side formed with outwardly-inclined faces, meeting at a point above the center of the brick, and intermediate bricks having their respective faces corresponding to the contiguous faces of the end bricks, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

HARRY S. VROOMAN.

Witnesses:
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