

R. HILLS.
FIRE-PROOF BUILDING.

No. 173,953.

Patented Feb. 22, 1876.

Fig. 1.

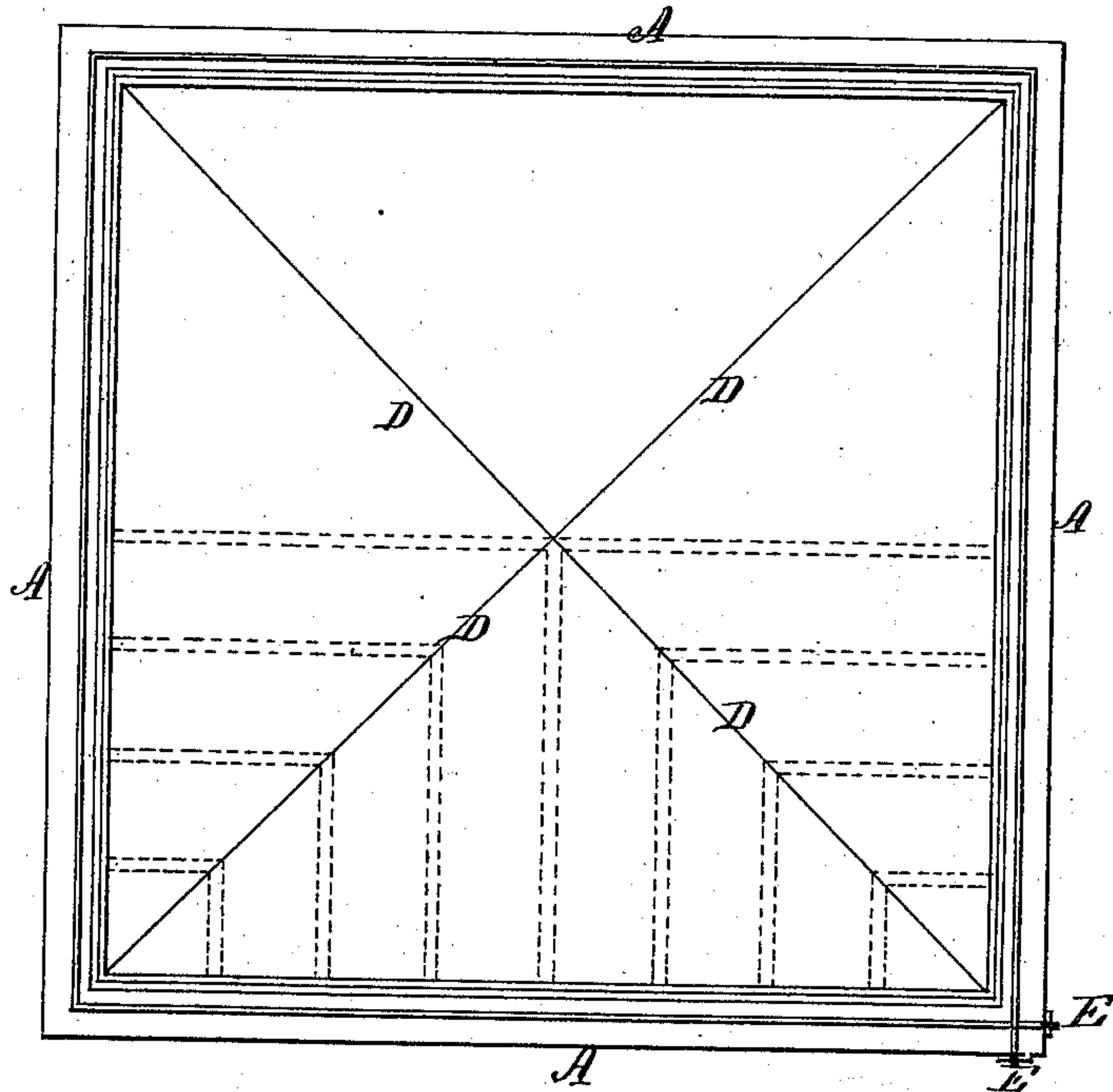
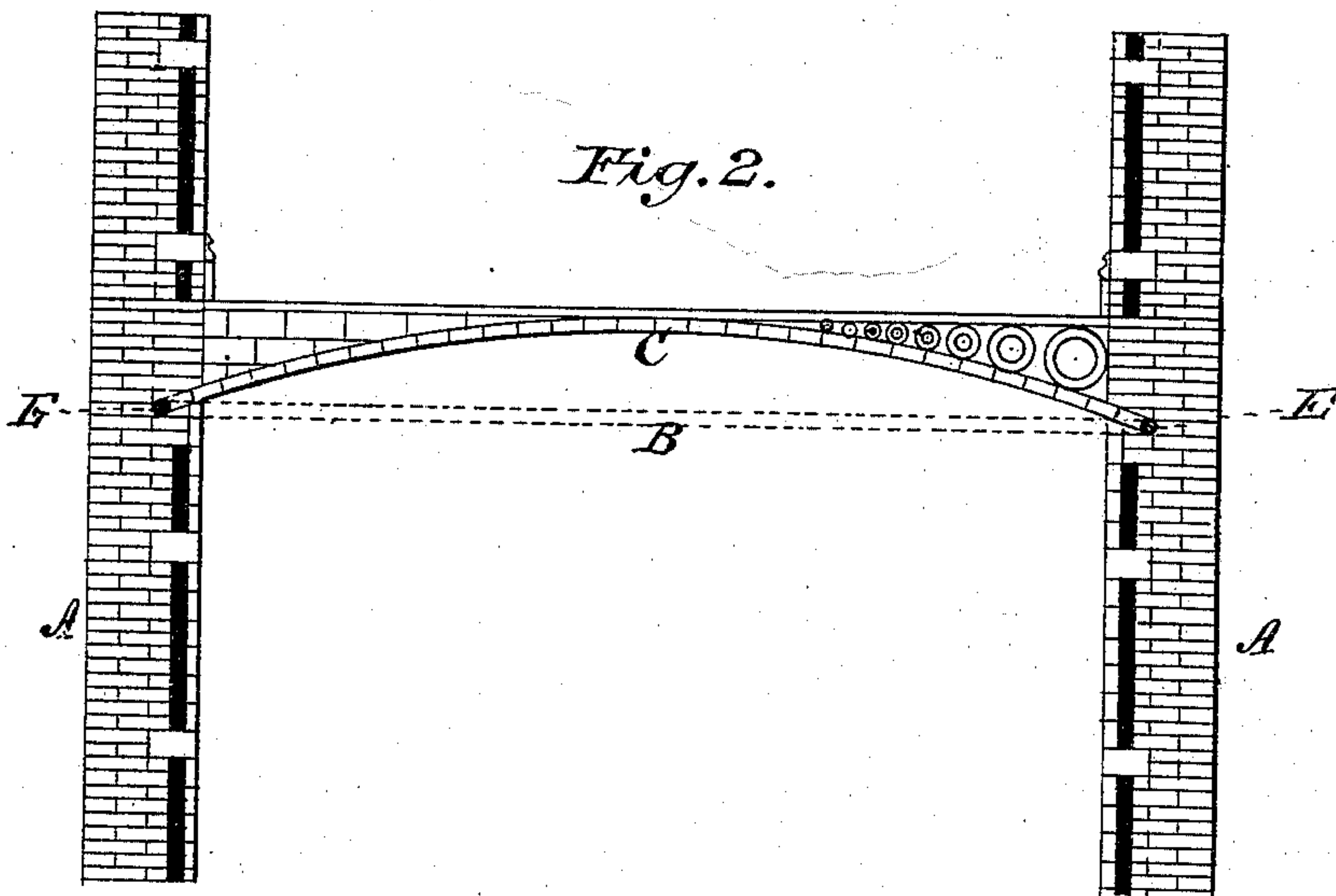


Fig. 2.



Attest:

Wm. H. Breton J.

R. M. Barn

Inventor:

Ralph Hills

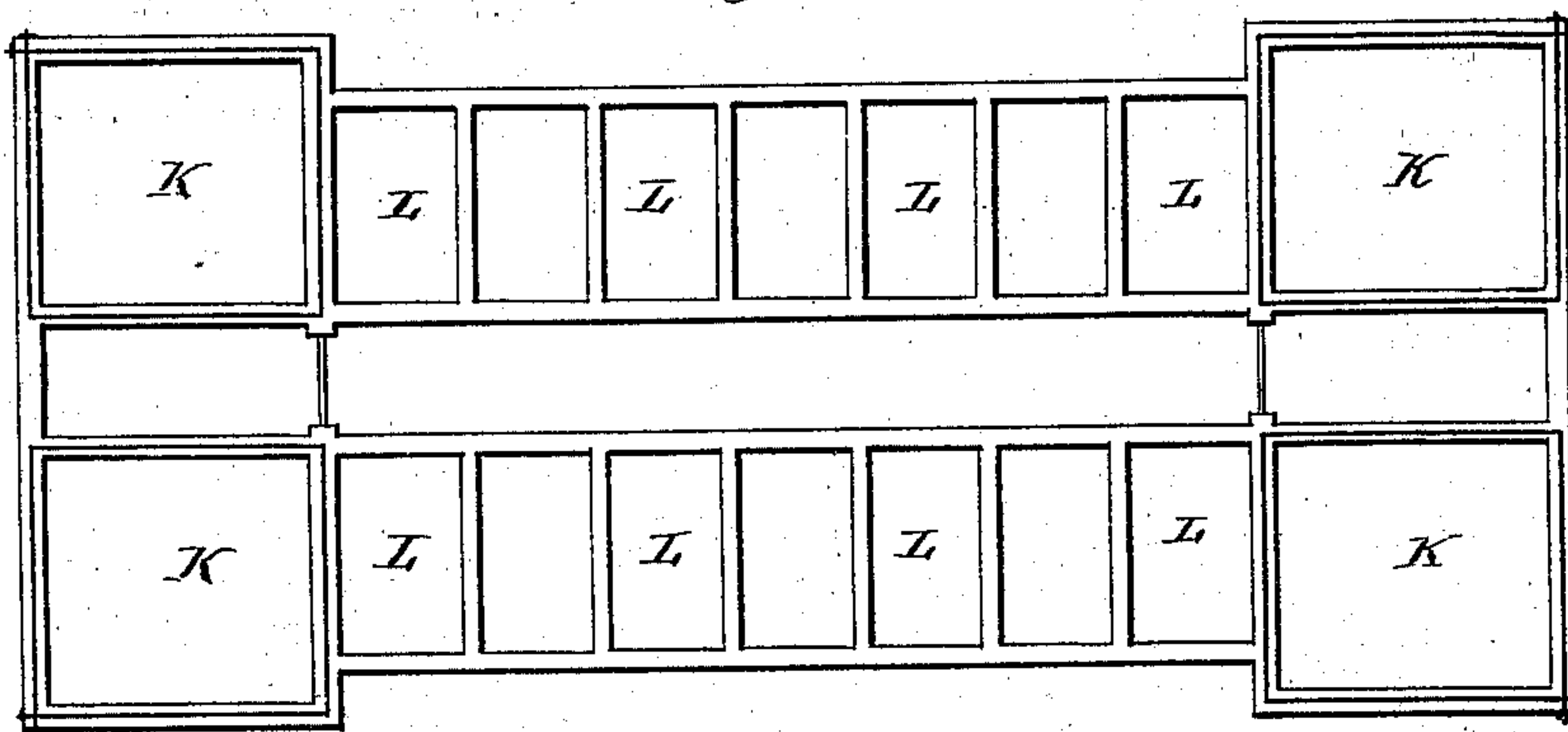
By Leggett & Leggett
attys.

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Fig. 5.



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UNITED STATES PATENT OFFICE.

RALPH HILLS, OF DELAWARE, OHIO.

IMPROVEMENT IN FIRE-PROOF BUILDINGS.

Specification forming part of Letters Patent No. **173,953**, dated February 22, 1876; application filed June 10, 1875.

To all whom it may concern:

Be it known that I, RALPH HILLS, of Delaware, in the county of Delaware and State of Ohio, have invented certain new and useful Improvements in Fire-Proof Houses; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to improvements in the construction of buildings, and more particularly to buildings constructed of masonry-work.

My invention consists in making the said buildings fire-proof in each of their apartments, by arching the ceilings with brick from all sides of the room to the center, and placing a belt of wrought-iron or steel rods, of sufficient size, within the walls, so as to embrace the entire arch at the level of the springing-line of said arches, substantially as hereinafter set forth and claimed.

In the drawings, Figure 1 represents a plan view of an apartment, representing the belt of iron or steel embracing the springing-line of the arches which form the ceiling. Fig. 2 represents a vertical sectional view of such an apartment.

A are the supporting-walls; B, the springing-line of the arch; C, the arch itself, which, arising from the four sides of the apartment, unite at the center and along the groined lines D. E represents the series of rods, firmly united at the corners of the apartment and at all intersections, so as to form a continuous wrought-iron or steel belt, embracing each apartment at the springing-line of the arch, so as to resist the thrust of said arch.

It will be observed that in an apartment arched in this way, from the four sides to the center, the greatest horizontal thrust is in the direction of the flattest arch, and it is evident that the flattest arch is that formed by the groin-lines. The horizontal thrust, therefore, in such a structure, is greatest at the four corners of the room or apartment.

It is therefore evident that the rods E cannot yield along the middle, because, in order to yield in that way, there necessarily would

have to be a corresponding shortening of the arch on the groin-line; but this is impossible, owing to the fact that the greatest outward strain is at the corners of the rooms upon that line.

The rods E are embraced in the body of the walls A of the structure, where they are out of sight, and also safest from accident or action of heat. The rods E receive the entire thrust of the arches that form the ceiling of the apartment, and, as a consequence, the walls A need only be of sufficient thickness to afford enough strength to support the weight of the superincumbent structure.

When the thin arch C is constructed, it is to be further strengthened and stiffened by forming on its upper surface ribs of brick laid on their faces or edges, with plaster-of-paris or cement, running from the side walls A parallel with each other toward the center of the apartment. (See Figs. 1 and 2.)

When a cement or tile floor is to be laid over this arch, the spaces between the ribs are to be filled with brick arches laid in cement, from rib to rib, at right angles to the walls, or with hollow tiles or broken brick, or any other firm, but light, incombustible material, made firm and solid, with suitable mortar or cement, to make a smooth, level, hard surface to receive the tile or other hard floor finish.

When a board floor is to be laid, the filling between the ribs may be dispensed with, and strips of wood can be laid upon and across the ribs and the flooring-boards laid upon them.

The vaulted arch C, Fig. 2, with its iron or steel belting, is to be placed also at the top of all the upper apartments of the building to aid in fire-proofing the roof. The roof may be of any desirable form or fashion; but to be fire-proofed fully the essentials are the iron-bound brick arches C immediately beneath it, and the upper surface of the roof to be made of sheet-iron, slate, tile, concrete, or other incombustible material.

In forming a ceiling of this nature, I prefer to employ ordinary, but well-burned and good-shaped, bricks, placed edge to edge horizontally, or, in other words, presenting their flat surfaces downward, the arch being from two to two and a half inches thick.

My invention is not limited, however, to this mode of placing the bricks; but they may, if desired, be placed face to face horizontally, showing the long sides downward, or they may be placed face to face vertically, showing the ends downward. By placing the bricks edge to edge, united with the binding plaster-of-paris, or of cement, and bound by the iron or steel belt at the springing-line of the arch, I have found them sufficiently strong for all ordinary purposes of floor or of roof supports. I have also found that, when the arches are thus made, they are sufficiently strong for all ordinary purposes of floor and roof supports, if made to a radius of thirty feet. Other lengths of radii may be used, but that of thirty feet gives good results and sufficient strength over common-sized rooms.

The iron rods may be of any size deemed necessary; but I have found that round iron rods, from one and one-eighth to one and three-fourths inch in diameter, were abundantly sufficient. If steel rods are used, they may be smaller. In a house of many rooms these rods interlace, the whole structure being firmly secured at all corners and intersections, so as

to completely belt independently each important room.

When there are a number of rooms placed side by side, as shown in plan, Fig. 3, the extreme end rooms K should be arched and belted with iron or steel rods, as heretofore described; but the intervening rooms L can be arched from side to side only, without the use of the iron rods, as, having their arches abutting one another, and abutting the arches of the end rooms, which are securely belted, they are secure without the rods.

What I claim, therefore, as new, and desire to secure by Letters Patent, is—

In the construction of fire-proof apartments, the combination with the walls A of the arches C and metallic belt E, substantially as and for the purpose described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

RALPH HILLS.

Witnesses:

LEVERETT L. LEGGETT,
THOMAS B. HALL.