

No. 87,569.

PATENTED MAR. 9, 1869.

G. H. JOHNSON.
BRACING FOR CYLINDRICAL STRUCTURES.

Fig. 1.

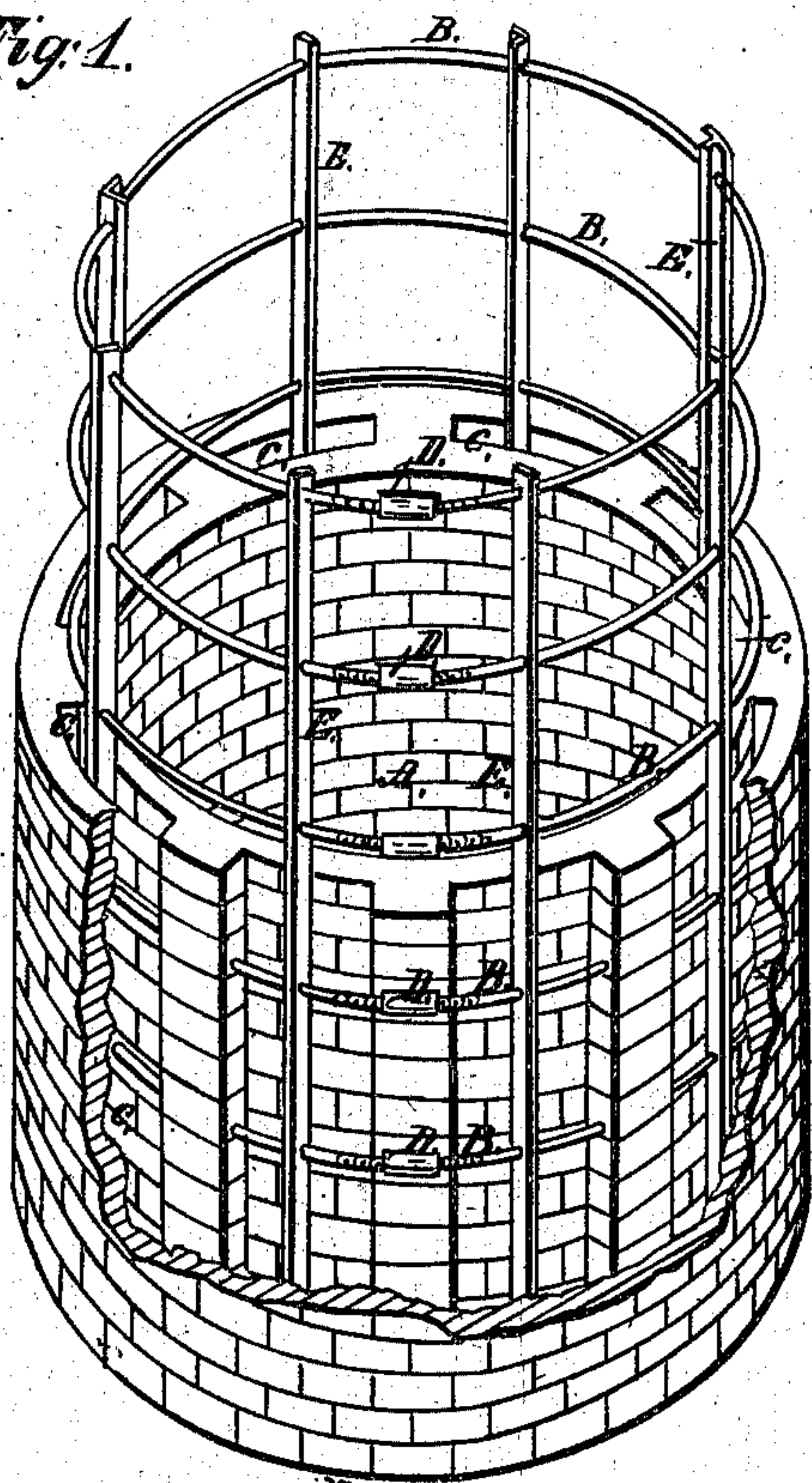


Fig. 2.

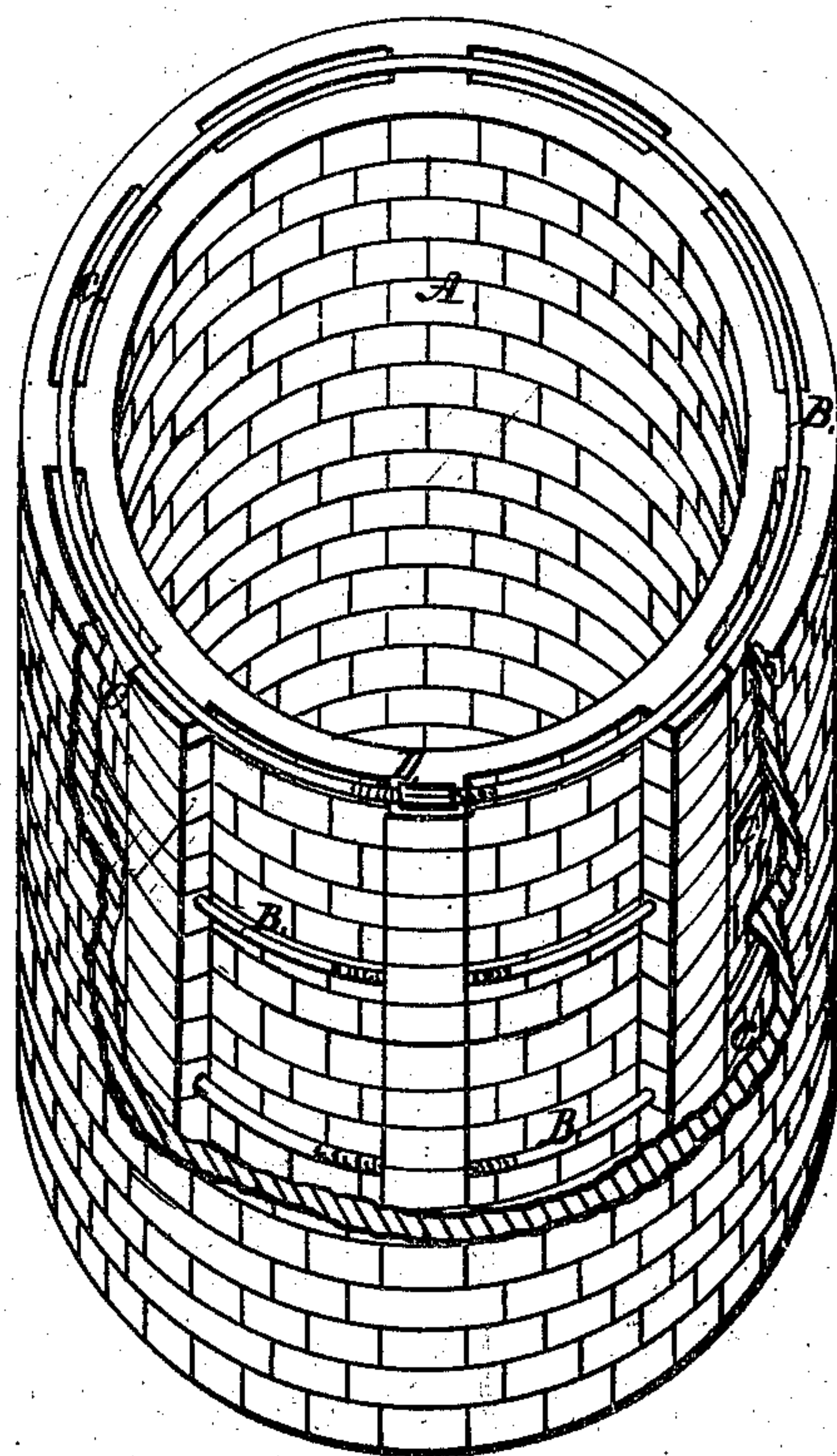
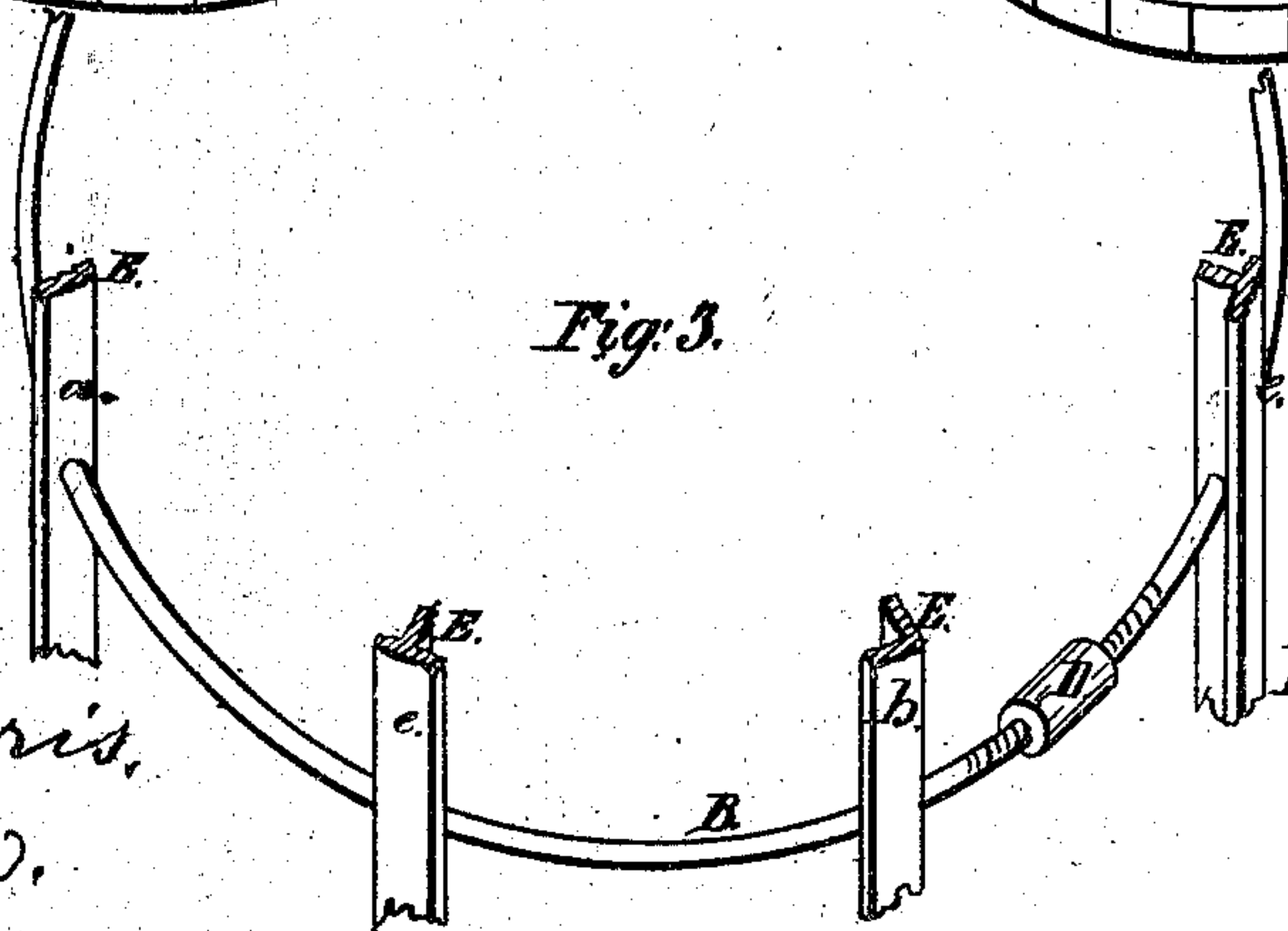


Fig. 3.



Witnesses.

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GEORGE H. JOHNSON, OF BUFFALO, NEW YORK.

Letters Patent No. 87,569, dated March 9, 1869.

IMPROVED BRACING FOR CYLINDRICAL STRUCTURES.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, GEORGE H. JOHNSON, of Buffalo, in the county of Erie, and State of New York, have invented a new and useful Improvement in Bracing and Strengthening the Walls of Cylindrical or Polygonal Structures; and I do hereby declare the following to be a full and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is an elevation, partially in section, of a cylindrical bin partially constructed.

Figure 2, a similar view of a cylindrical bin, strengthened by tension-bars, or bands alone.

Figure 3 illustrates different forms and descriptions of vertical stay-rods, or bars.

Similar letters indicate like parts in each of the drawings.

My invention relates to a new and improved mode of bracing and strengthening the walls of cylindrical or polygonal grain-bins, and like structures, by means of iron stays and supports; and

It consists—

First, in the insertion of a series of horizontal annular tension-bars, at suitable intervals, within the circular or polygonal walls of such structures, the ends of each bar being so united as that it shall form an endless, unbroken band, or circle, within the wall; and,

Second, in the combination, with such horizontal endless tension-bars, of vertical connecting-rods or plates, so as to form a metallic frame within the wall of the structure.

My invention is especially designed for the purpose of strengthening the hollow walls of cylindrical grain-bins constructed of brick.

Heretofore, such walls have been strengthened by means of iron bond-plates, cast in sections, and laid in horizontal courses in the brick walls, the several courses of bond-plates being united by vertical tie-rods and bolts.

These bond-plates are very expensive, and, unless firmly tied together, they are comparatively useless in strengthening the circular walls against the outward pressure of a bulk of grain enclosed therein, for, being cast in segments, the outward thrust, or strain, of a pressure thereon, from within, has a tendency to separate them at their joints.

To obviate these objections to the use of cast-iron bond-plates, as heretofore employed, and for which Letters Patent have heretofore been granted, I insert, at regular intervals within the interior space, *c*, of the hollow wall of a cylindrical grain-bin, *A*, wrought-iron bars, or rods, *B*, of comparatively small diameter.

The bars *B* are bent to conform to the curve of the wall, and are laid horizontally, at equal distances apart, upon the courses of brick, as they are laid up, so as to extend within the hollow space *c* of the wall. Their ends are threaded to the right and left, respectively, so that when they meet they may be caught and drawn

together by a right and left-threaded nut, *D*, by means of which the circumference of the circular band, formed by the tension-rod, or bar, may be tightened and reduced as required, after it has been placed in position upon the course of bricks in the wall.

Although I prefer to use one continuous bar in forming the circular band *B*, it may be formed by two or more rods, or sections united by nuts or otherwise, to form an unbroken band, as described.

It is evident that the thrust, or strain, upon such bands, or annular tension-bars, created by the outward pressure of a mass of grain within the cylindrical bin, tending to spread open and separate the arch of the walls, will operate to burst, or break asunder the bands, and hence, act upon them wholly in the direction of their length, so that the strain thereon will be a tensile one, which will be resisted by the maximum strength of the metal. I am, therefore, enabled to use a comparatively small, light rod, in forming the bands to be used in combination with the brick wall, and yet obtain therein sufficient strength to resist all possible strain thereon, and I thus gain the requisite sustaining-force with far less expense than in the use of the old forms of bond-plates.

In order to strengthen the cylinders of masonry vertically, as well as laterally or radially, I combine, with the horizontal annular tension-rods *B*, vertical rods or plates, *E*, extending, within the hollow space *c*, from the top to the bottom of the wall, and which are combined with the series of horizontal annular tension-rods, either by means of eyes, formed at proper intervals along their length, through which the horizontal bars shall be inserted, as illustrated in figs. 1 and 3 of the drawings, or by being secured thereto in any other suitable manner.

These vertical stay-rods *E* may be made of plain bars, *a*, fig. 3, or of angle-bars, *b*, or T-bars, *c*. They are firmly secured at the bottom to the foundation of the structure, and are made to clamp it down firmly and securely, by means of nuts bearing upon plates on the upper surface of the walls, so as to tie and firmly clamp the whole structure together upon its foundation, and, in combination with the annular bands, they constitute a supporting-frame for the masonry, which will impart thereto immense strength, in proportion to the thickness of the walls. The walls thus strengthened are also left perfectly clear, smooth, and uniform in surface and finish, both within and without.

Although my invention is more especially adapted to light, hollow walls, made of porous bricks, such as are preferable in the construction of granaries, I contemplate the application thereof to the construction of solid walls, as I obtain thereby great strength in the wall, at greatly less expense than by any of the methods heretofore designed or employed, and at the same time produce a wall having a smooth, even surface on both sides thereof.

Having thus fully described my invention,

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

1. A series of annular tension-bars, or rods, placed horizontally within the walls of cylindrical or polygonal elevator grain-bins, or other similar structures of masonry, and combined therewith, substantially in the manner herein set forth.

2. In combination with a series of horizontal annular tension-bars, or rods, inserted within the walls of a grain-bin or other cylindrical or polygonal structure of masonry, vertical bars or plates, framed and united or

secured to said tension-bars, substantially as herein described.

The foregoing specification of my improvement in the mode of bracing and strengthening the walls of cylindrical or polygonal structures, signed by me, this 14th day of January, 1869.

GEO. H. JOHNSON.

Witnesses:

DAVID A. BURR,
HENRY M. GAYLORD.