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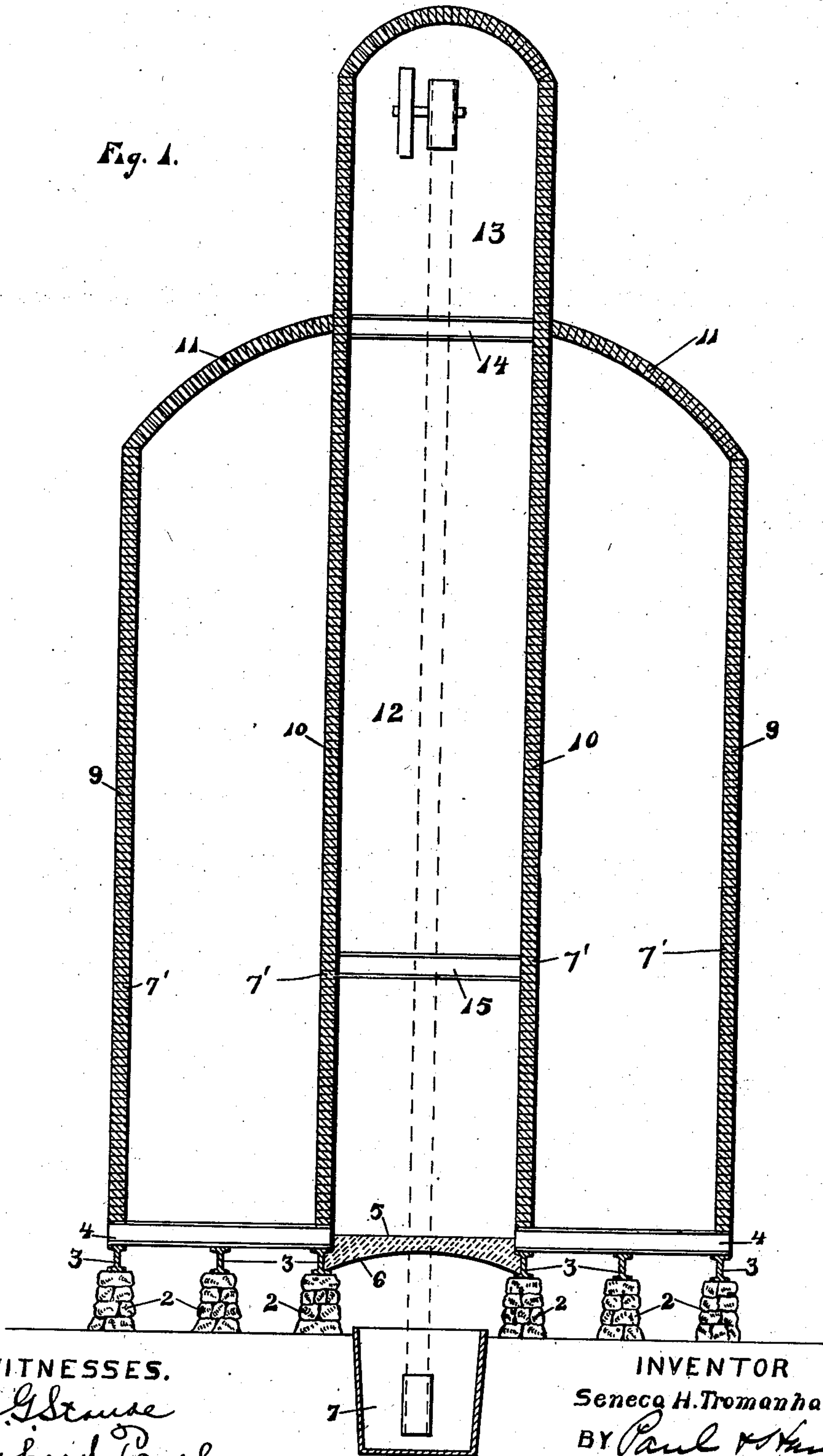
Patented June 10, 1902.

S. H. TROMANHAUSER.
ELEVATOR OR STORAGE HOUSE CONSTRUCTION.

(Application filed Mar. 23, 1901. Renewed Jan. 31, 1902.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES.

E. G. Stouse
Richard Paul,

INVENTOR

Seneca H. Tromanhauser.

BY *Paul & Stanley*
HIS ATTORNEYS.

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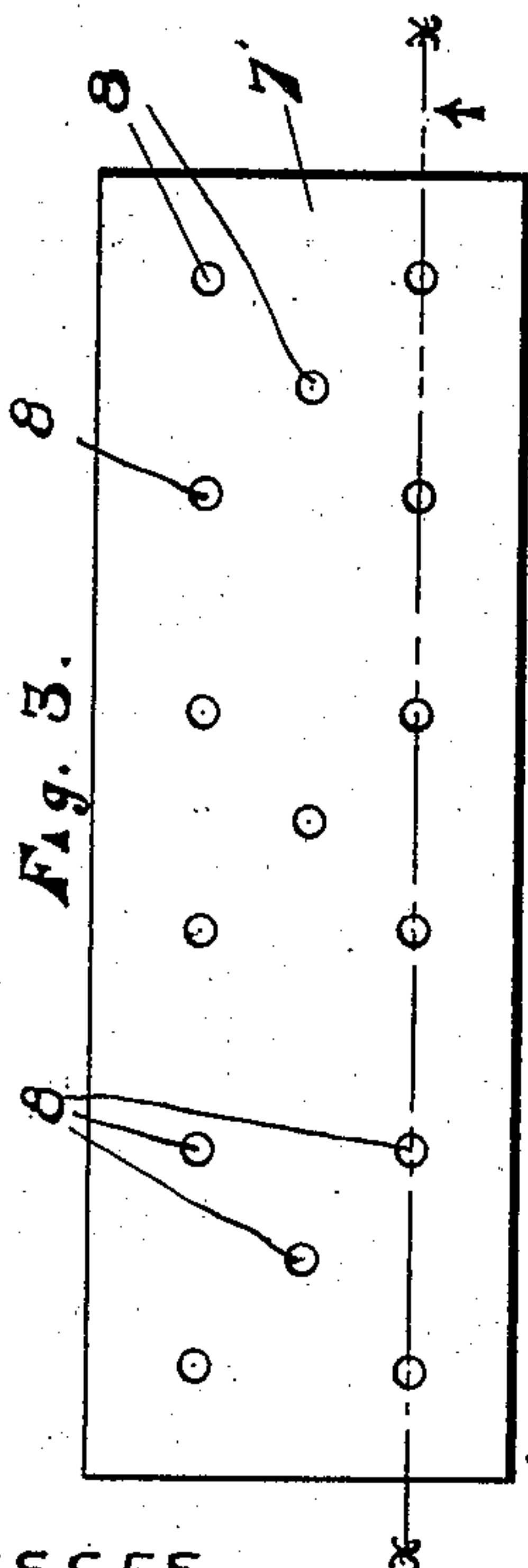
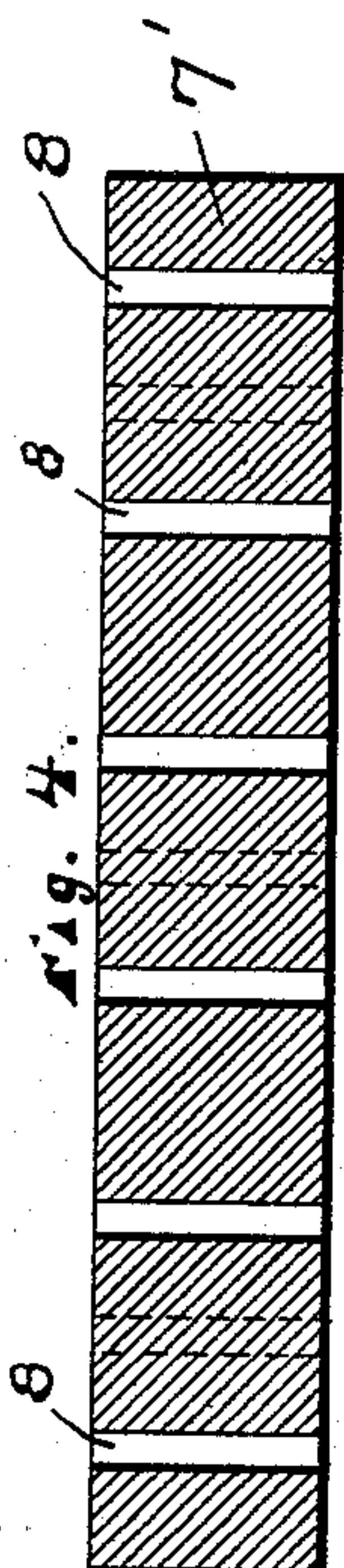
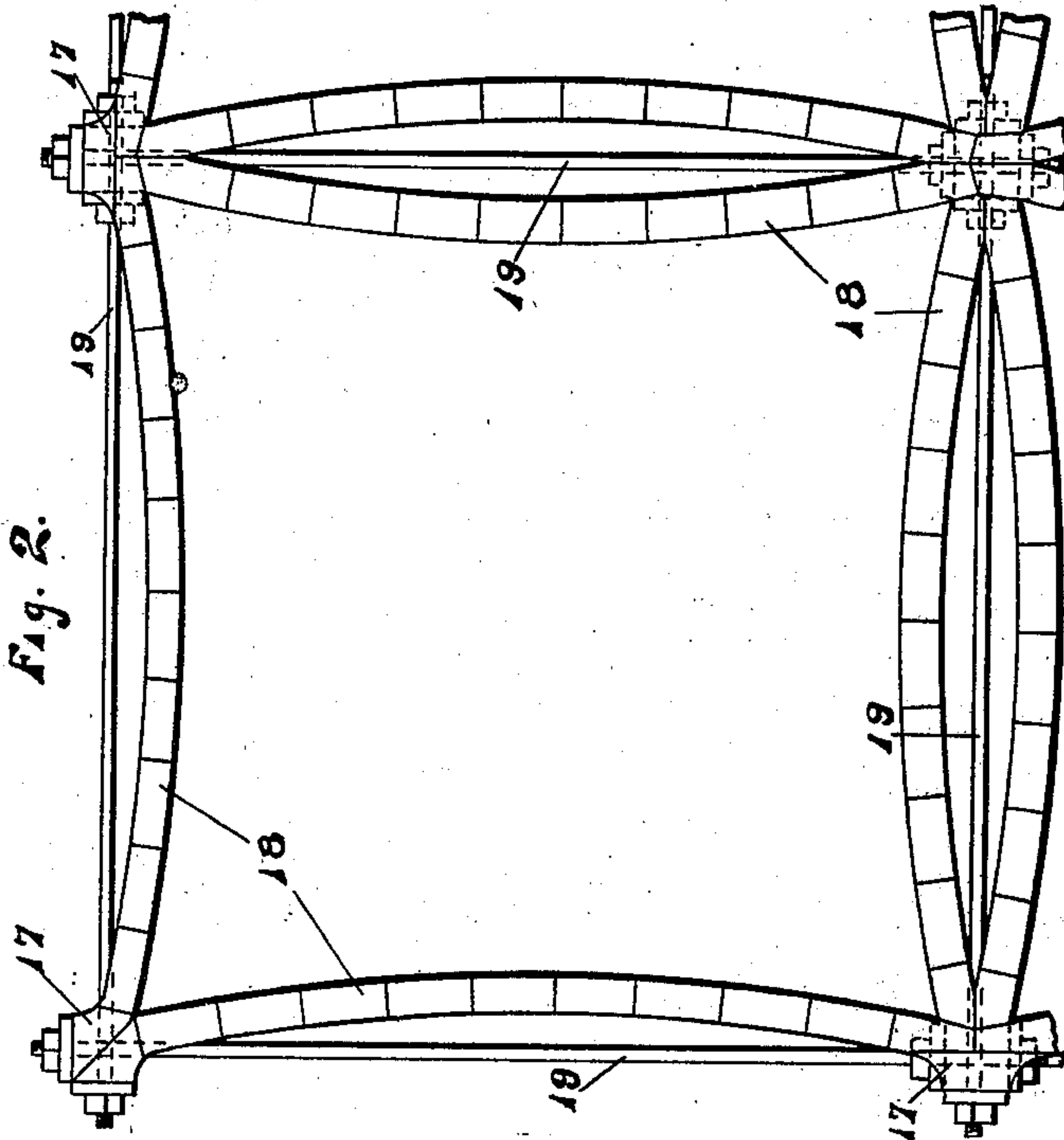
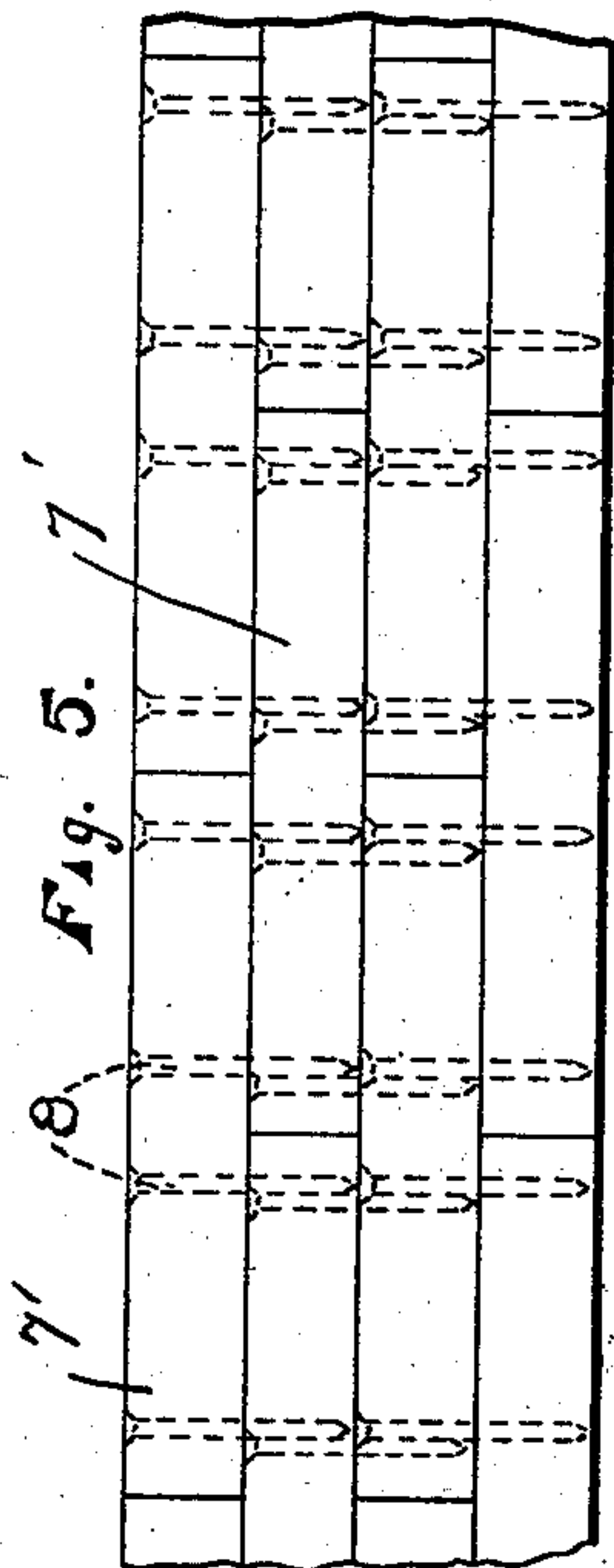
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WITNESSES

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UNITED STATES PATENT OFFICE.

SENECA HAVER TROMANHAUSER, OF MINNEAPOLIS, MINNESOTA.

ELEVATOR OR STORAGE-HOUSE CONSTRUCTION.

SPECIFICATION forming part of Letters Patent No. 702,118, dated June 10, 1902.

Application filed March 23, 1901. Renewed January 31, 1902. Serial No. 92,073. (No model.)

To all whom it may concern:

Be it known that I, SENECA HAVER TROMANHAUSER, of Minneapolis, in the county of Hennepin, State of Minnesota, have invented
5 certain new and useful Improvements in Elevator or Storage-House Construction, of which the following is a specification.

The invention relates to grain-elevator or warehouse construction; and the object of the
10 invention is to provide an elevator or storage-bin wall that will withstand any bulging or lateral strain arising from the pressure or weight of the grain and will also be of more simple and economical construction than any
15 wall heretofore employed for this purpose.

A further object is to provide a wall that will be fireproof and moisture-proof and will even absorb the moisture from damp grain that may be placed in the bins.

20 The invention consists generally in an elevator or storage-bin having each of its walls in the form of an arch that lies in a substantially vertical plane, with its convex surface on the inside of the bin, and suitable columns
25 at the ends of each arch, supporting the same against horizontal thrust.

Further, the invention consists in various constructions and combinations, all as hereinafter described, and particularly pointed out
30 in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is a vertical section of a grain-elevator embodying my invention. Fig. 2 is a horizontal section of the
35 bin constructed in accordance with my invention. Fig. 3 is a plan view of one of the blocks of which the wall is composed. Fig. 4 is a longitudinal section on the line xx of Fig. 3. Fig. 5 is a side elevation of a wall
40 embodying my invention.

In the drawings, 2 represents the stone foundation of an elevator; 3, horizontal rows of I-beams resting upon said foundation and whereon the elevator proper is built.

45 4 represents cross-beams, between which is the working floor 5 of the elevator, occupying a line along the center of the same and resting upon an arch 6, whose ends bear upon the inner rows of I-beams 3. Beneath the
50 arch 6 is the ordinary elevator-boot 7. Upon each side of the working floor 5 are rows of grain-bins. The walls of the elevator form the outer walls of these bins and must be constructed in a very substantial manner in

order to withstand the extreme bulging strain 55 or pressure arising from the weight of the grain.

It has been customary heretofore to construct elevators of wood; but owing to the very heavy construction required it has been
60 found that wood in many ways was unsuitable, as it is desirable that the modern grain-elevator should be absolutely fireproof. Buildings of this character have been constructed of tile of special form built around
65 or within a skeleton steel or iron frame, and solid cement walls have also been employed in the construction of the bins. It has been found, however, that this method of building grain-elevators was very expensive, and in
70 some cases bin-walls of cement have been unable to withstand the bulging strain, though the walls were tied together in various ways. To obviate all these objections and difficulties to the various constructions heretofore
75 employed, I have devised a bin or elevator wall which consists in providing a block 7, of the ordinary brick, tile, or cement material, having a series of holes 8 provided at intervals therein. These bricks may be made in
80 various sizes, according to the size of the elevator to be built and the capacity of the bins. The length of each brick, however, will have a fixed ratio to its width, preferably either
85 two, three, or four to one, so that in constructing a bin-wall the blocks can be fitted together at the corners. As shown in Fig. 4, the holes in the blocks extend through the same from top to bottom and are formed
90 therein when the block is made usually by a stamp or die having a series of pins that will perforate the material of the block before it is burned or becomes hardened. These holes
95 are a suitable distance apart and preferably set in from the edge of the block and are of suitable size to receive suitable wire nails or dowel-pins. The blocks are preferably of sufficient depth or thickness so that a spike
100 when dropped into a hole in a block will be long enough to extend through two blocks placed one upon the other. The holes will be formed and the blocks will be laid in the walls so that the holes of one block will register with those directly beneath. The rows of
105 blocks will be laid in cement or mortar and the holes filled with the same material. The nails or pins will then be forced into the holes, and the cement will set around them, so that

the blocks will be securely tied or bound together and lateral twisting or bulging of the wall will be prevented. In building the elevator-wall and the bins the blocks will be laid
5 in the same manner as an ordinary brick would be, and as the courses are laid one above the other the pins will be dropped into place, their upper ends or heads covered with cement or mortar, and the construction of the
10 wall continued to the top of the bin.

In Fig. 3 I have shown the holes arranged in three groups, five in each, and in forming the corners of a square bin the ends of the blocks of one wall will be pinned to the first
15 group of holes in the adjoining wall, and as this group of holes will occupy one-third the length of the block, the proportion of the one I have shown being three to one, it follows that the blocks will fit together accurately at
20 the corners.

In Fig. 1, 9 and 10 represent the walls of a bin constructed in the manner heretofore described, and 11 is a curved wall at the top of the bin, also forming a part of the elevator-roof. 12 represents a bin occupying a position at the center of the elevator, above which is a cupola 13, having walls formed, preferably, by continuing the walls 10 above the roof. I-beams 1, 4, and 15, arranged at
25 intervals between the walls 10 and 11, support and brace the same.

In Fig. 2 I have shown a bin provided at each corner with vertical columns or pilasters 17, constructed with the blocks heretofore
35 described or of ordinary masonry, or steel columns may be employed, if preferred, and between these columns and bearing upon the same are inwardly-curved arches 18. These arches may be composed of ordinary brick or
40 tile blocks, as shown, or I may use the perforated blocks pinned or tied together, as heretofore described, or concrete construction may be employed, if preferred. The ends of the arches are preferably connected and
45 supported against horizontal thrust by the tie-rods anchored in the columns 17 at intervals from the top to the bottom of the bin. The arches 18 when made of common brick or tile connected by the tie bars or rods will
50 form a very economical substantial structure capable of resisting great internal pressure and is a construction particularly adapted for large bins. The arches will be even stronger when composed of the perforated
55 blocks pinned together, as they will then form a complete homogeneous mass that will be even more rigid and substantial than when in one solid piece. This arched construction of bin may be employed in either country or
60 terminal elevators and the storage-bins for the same and in warehouses of all descriptions where a wall that is capable of withstanding extreme lateral pressure and of economical fireproof construction is desired.

65 It will be understood that I do not confine myself to any particular form of block to be used in the construction of these vertical

arches, nor to the number or size of the perforations in the blocks when blocks of this character are employed, as the same may be
70 modified in various ways to suit the different styles of construction and the size of the bins, the essential feature being the bin-walls made in the form of double vertical arches of either the perforate or imperforate blocks or bricks
75 or of concrete.

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

1. An elevator or storage-bin having each
80 of its walls in the form of an arch that lies in a substantially vertical plane with its convex surface on the inside of the bin, suitable upright columns or pilasters at the ends of each arch, each column or pilaster forming a
85 support horizontally for two or more arches, and tie-rods anchored in said columns at intervals between the top and bottom of each arch and rigidly connecting its ends, substantially as described. 90

2. An elevator or storage-bin rectangular in form having each of its walls in the form of an arch that lies in a substantially vertical plane with its convex surface on the inside of the bin, suitable upright columns
95 or pilasters at the ends of each arch, each column or pilaster forming a support horizontally for arches at right angles to each other, and tie-rods anchored in said columns at intervals between the top and bottom of
100 each arch and rigidly connecting its ends, substantially as described.

3. A series of abutting storage-bins substantially square in cross-section, each bin having its walls in the form of an arch that
105 lies in a substantially vertical plane with its convex surface on the inside of the bin, the ends of each arch meeting the ends of the arches forming the abutting walls of the same bin and also meeting the corresponding ends
110 of the oppositely-curved arch of the adjacent bin and each arch forming a complete wall of the bin, upright columns or pilasters provided at the corners and intersecting the meeting ends of said arches, and tie-rods an-
115 chored in said columns and extending between the opposite arches at intervals between the top and bottom of the same and rigidly connecting their ends, substantially as described. 120

4. An elevator or storage-bin having each of its walls in the form of an arch that lies in a substantially vertical plane with its convex surface on the inside of the bin, suitable upright columns at the ends of each arch and
125 forming supports horizontally therefor, and means connecting said columns and binding or tying the arches together.

In witness whereof I have hereunto set my hand this 19th day of March, 1901.

SENECA HAVER TROMANHAUSER.

In presence of—

RICHARD PAUL,
M. C. NOONAN.