2 Sheets--Sheet 1.

D. L. EMERSON.

Construction of Houses.

No. 137,833. Patented April 15, 1873.

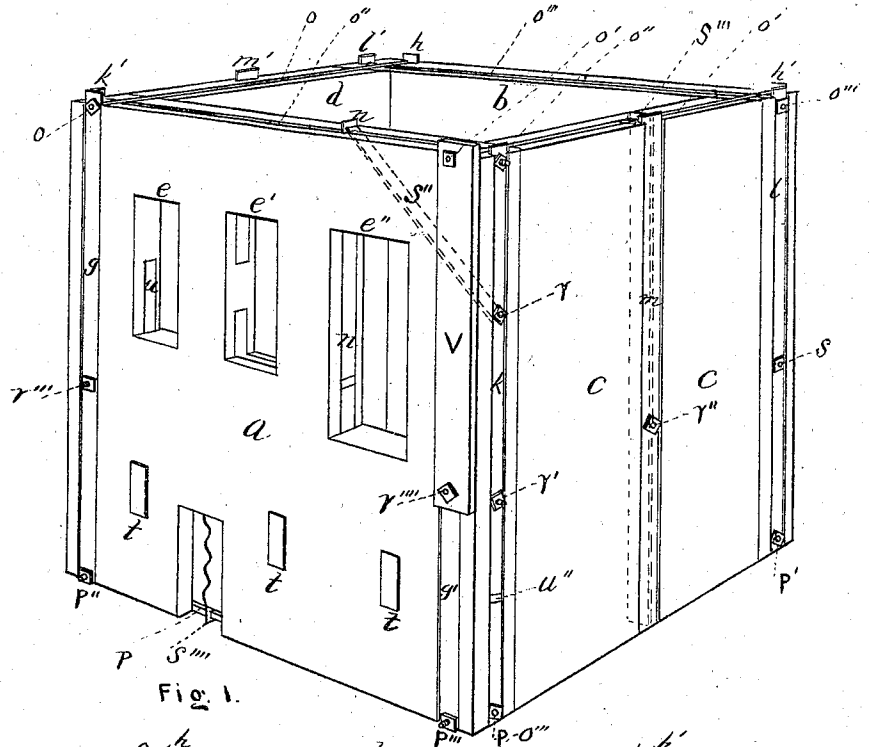

Fig. 1.

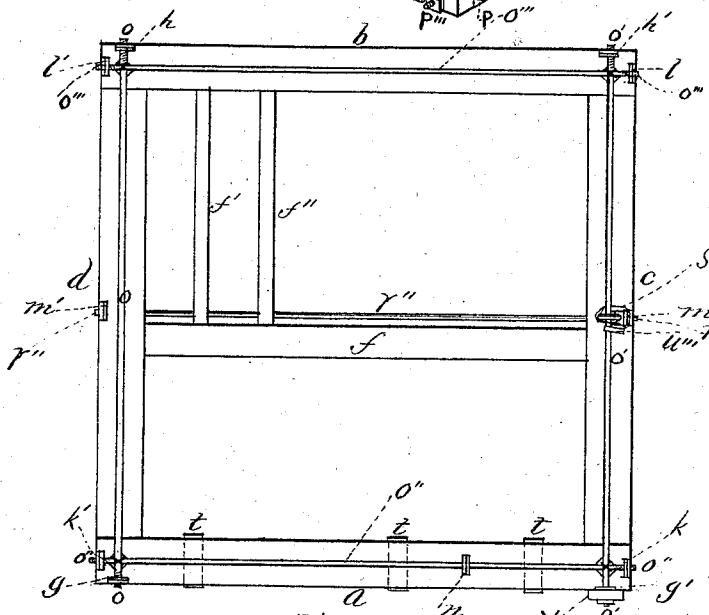

Fig. 2

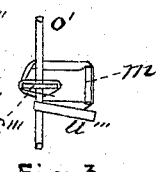

Fig. 3.

WITNESSES

E. H. Ober

D. J. Butler.

INVENTOR

David L. Emerson

by his Attys

Henry W. Williams & Co

A.M. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS)

2 Sheets--Sheet 2.

D. L. EMERSON.

Construction of Houses.

No. 137,833. Patented April 15, 1873.

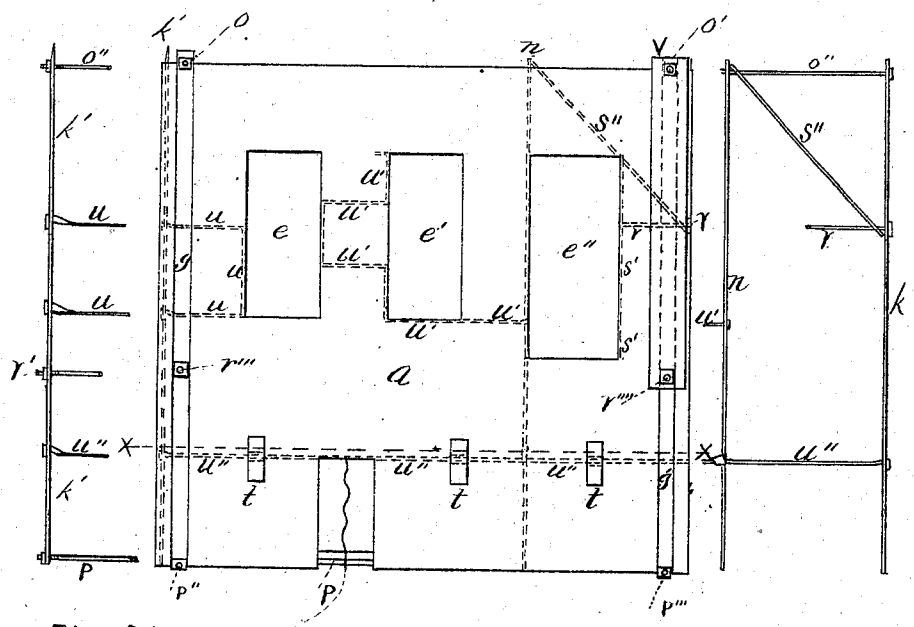

Fig. 5. Fig. 4. Fig. 6.

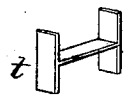

Fig. 8.

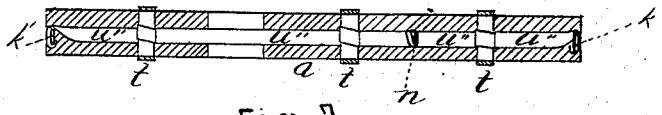

Fig. 7.

WITNESSES

E. H. Ober.

D. J. Butler.

David L. Emerson INVENTOR

by his Attys

Henry W. Williams & Co

AM. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS)

UNITED STATES PATENT OFFICE.

DAVID L. EMERSON, OF OAKLAND, CALIFORNIA.

IMPROVEMENT IN THE CONSTRUCTION OF HOUSES.

Specification forming part of Letters Patent No. **137,833**, dated April 15, 1873; application filed December 16, 1872.

To all whom it may concern:

Be it known that I, DAVID L. EMERSON, of Oakland, in the county of Alameda and State of California, have invented a Method of Rendering Walls and Structures Fire, Earthquake, and Tornado Proof, of which the following is a specification:

It is intended in this invention to provide a means by which buildings may be rendered indestructible by fire, earthquake, tornado, or other known force. This result is accomplished by strengthening the walls individually and the building as a whole, so that not only is each wall strengthened but all the walls are bound together, thus rendering the building, in one sense, as nearly as possible, independent of the ground upon which it is placed or even of the foundations.

Experience has shown that the effect of an earthquake and a large fire upon a brick building are the same to a large extent. Each cracks and warps the walls.

In this invention the walls are intended to be so constructed as to be beyond all danger of cracking, warping, twisting, or falling in an earthquake, tornado, or large conflagration.

My method of stengthening the walls is also a preventive against accident from other forces, such as pressure from the inside of a building or pressure in any direction or upon any part of a wall or structure.

The nature of the invention is fully described below.

In the accompanying drawing, Figure 1 is a view, in perspective, of the four walls of a building, or a portion of them, including the basement and first story. Fig. 2 is a view, in plan, of the structure represented in Fig. 1. Fig. 3 is a detached plan, showing the method of fastening certain portions fully described below. Fig. 4 is a front elevation. Figs. 5 and 6 are detached views of certain uprights and their attachments, as below described. Fig. 7 is a longitudinal section of the front wall in the direction and position of the broken line *x x*, Fig. 4. Fig. 8 is a view, in perspective, of one of the anchors.

Similar letters of reference indicate corresponding parts.

a is the front wall. *b* is the rear wall. *c* and *d* are the side walls. These four walls are supposed to be built of brick. *e* and *e'* represent openings for windows. *e''* is an opening for a door. These last, *e e' e''*, are represented as being in the first or lower story, the basement being below. *f f' f''* are timbers used in building the structure. *g* is an "upright" or post, the thickness and width of which are determined by the architect constructing the building. However, the upright would be probably about one-third as wide as the thickness of the wall, and from one-half to one inch thick. This upright extends from the top to or into the foundation of the building, and may be laid over the outside of the building, placed flush with the outside and painted or not to correspond with the color of the bricks, or placed inside the wall, say, one thickness of brick from the outside. It is made usually of iron, although, of course, any suitable substance may be used. This description applies to all the uprights shown in the drawing, and used in building, excepting those designated by the letter *s'*, *n*, and *s'''*. The upright *g* is connected (by means described below) with the upright *h*. The uprights *g'* and *h'* are similarly connected, as are also *k* and *k'*, *l* and *l'*, and *m* and *m'*. These uprights may be placed at the corners and in any other portion of the walls, and as many be used as thought desirable. They may be placed in the wall and at right angles with its surface, as in the case of the upright *n*, which extends from top to bottom of the wall *a*, passing along one side of the door-way *e''*. *o* is a straight rod, made of iron or other suitable material, extending from the upper part of the upright *g* to the upper part of the upright *h*. This rod is secured by a nut, or bolted or secured in any other manner, so that it binds the uprights *g* and *h* tightly against the wall and greatly strengthens the wall *d* through which it passes. The rods may be made round, square, or of any other shape, if desired, but must be drawn tightly, and, therefore, must necessarily be straight. They are carried through the center of the walls at intervals, as many being used as desired. The rods passing from the upright *g* to *h* are *o*, *r'''*, and *p''*. Those passing from *g'* to *h'* are *o'*, *r''''*, and *p'''*. These rods also pass through the upright *s'''*. The rods *o'''*, *s*, and *p'* pass from the upright *l* to the upright *l'*, and the rods *o''*, *r'*, and *p* pass from the upright *k* to the upright *k'*. The rod *r''* connects the uprights *m* and *m'*. The posi-

tions of the rods merely illustrate the manner in which the walls are strengthened.

In order to show how a short upright may be used in a door-way or window, a short upright (see broken line s', Fig. 4,) is placed in the door-way e'', and a short rod, r, connects it with the upright k.

It will thus be seen that the walls $a\ b\ c\ d$ are clamped and pressed together, so that instead of four independent walls, we have one complete building standing or falling as a whole.

Wherever the rods cross each other they are tied by means of strong wire or in some other manner, no matter where they cross. This of course adds strength.

s''' is an upright placed in the center of the wall c at right angles with the upright m, the rods o', r''', and p''' passing through it. s'''' is a portion of a corrugated upright. This may be used in such a position as that occupied by the upright n or s''', if desired. It is stronger in many respects than a straight upright. $t\ t\ t$ are anchors, a perspective view of one of which is seen in Fig. 8, which are placed in a wall and extend entirely through it, clamping it upon each side.

I do not claim the use of the anchors alone as my invention.

u is a piece of strap-iron, very thin and flat, and made of malleable or annealed iron. Any other metal can be used, if desired, or any substance answering the purpose. This strap-iron u is wound around the upright k', (see Fig. 5,) pounded down, and passes through the brick-work to the window e, down to the bottom of it and back to the upright k', where it is secured. The broken lines w' represent the path of another piece of strap-iron in the brick-work. Commencing a little to the left of the upper side of the window e', it passes down the side of the window a short distance, then through the brick-work to the window e, down a short distance and back to the window e'; down to the bottom of it, along its under side, and through the brick-work to the upright n, where it is fastened. w'' is a piece of strap-iron starting from the upright k' (see Fig. 5) and extending horizontally through the brick-work, around the anchors $t\ t\ t$ and upright n, and to the upright k, where it is fastened. (See Figs. 6 and 7.) v roughly represents a portion of a pillar, showing how the upright g' could pass down the center of the pillar of an ornamental building entirely out of sight.

It will be noticed that the upper end of the upright k' (see Figs. 4 and 5) is shaved off in the drawing. This is merely to show how it could be attached to another upright running up to the next story without taking more room at the connection. It could be fastened by nuts or any other known device.

In wooden buildings a brace like that designated as s'' would be desirable as an additional protection against tornadoes and earthquakes. This is a piece of iron in the wall similar to an upright, and extends diagonally from the upright k to the upright n. The rods r and o'', passing through it, keep it in place.

The strap-iron referred to is so thin that it can be pounded into almost any shape, and, therefore, occupies but very little room in the brick-work. The manner in which two uprights, placed in the relative positions of uprights m and s''', are fastened is illustrated in Fig. 3.

w''' is a piece of strap-iron passing around uprights m and s''' and rod o'. The strap-iron w''' is pounded down and the brick-work laid upon it when commencing the next story.

Some of the advantages of my invention are: First, my invention prevents walls from cracking, warping, splitting, or falling. As fire passes rapidly through cracks in walls, (which usually form drafts,) and not through the walls themselves, this advantage is evident. By preserving the walls intact it removes many of the dangers to firemen and others endeavoring to save property. Second, my invention toughens a wall without making it any thicker. This is a great advantage in earthquake regions. Third, instead of increasing the cost of building, it diminishes it. It is estimated that a twelve-inch wall with my invention in use will cost less than an eighteen-inch brick wall without it, and at the same time be much stronger.

This invention not only protects buildings from injury by fire, earthquakes, and tornadoes, but also from injury from other causes, as, for example, the enormous pressure in grain-elevators, &c.

Of course there is an endless variety of ways and positions in which the strap-iron may be used and placed. I propose to pass it through any portion of the wall in connection with the uprights or anchors, or both, and in any direction that seems at the time necessary.

I do not claim in this application the strap-iron alone as applied to the walls.

In ornamental buildings having iron pillars the uprights could pass down upon the outside of the pillars, being attached in any manner thereto, or the pillars could be so cast that the uprights could be set into them.

It will be observed that the system of tie-rods and uprights in any of the flat walls composing the structure are entirely independent of those in the remaining walls, and that the series of walls with their tie-rods and braces are united with each other by being secured at the corners or junctions to a common angle-iron, or to a vertical brace placed against the opposite face of the adjacent wall, while a similar system within the partition-walls, and connected in like manner to the outer walls, will prevent bulging of the latter. My invention is, therefore, applicable to ordinary structures, buildings, &c., wherein flat walls are used.

Having thus fully described my invention,

what I claim, and desire to secure by Letters Patent, is—

1. A structure composed of plane walls of masonry, wherein each wall is separately tied and braced, substantially as set forth, and is united to the adjacent wall by having the ends of its horizontal tie-rods joined to a vertical brace situated within or exterior to this adjacent wall, in the manner substantially as described.

2. The combination formed by the arrangement of the strap-iron with the uprights.

3. The combination and arrangement of the strap-iron with the anchors.

4. The combination and arrangement of the strap-iron, anchors, and uprights.

5. The combination and arrangement of the brace *s''*, or its equivalent, with the uprights and rods, or with one or more of either separately.

D. L. EMERSON.

Witnesses:

HENRY W. WILLIAMS,

B. W. WILLIAMS.