J. Touaillon,

Building.

No. 99,973. Patented Feb. 15. 1870.

Fig. 1

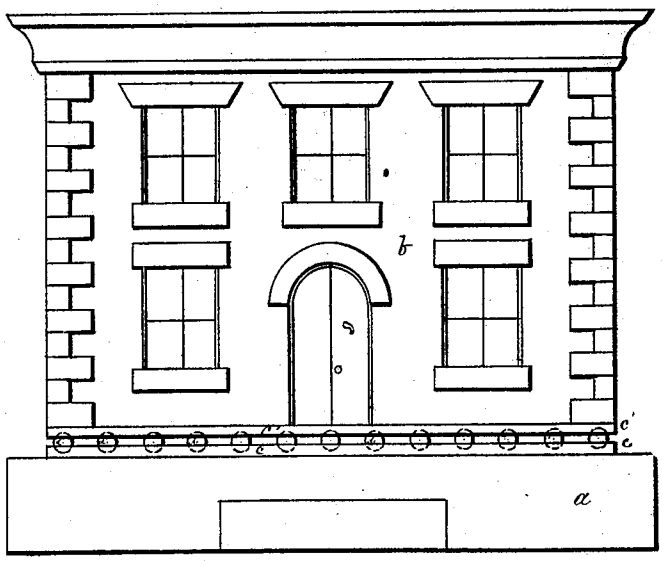


Fig 2

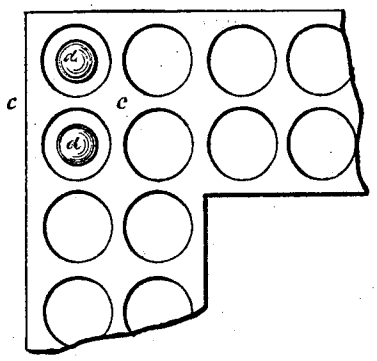


Fig. 3

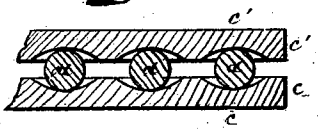
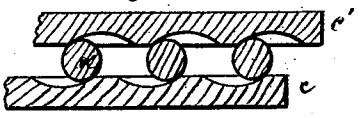


Fig 4



Witnesses

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JULES TOUAILLON, OF SAN FRANCISCO, CALIFORNIA.

Letters Patent No. 99,973, *dated February* 15, 1870.

IMPROVEMENT IN BUILDINGS.

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, JULES TOUAILLON, of the city and county of San Francisco, State of California, have invented a new and improved Method of Constructing Buildings, so as to render them proof against earthquake shocks; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings and letters of reference marked thereon.

My invention relates to certain improvements in dwelling-houses, warehouses, and other buildings, and consists of certain details of construction hereinafter more fully described; and has for its object security against injury to or destruction of buildings by earthquakes.

In the drawings that form a part of this specification—

Figure 1 is a front elevation of a dwelling having my improvements, in which *a* is the foundation, and *b* the superstructure. *c* represents a strong plate, made of metal or other suitable material, resting upon and forming a part of the foundation of the building. *d d* are spherical balls, resting upon the plate *c*, and free to move in any direction. *c'* is a plate, similar to *c*, resting upon the balls *d d*, and secured to and forms a part of the superstructure.

Figure 2 represents a plan of a part of plate *c* broken out of one corner.

Figure 3 represents a sectional view of the plates *c c'* and the balls *d d* on a vertical plane, passing through the center of one row of balls.

Figure 4 is a similar section, but with the balls *d d* and plates *c c'* in a different relative position.

The upper face of plate *c* and the lower face of plate *c'* are provided with depressions having the form of a segment of sphere with a radius considerably greater than that of the balls *d d*.

In figs. 1 and 3, the depressions in the plate *c'* are directly above and opposite the corresponding depressions in the lower plate *c*, and the weight of the superstructure will have no tendency to change this relative position of the plates *c c'*, and the balls *d d*.

Now, if during an earthquake, sudden and violent motion should be communicated to the foundation *a* in a vertical direction, little or no damage could result to the superstructure *b*, for the reason that this motion or force would be communicated in the direction of its greatest strength, but if the motion of the foundation was in any other direction, forming an angle of less than ninety degrees (90°) with the horizon, the balls *d d* being free to move, would allow the foundation to move in advance of the superstructure, thus causing the balls to roll up the spherical sides of the depressions in plate *c*, while the inertia of the superstructure would cause the spherical sides of the depressions in the plate *c'* to ride up toward the top of the balls *d d*, as represented in fig. 4; but as the weight of the superstructure is a powerful force opposed to such a movement as this last described, these two forces tend to neutralize each other, and will do so when the superstructure acquires the same velocity as the foundation, and once having acquired this velocity, the aforesaid weight will cause the plates *c c'* and the balls *d d* to resume their original relative position.

It will be seen that by this device the earthquake motion would be communicated to the superstructure without shock, and consequently no injury would result from such motion to a properly constructed building.

In cities where buildings are built with very little space between them, the walls may be provided with springs or bumpers, made of India rubber or other suitable material, to prevent injury or destruction from striking together.

Having thus described my invention,

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

A building, constructed with its superstructure separate and distinct from its foundation, the two parts being separated by means of balls arranged substantially as described, for the purpose set forth.

In testimony whereof, I have hereunto set my hand and seal.

JULES TOUAILLON. [L. S.]

Witnesses:

C. W. M. SMITH,

H. S. TIBBEY.