

No. 845,046.

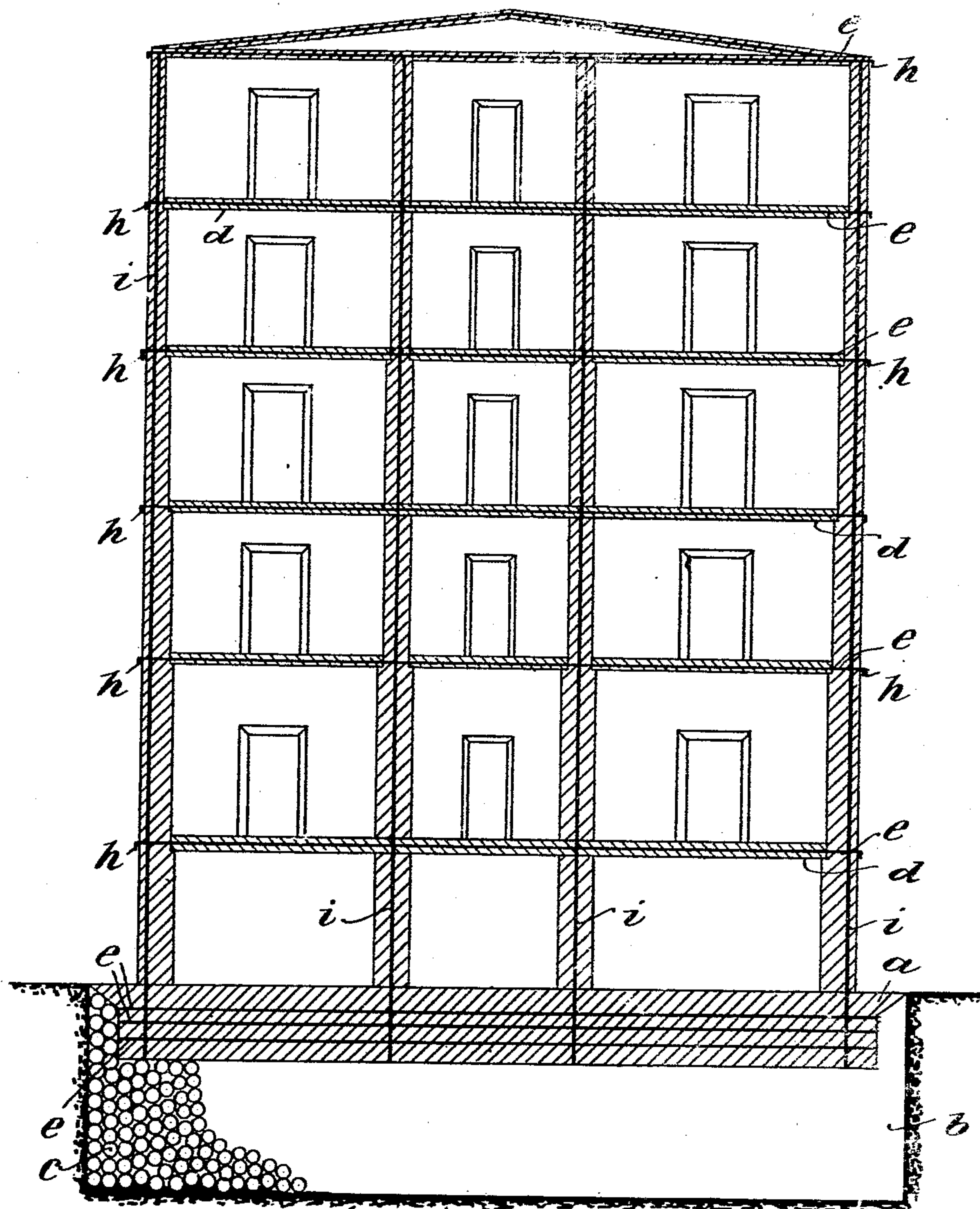
PATENTED FEB. 26, 1907.

J. BECHTOLD.  
EARTHQUAKE PROOF BUILDING.

APPLICATION FILED MAY 26 1906.

2 SHEETS—SHEET 1.

FIG. 1.



Witnesses:

E. O. Midebrandt  
W. Reynolds

Inventor.

Jacob Bechtold  
by Georgius Masses  
attorney

No. 845,046.

PATENTED FEB. 26, 1907.

J. BECHTOLD.  
EARTHQUAKE PROOF BUILDING.  
APPLICATION FILED MAY 26, 1906.

2 SHEETS—SHEET 2.

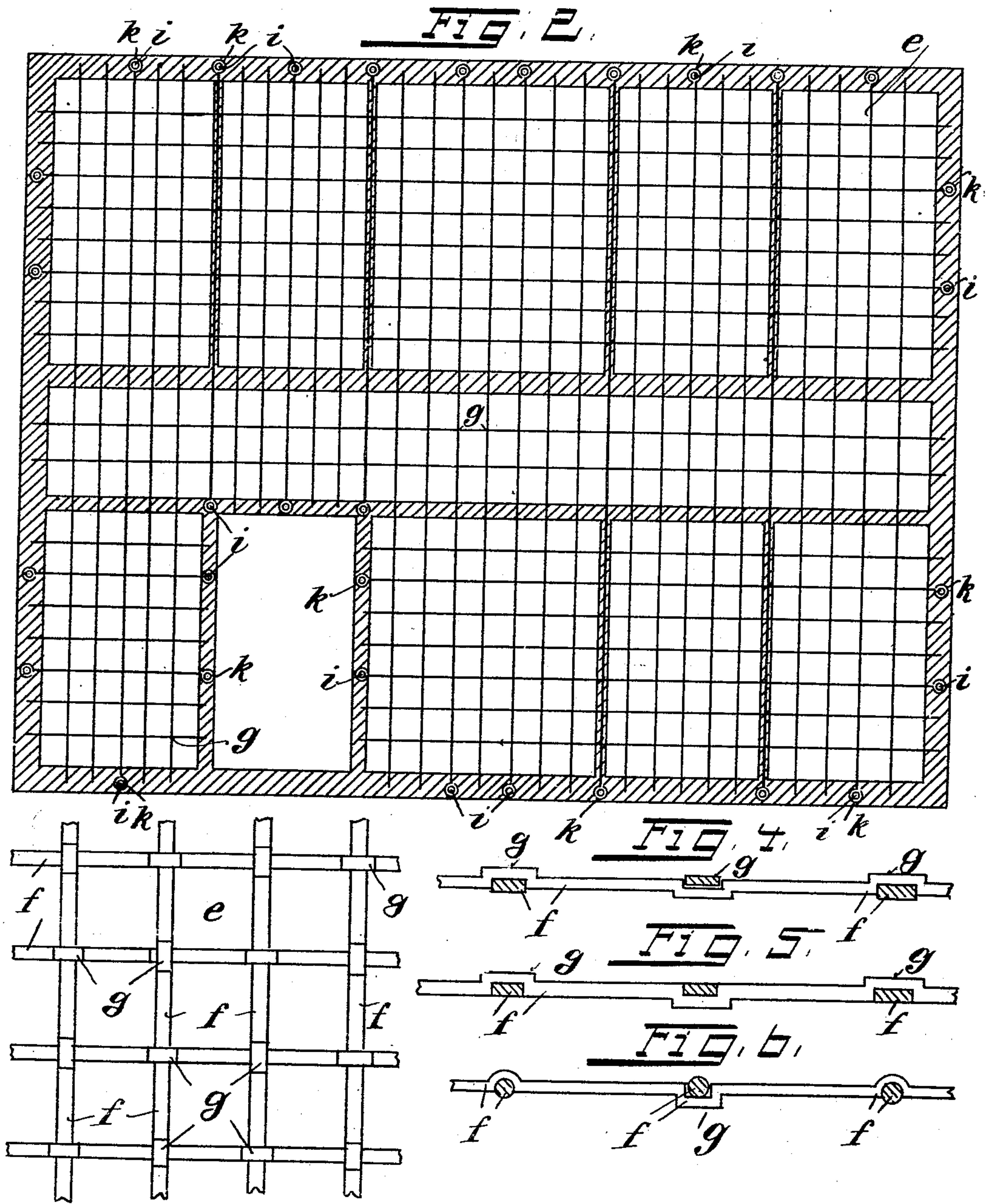


FIG. 3.

Witnesses:

E. O. Hildebrand  
N. Reynolds

Inventor:

Jacob Bechtold  
by Georgii Massie  
attorney



# UNITED STATES PATENT OFFICE.

JACOB BECHTOLD, OF MUNICH, GERMANY.

## EARTHQUAKE-PROOF BUILDING.

No. 845,046.

Specification of Letters Patent.

Patented Feb. 26, 1907.

Application filed May 26, 1906. Serial No. 318,945.

*To all whom it may concern:*

Be it known that I, JACOB BECHTOLD, a citizen of Bavaria, Germany, residing at Munich, Bavaria, Germany, have invented certain new and useful Improvements in Earthquake-Proof Buildings; 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 appertains to make and use the same.

The present invention relates to earthquake-proof buildings, and consists of the details of construction hereinafter set forth, and particularly pointed out in the claims.

In order to render the present specification easily intelligible, reference is had to the accompanying drawings, in which similar letters of reference denote similar parts throughout the several views.

Figure 1 is a sectional elevation of one form of embodying the present invention. Fig. 2 is a sectional plan view taken above one of the floors. Fig. 3 is a part plan of some of the ironwork of the building. Figs. 4 and 5 are cross-sections showing the arrangement of the iron cross-bars, and Fig. 6 is a section showing the combination of vertical and horizontal stays.

In the case of earthquakes the danger accrues from the rigid foundations of the buildings, and it will be best avoided by standing the whole edifice on a rigid base-plate of suitable carrying power, which base-plate is not in rigid connection with the surface of the earth.

In the embodiment of the invention illustrated in the accompanying drawings the house is built on the rigid base-plate *a*, which is mounted on loose pebble-gravel or on balls of hard material—such as granite, gneiss, basalt, or the like—the said round pebbles or balls being of about twenty to twenty-five centimeters diameter and indicated at *c*. This material is placed in an excavation *b*, which is advantageously about four meters deep, and thus forms a mass of relatively movable units arranged in a heap as distinguished from a single horizontal layer of bodies. An earthquake will have a moving effect on this mass, and the weight of the edifice on the base-plate will always have the effect of keeping the whole in a horizontal position, the tendency of the building being to compensate the movement of any part of the balls due to an upheaval at any point at the bot-

tom of the excavation, the mass of balls acting after the manner of a fluid. This effect can be easily demonstrated by taking a box about half a meter square, such as used by children for toys, and filling it with marbles or other balls and providing it with an easily-movable bottom, such as stretched canvas or cloth, which would represent the crust of the earth in an upheaval. It will be found that the balls will retain an even upper horizontal surface, or practically so, if the cloth bottom is pushed up at any points. If the base-plate *a* were mounted directly on the solid earth, it would probably break on an upheaval at one point, and the house would fall down. On the layers of balls the weight of the building will always compensate an upheaval at any point below the bottom. Even if the crust of the earth cracks, as is often the case, it will not necessarily destroy the building, because the balls will enter and fill up the crack, and the building will merely sink and can subsequently be raised.

The building must of course stand entirely free from other buildings at all sides. The building itself should be made without joints, as with brickwork, and should consist advantageously of concrete and ironwork. In the base-plate *a* and the various floors *d* grids *e*, consisting of iron rods *f*, are provided, the said rods crossing each other, as at *g*, Figs. 3, 4, and 5. The ends of the said rods may extend outside the walls and be bent round, as at *h*, Fig. 1. Vertical rods *i* are provided in the vertical walls, and the rods of the grids may be bent round to form hooks, as at *k*, and thus to embrace the vertical stays, as will be readily understood. The framework is all filled out with concrete, built up by uninterruptedly adding about fifteen-centimeter layers, the lower layer being in a condition to bind well when the next layer above it is plastered on. By this means an extremely stable building will be attained.

I claim as my invention—

1. An earthquake-proof building consisting of a rigid base-plate to carry the building and a mass of spherical bodies of hard material, to carry the said base-plate freely.

2. An earthquake-proof building consisting of a rigid base-plate, a building thereon an excavation below the said plate and a mass of hard spherical bodies in said excavation on which the said base-plate freely rests.

3. An earthquake-proof building, consisting of a rigid base-plate, a building made of



ironwork frame with concrete floors, and walls, an excavation below the building and a plurality of layers of hard spherical bodies inserted between the said base-plate and the supporting-ground substantially as described.

4. An earthquake-proof building, consisting of a rigid base-plate to carry the edifice and a mass of spherical bodies of hard material contained between the said base-plate and the supporting-ground.

5. An earthquake-proof building, consisting of an edifice made of concrete walls and floors and having ironwork grids in the floors

and vertical stays connected to the ends of the members forming the grids, in the walls, a rigid base-plate to support the building and a mass of hard spherical bodies inserted between the lower side of the said base-plate and the supporting-ground.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

JACOB BECHTOLD.

Witnesses:

LOUIS F. MUELLER,  
GEORG KÖRNER.