J. A. CALANTARIENTS.

BUILDING CONSTRUCTION TO RESIST THE ACTION OF EARTHQUAKES.

APPLICATION FILED JULY 27, 1906.

932,443.

Patented Aug. 31, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

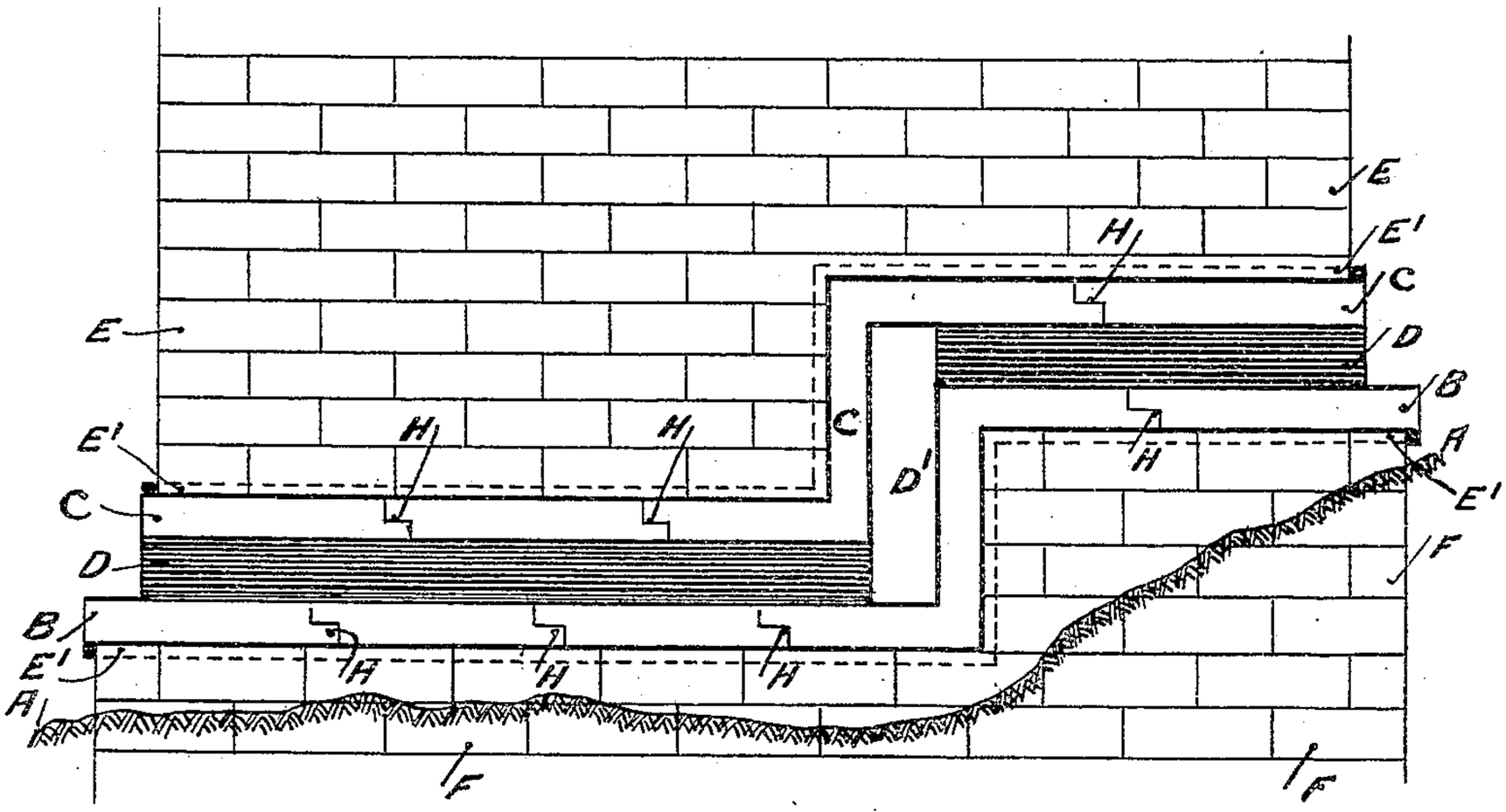


Fig. 2.

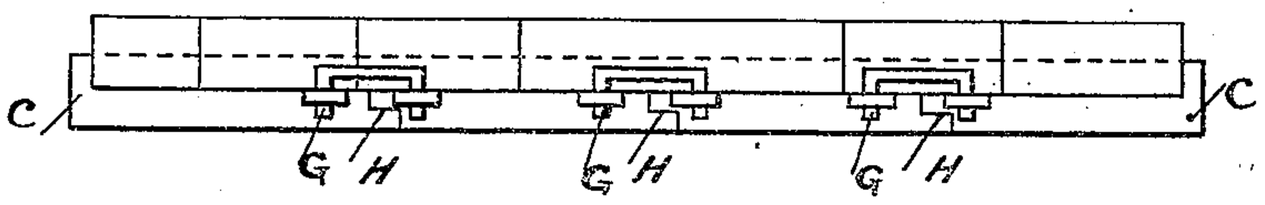
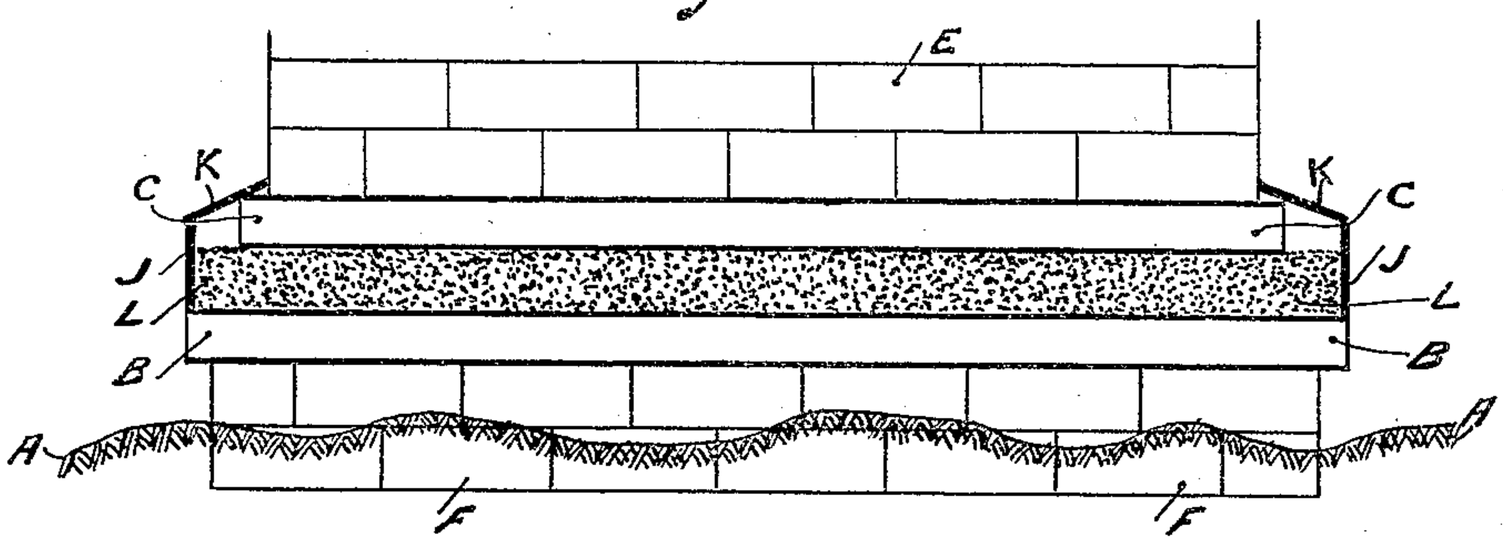


Fig. 3.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 4.

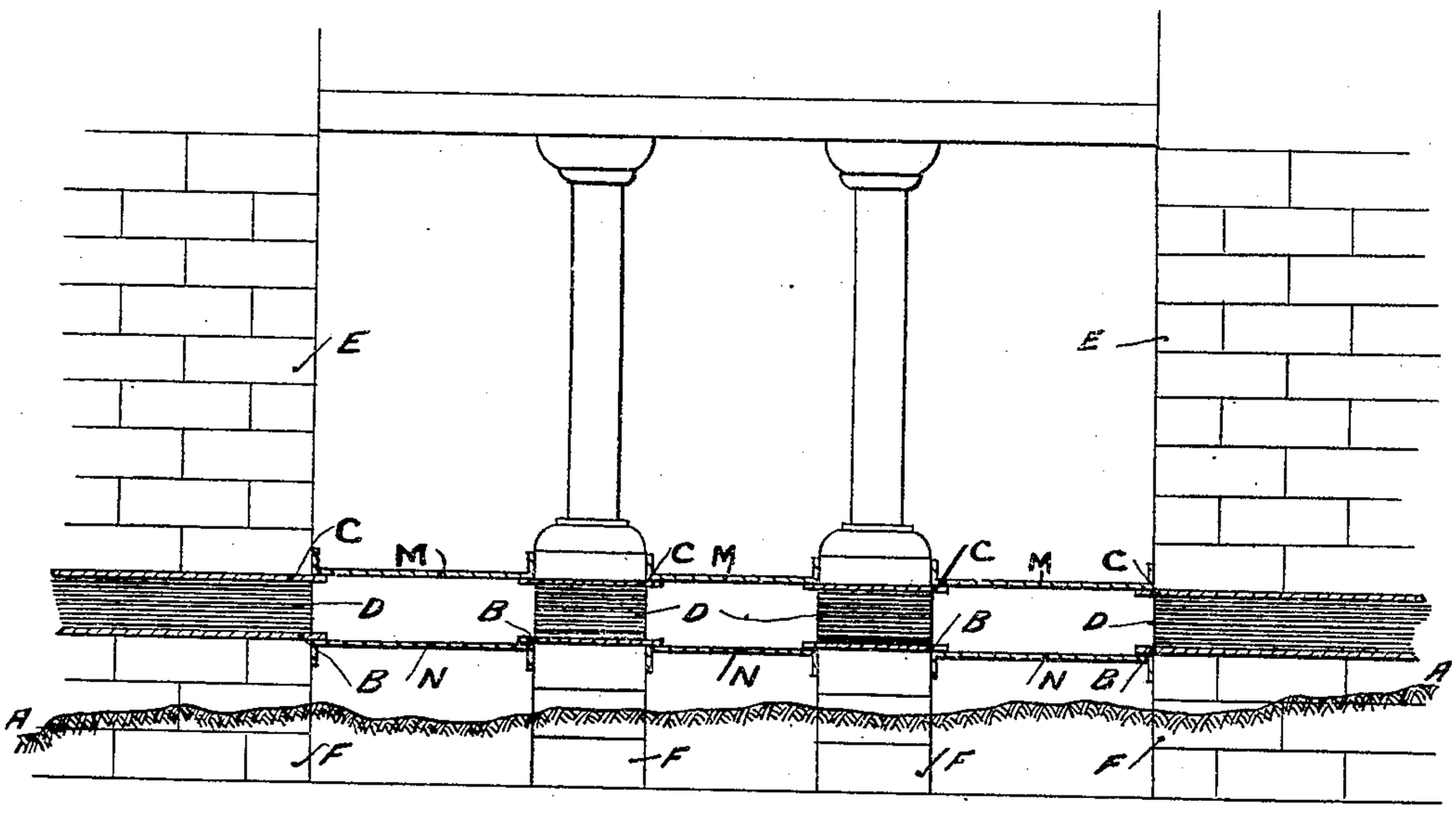
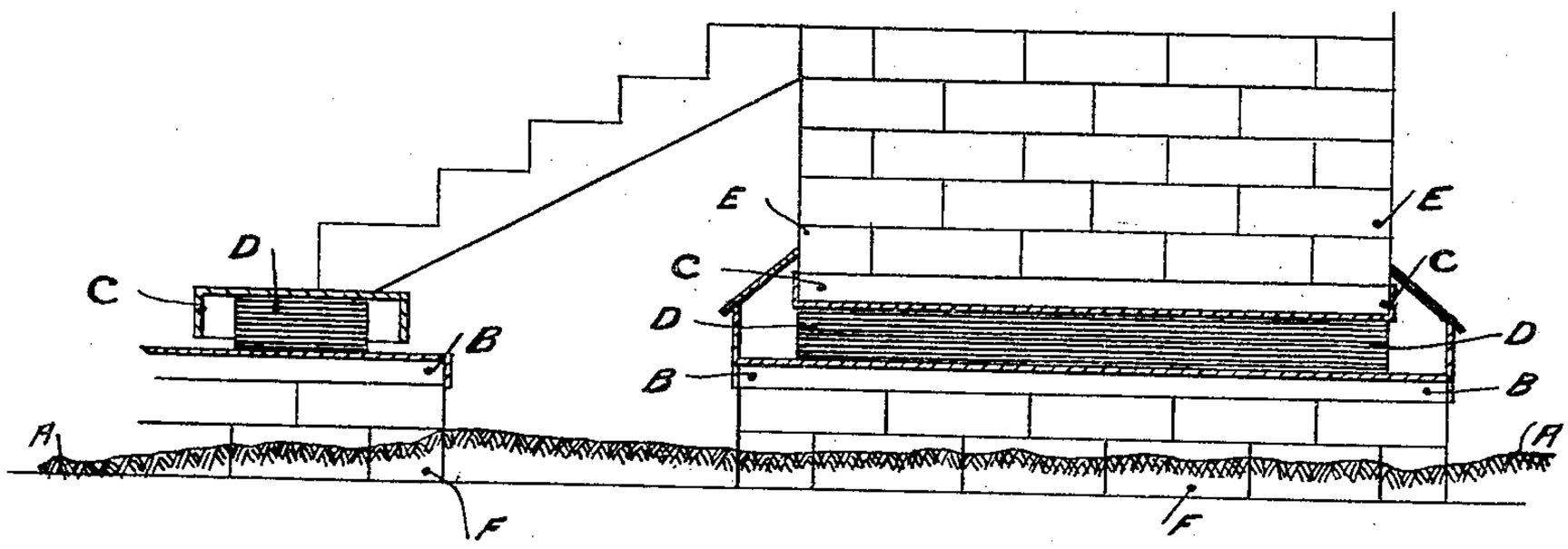


Fig. 5.



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BUILDING CONSTRUCTION TO RESIST THE ACTION OF EARTHQUAKES.

932,443. Specification of Letters Patent. Patented Aug. 31, 1909.

Application filed July 27, 1906. Serial No. 328,086.

To all whom it may concern:

Be it known that I, JOHANNES AVETICIAN CALANTARIENTS, a subject of Great Britain, residing at Scarborough, in the county of York, England, doctor of medicine, have invented new and useful Improvements in and Connected with Building Construction to Resist the Action of Earthquakes, of which the following is a specification.

This invention relates to building construction and has for its object to prevent as much as possible the communication of shocks or vibrations of earthquakes to buildings and so render them safer. It is proposed to attain this object by a construction characterized by the portion of the building above ground, or the superstructure, meeting the foundation portion of it by introducing between their meeting surfaces a zone of appropriate material capable of free interstitial movement under the impetus of earthquake shocks. To the end in view the foundation is built up to the ground level, or thereabout, in the usual manner taking care that it is well bound together and firm in all directions. The top of the foundation wall is faced with a strong solid material, such as slabs of granite, stone, iron, or other suitable material, with a perfectly smooth upper surface, level throughout, well bound together horizontally, and to the wall beneath. Upon this are deposited layers of a smooth imperishable material such as plates of talc, mica, or other suitable substance, dusting well each layer with powdered talc, kaolin, soapstone, or steatite, or other suitable material until the desired thickness is obtained. Upon this laminated layer are deposited strong slabs of granite, stone, iron, or other suitable material with a perfectly smooth under surface, and well bound together horizontally. The wall is laid upon this and the building completed taking care that the upper line of slabs or plates is securely fastened and bound to the wall above in such manner that the whole building, or superstructure, above the laminated zone is solidified, or forms what may be described as a solid block. Nothing must be allowed to bind the upper and the lower line of blocks, or the upper and the foundation walls together. The only line of contact is through the slippery laminated or loose layers between the two smooth surface lines of slabs or plates. Under the influence of earthquake, the foundation portion of a building so constructed will be subject to the tremors of the surrounding earth, like any other building, but these rapid vibrations will only cause a sliding movement of the smooth slippery plates one upon the other, and the laminated layer being adequately thick, very little, if any motion will be communicated to the solid walls of the building above, the amount depending upon the strength of shock. In any case there will be all the difference between a disastrous shock and a mere feeling of tremor. As the line of the wall must be perfectly level, in the case of rising ground there must of necessity be a succession of levels. The shock absorbing line will follow these levels by strong perpendicular connections, the lower plate with the lower and the upper with the upper, but the space between the perpendiculars must be left empty.

For the sake of economy, instead of talc, soapstone or the like, a thick layer of sand may be used. In this case it will be necessary to have the lower plate wider than the upper and the edge folded up to about the level of the sand, so that there should be some space left approximately three inches, between it and the edge of the upper plate. It may be desirable to support the upper plate in a horizontal position on the lower until the building is finished, and then to remove the supports.

The upper and lower smooth surfaces of the shock absorbing zone may be formed of galvanized iron plates of standard sizes, the talc or other mobile layers placed between them and temporarily secured together ready for fixing on the foundation walls, the temporary fastenings being removed when the building is finished. Similar plates adapted for using sand may be made of standard sizes, ready for fixing and filling with sand.

It is always advisable to avoid building on solid rock in countries where earthquake prevails, but if from circumstances it is unavoidable, the site should be covered with loose earth to as great a depth as practicable, then lay the foundation and proceed as previously set forth.

In order that the invention may be more readily undertsood reference should be made to the accompanying drawings in which—

Figure 1 is an elevation illustrating the shock absorbing zone formed by plates of talc and soapstone layers and other adjuncts.

Fig. 2 is an elevation showing a convenient fastening for the plates. Fig. 3 is a sectional elevation showing the edge of the lower plate turned up to form a trough to hold the sand. Fig. 4 is an elevation showing the construction applied for securing the stability of columns, and Fig. 5 is a section showing construction for isolating the stair case of front door from ground shock.

The same letters refer to like parts and the undulating line A. A. designates the ground level.

Referring to the said figures: Fig. 1, B is the lower slab or plate with smooth level upper surface, fixed on the top of foundation wall and following the line of rising ground.

C is the upper slab or iron plate with smooth under surface and following line of rising ground.

D are the layers of talc or soapstone intervening between the upper and lower plates.

E is the wall of the building or superstructure.

F is the foundation wall.

D′ is the perpendicular space between upper and lower plates, left empty.

The edge of the iron plates B and C is turned to inclose the upper and lower bricks or blocks of stone of the wall to hold them fast. This is indicated by the dotted lines E′.

H shows how the parts of the plates fit one another to secure a level surface. Fig. 2. This mode of fastening G, the parts of the plates together is one of many. The fastening can be done in any other convenient way. Fig. 3. The edge J of the lower plate is turned up to form a trough to hold the sand. The space between J and the upper plate C is to allow for the free movement of the foundation wall without the points J and C meeting.

K is a protective covering against rain.

L is a zone or bed of sand on which the walls and the building rest.

It will be obvious that while building the ends must be supported to prevent tilting to one side by unequal building or balance. Fig. 4. In this construction iron bars, girders, or joists M are used for securing stability of the columns to the upper plates C of the shock absorbing zone. These bars or joists M fix the base of the columns abutting upon the shock absorbing zone, to the upper plates C and form a lateral strengthening device. N are similar bars or joists for securing or connecting the foundation of columns to the lower plates B. The floor is laid over and upon the joists M as supports. Fig. 5 is self explanatory.

I claim:

In buildings constructed to resist the action of earthquakes by the interposition of a shock absorbing zone between the foundation and superstructure, a zone formed of smooth level surfaced metal plates, which abut upon the foundation and superstructure, with interposed laminations or layers of soapstone, mica, talc, sand, or the like, arranged to allow free horizontal movement between the foundation and superstructure under the impetus of earthquake shocks, substantially as set forth.

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Witnesses:

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C. R. Thomas.