

P. BORGARELLI.  
DRIER FOR CEREALS, &c.

No. 504,320.

Patented Sept. 5, 1893.

Fig. 1.

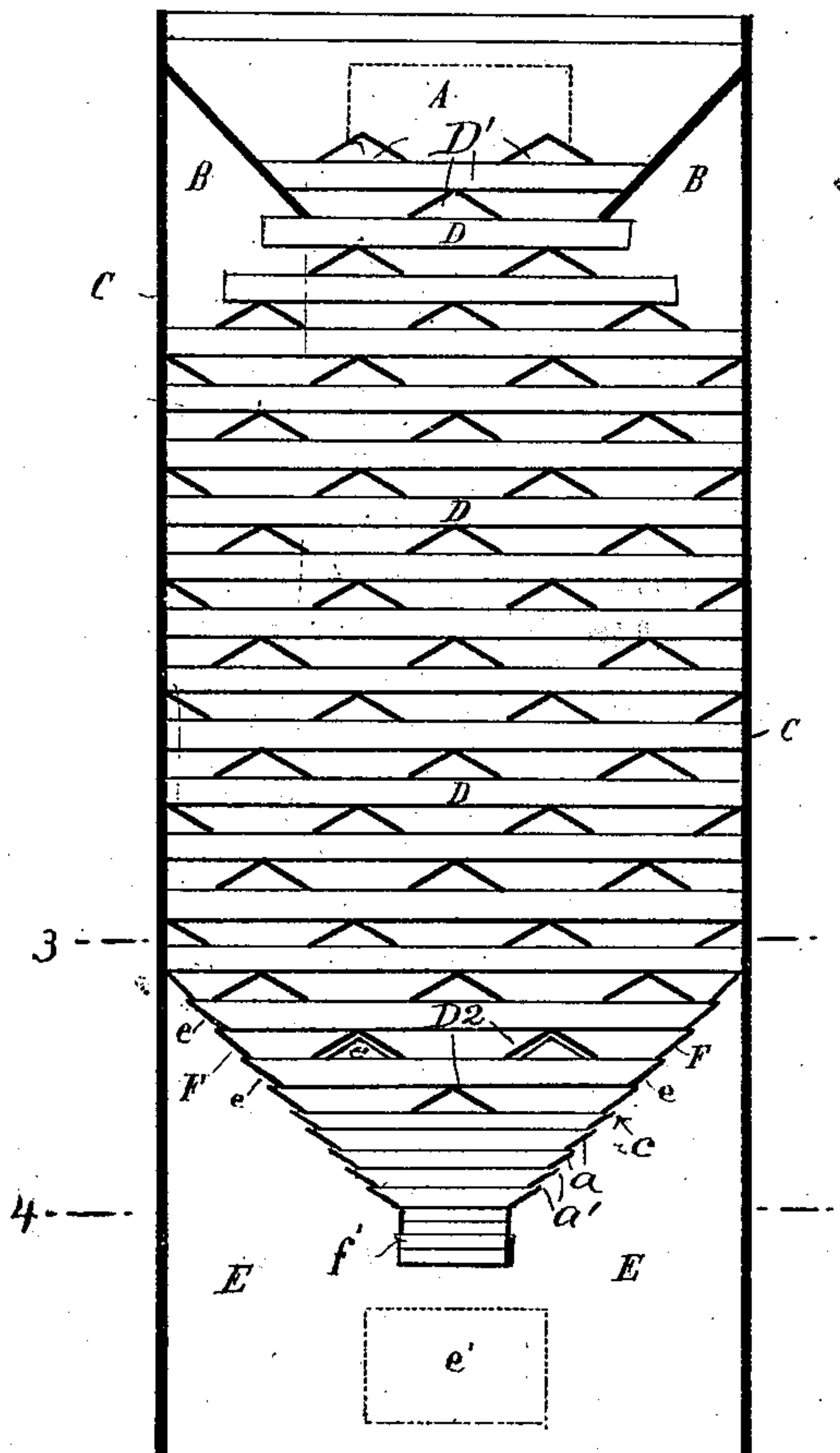


Fig. 2.

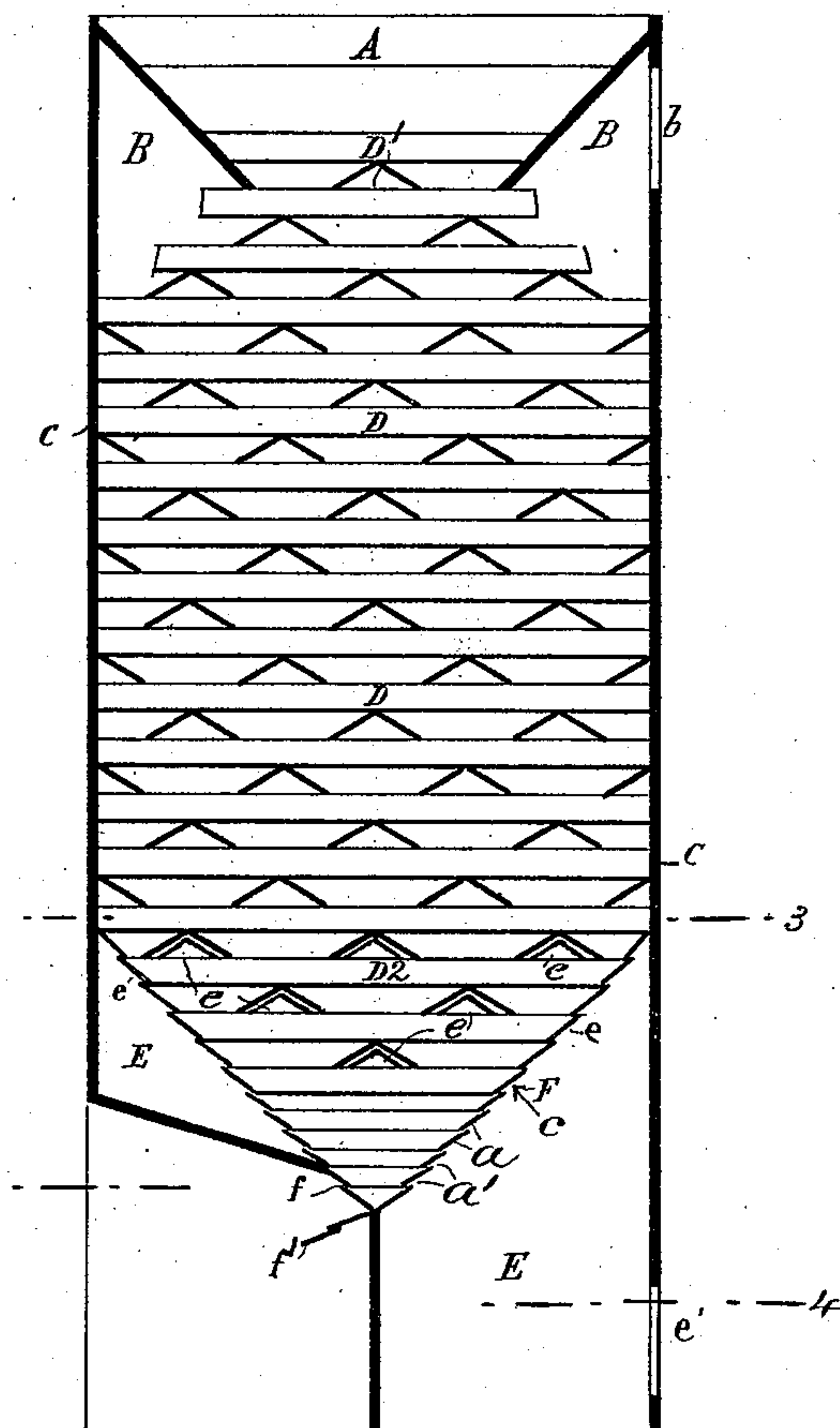


Fig. 3.

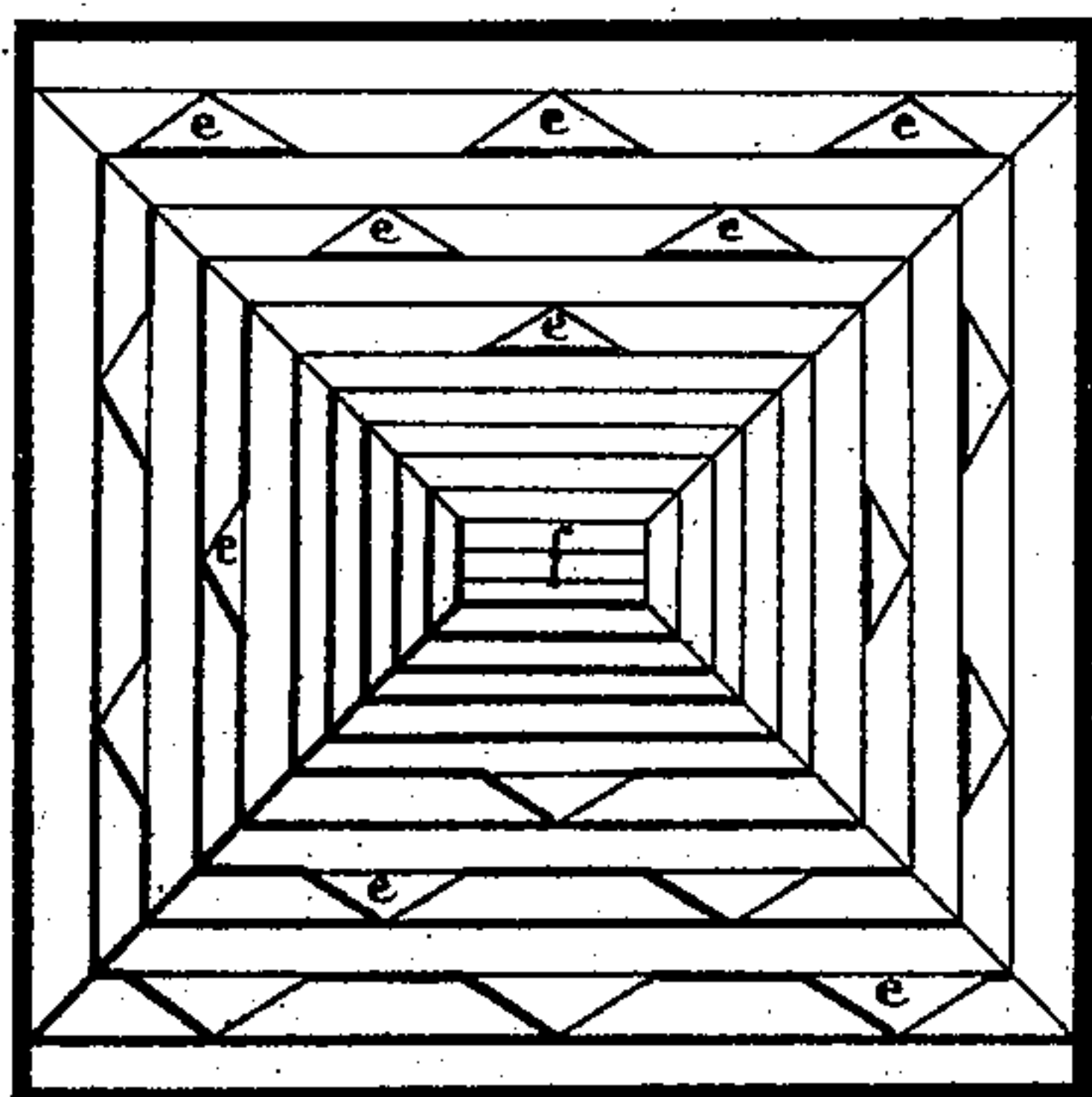
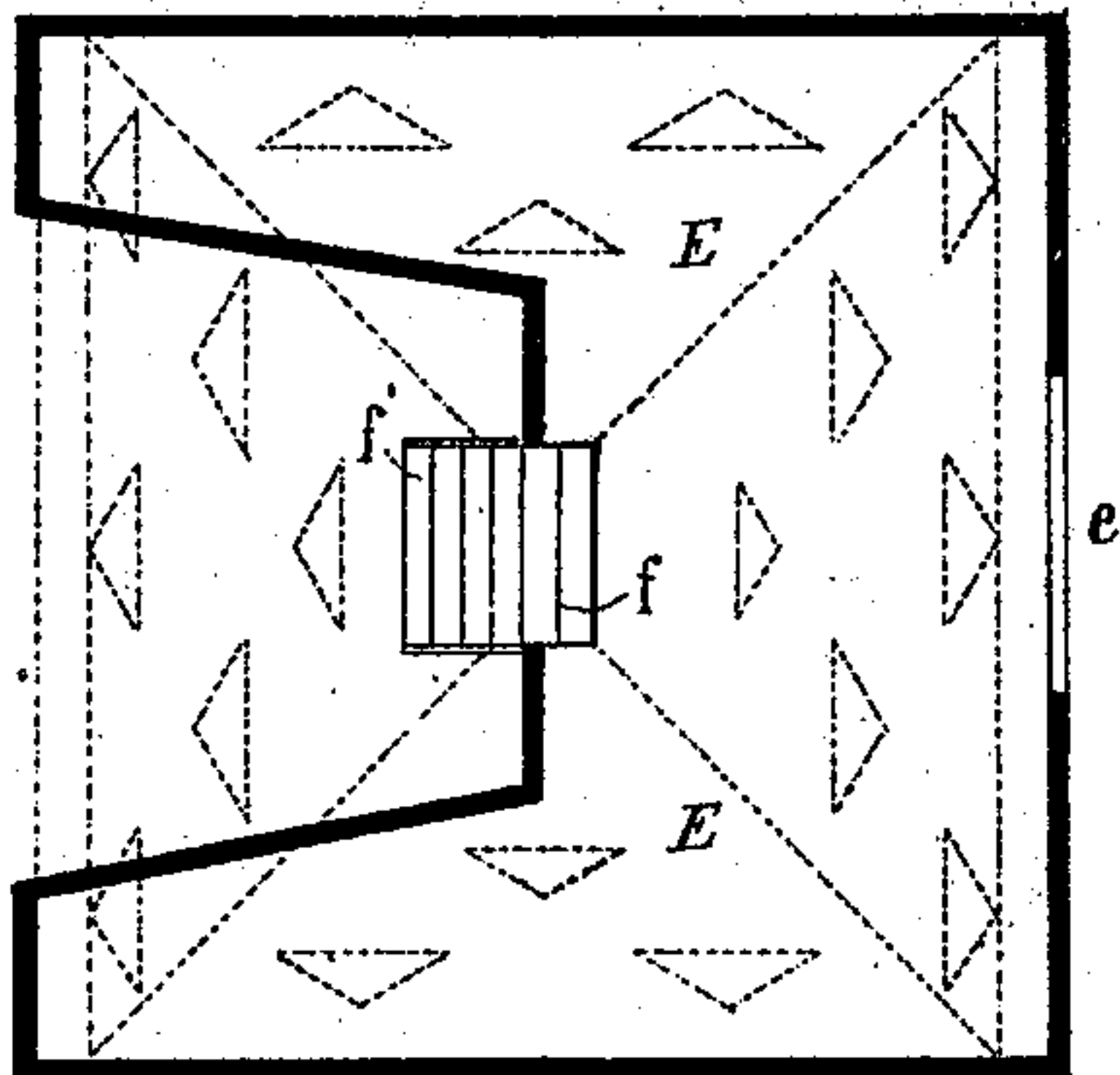


Fig. 4.



WITNESSES:

*Fred White*

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*By his Attorneys*

*Arthur C. Fraser & Co.*

(No Model.)

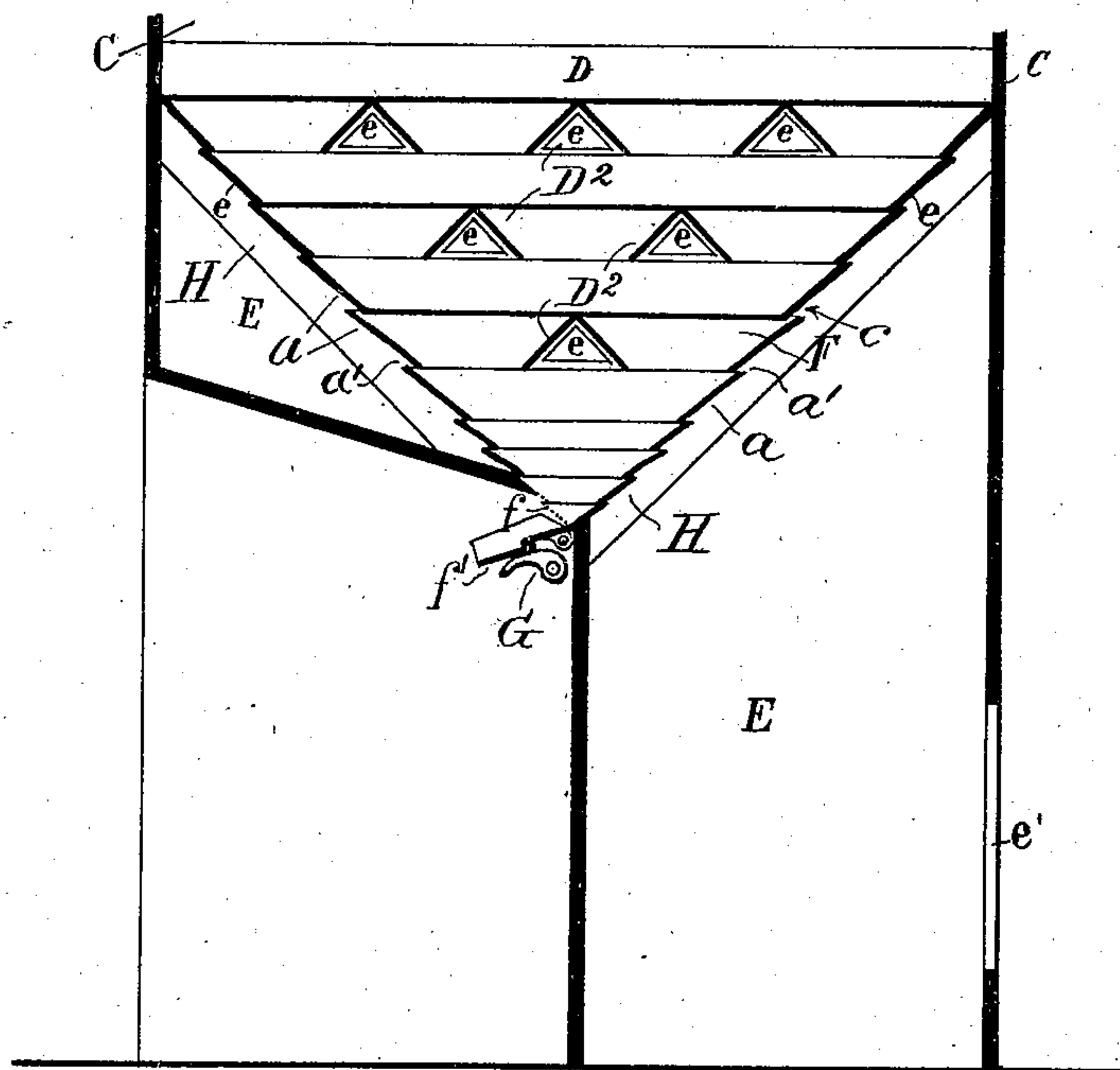
2 Sheets—Sheet 2.

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FIG. 5.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

PAOLO BORGARELLI, OF TURIN, ITALY.

## DRIER FOR CEREALS, &c.

SPECIFICATION forming part of Letters Patent No. 504,320, dated September 5, 1893.

Application filed October 31, 1892. Serial No. 450,417. (No model.) Patented in England September 4, 1891, No. 14,986.

*To all whom it may concern:*

Be it known that I, PAOLO BORGARELLI, a subject of the King of Italy, residing in Turin, Italy, have invented certain new and useful Improvements in Driers for Cereals and other Finely-Divided Materials, (which invention has been patented in Great Britain, No. 14,986, dated September 4, 1891,) of which the following is a specification.

10 This invention relates to apparatus for drying cereals or other finely divided, granular, or pulverulent materials, and particularly to such apparatus in which the air circulates from below upward in a vertical chamber contain-  
15 ing the material to be treated, which material is introduced through a hopper at the top and is removed through an opening at the bottom, so that the material passes slowly through the apparatus, being in its course  
20 brought in contact with diaphragms within the chamber which diaphragms have double inclined faces and are so arranged that the material in descending through the chamber is repeatedly divided, mixed and spread out  
25 by the diaphragms, so that the material offers extensive and continually changing surfaces to the action of the rising air. An apparatus of this character is disclosed in my United States patent dated March 1, 1892, No.  
30 469,849.

My present invention aims to provide certain improvements in apparatus of this general character, and to this end in carrying out my invention I construct such apparatus  
35 with certain improvements which will be hereinafter fully set forth.

In the accompanying drawings, which illustrate the preferred form of my invention, Figure 1 is a vertical section of a drier constructed  
40 according to my invention. Fig. 2 is a vertical section thereof at right angles to the plane on which Fig. 1 is cut. Fig. 3 is a horizontal section of the lower portion of the drying chamber, cut on the line 3—3, and Fig. 4 is a  
45 similar section cut through the withdrawing chamber on the line 4—4. Fig. 5 is a fragmentary section corresponding to Fig. 2, showing the lower part of the drier on a larger scale.

50 Referring to the drawings, I will now describe the preferred form of my invention.

In these figures, which only show the essen-

tial parts of the apparatus, C is the desiccating chamber, containing as heretofore, diaphragms D, formed with double inclined top  
55 faces, the sides of which are made either solid or with openings. These diaphragms are of bar shape and arranged in superposed layers crossing each other at right angles and disposed in alternating positions, so that the  
60 diaphragms of one layer are situated above and below the spaces in the contiguous layers. As usual the lower edge of each diaphragm rests on the upper edge of that beneath.

A is the charging hopper at top of the chamber C.

F is the lower hopper which conducts the materials to the discharge opening *f*. The lower hopper is surrounded by a chamber  
70 E into which air or other gas enters, either freely from the atmosphere or by force from any suitable blower. This air may be previously heated or dried by any known means either outside or within the chamber E. The  
75 incoming air may be mixed with any antiseptic gases or vapors if desired in order to disinfect the material simultaneously with the drying thereof, as is frequently done with cereals. The air passes from the chamber E  
80 up through the chamber C and issues thence into the exhaust chamber B formed around and beneath the hopper A, being drawn therefrom by any suitable means as a fan or a chimney draft out through the opening *b*.  
85 These several features thus far described are illustrated in my said United States Patent No. 469,849.

I will now describe my present improvements: In the charging hopper A I provide diaphragms D', of the same construction and  
90 arrangement as those in chamber C and forming as it were a continuation of these. These diaphragms D' are designed to effect a regular distribution of the material to be treated at its entrance into the drying chamber. Ac-  
95 cording to my invention I arrange similar diaphragms D<sup>2</sup> in the bottom hopper F, these forming a continuation of those in the chamber C. The object of these is to continue the  
100 mixing operation and to facilitate the passage of the air through the material until the moment when the latter issues from the apparatus. According to my invention air inlet openings *e* are formed in the sides of the hop-



per F through which the air enters from the chamber E, such openings being, if necessary, provided with any suitable regulating slides or flaps.

5 For the purpose of facilitating the entrance of air the whole or a part of the hopper F is made of a series of overlapping bars *a a*, like louvre blades, constructed to leave spaces *a'* between them for the inlet of air, as seen in  
10 Figs. 1 and 2. This arrangement may be employed in combination with the openings *e* in the solid part of the hopper. In the construction shown that portion of the hopper above the point *c* is solid while that portion  
15 below this point is composed of separated bars *a*. Pieces H may be employed to support the bars *a*.

A device for automatically regulating the discharge of the material from the hopper F,  
20 is supplied as heretofore this being applied at the discharge opening *f* of the apparatus. Preferably the opening *f* is formed in the side of the hopper F, and beyond it is a channel *f'*, the inclination of which can be varied by  
25 a support G pivoted to the wall of the drier which channel is constructed to be movable so that it can be adjusted to such position that the material treated will rest upon it by cohesion as long as the material is moist, but  
30 will run off as soon as the drying operation has progressed sufficiently to destroy the cohesion. By this provision the material will be automatically prevented from escaping until it has attained the required degree of  
35 dryness.

In operation the material to be treated will be introduced into the hopper A, descend through the chamber C into the hopper F and be discharged through the opening *f* onto and  
40 from the channel *f'*. It will be subdivided by the diaphragms D' as it enters the chamber, by the diaphragms D as it traverses the

latter, and by the diaphragms D<sup>2</sup> within the discharge hopper F. The air will rise in the chamber E, and pass through the openings *a'* 45 and *e* into the hopper F, thence up through the chamber C and into the chamber B, from which it will escape through the opening *b*.

It will be seen that my invention provides an improved drier which will be effective in 50 operation, compact in form and of simple construction.

What I claim in apparatus for drying cereals or other granular or finely-divided substances is the following-defined novel fea- 55 tures and combinations, substantially as hereinbefore set forth, namely:

In a drier, a drying chamber C through which the material to be dried passes from top to bottom, and a plurality of rows of dia- 60 phragms within said chamber, those of each row crossing those of the next, and those of each row resting with their lower edges on the upper edges of those of the row beneath, in combination with a discharge hopper F at the 65 lower end of said chamber C, constructed internally with a plurality of rows of diaphragms, said diaphragms in said hopper constituting a continuation of the diaphragms in said chamber, said hopper constructed 70 with louvre blades *a a* constituting its side walls, said blades being spaced apart for permitting the entrance of air between them, and having holes *e* coinciding with the ends of said diaphragms in said hopper, substan- 75 tially as and for the purpose set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

PAOLO BORGARELLI.

Witnesses:

SECONDO CORTA,  
M. S. POWERS.