

No. 862,911.

PATENTED AUG. 13, 1907.

L. HERMANN.

FLOOR AND CEILING CONSTRUCTION FOR FIREPROOF BUILDINGS.

APPLICATION FILED FEB. 4, 1907.

3 SHEETS—SHEET 1.

Fig. 1.

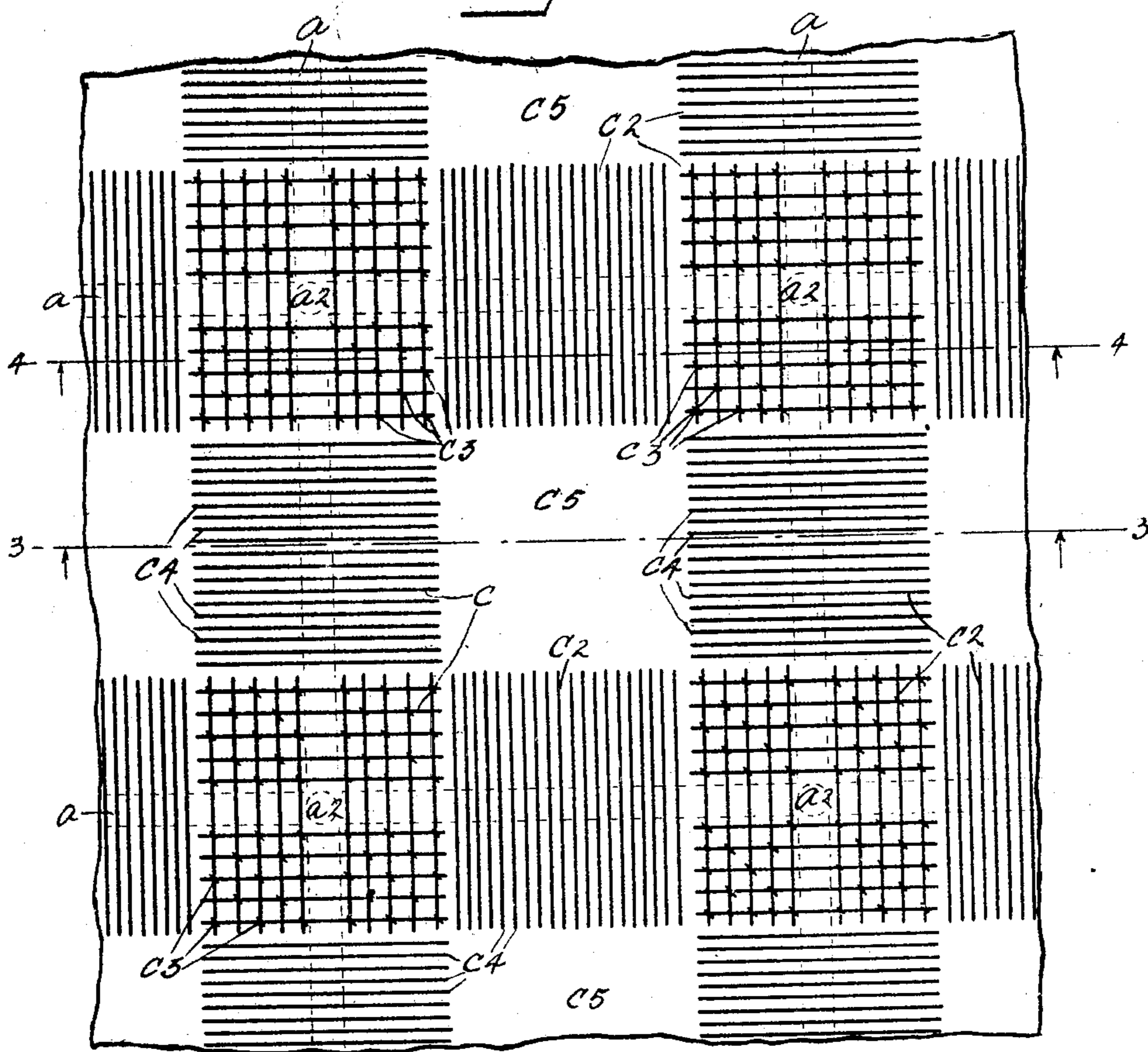
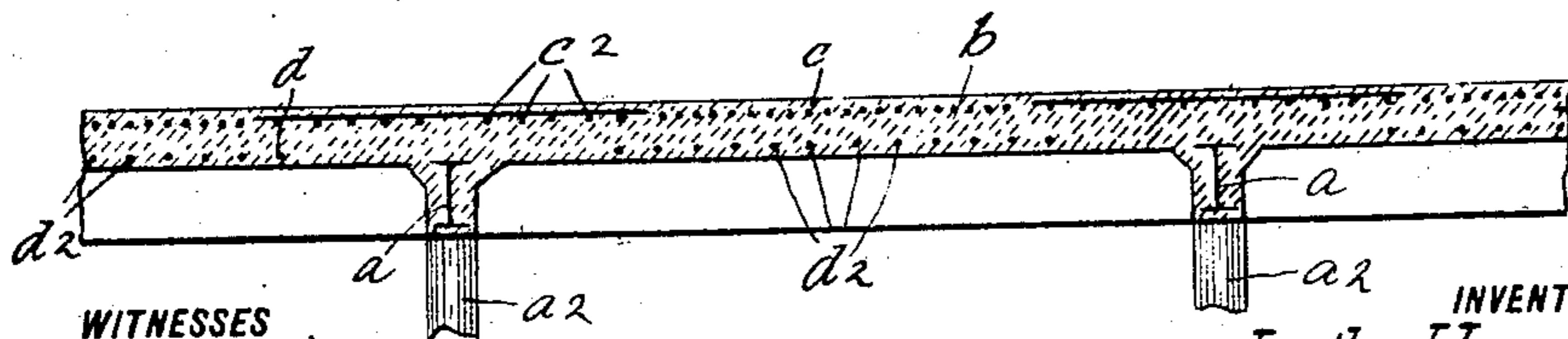


Fig. 4.



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3 SHEETS—SHEET 2.

Fig. 2.

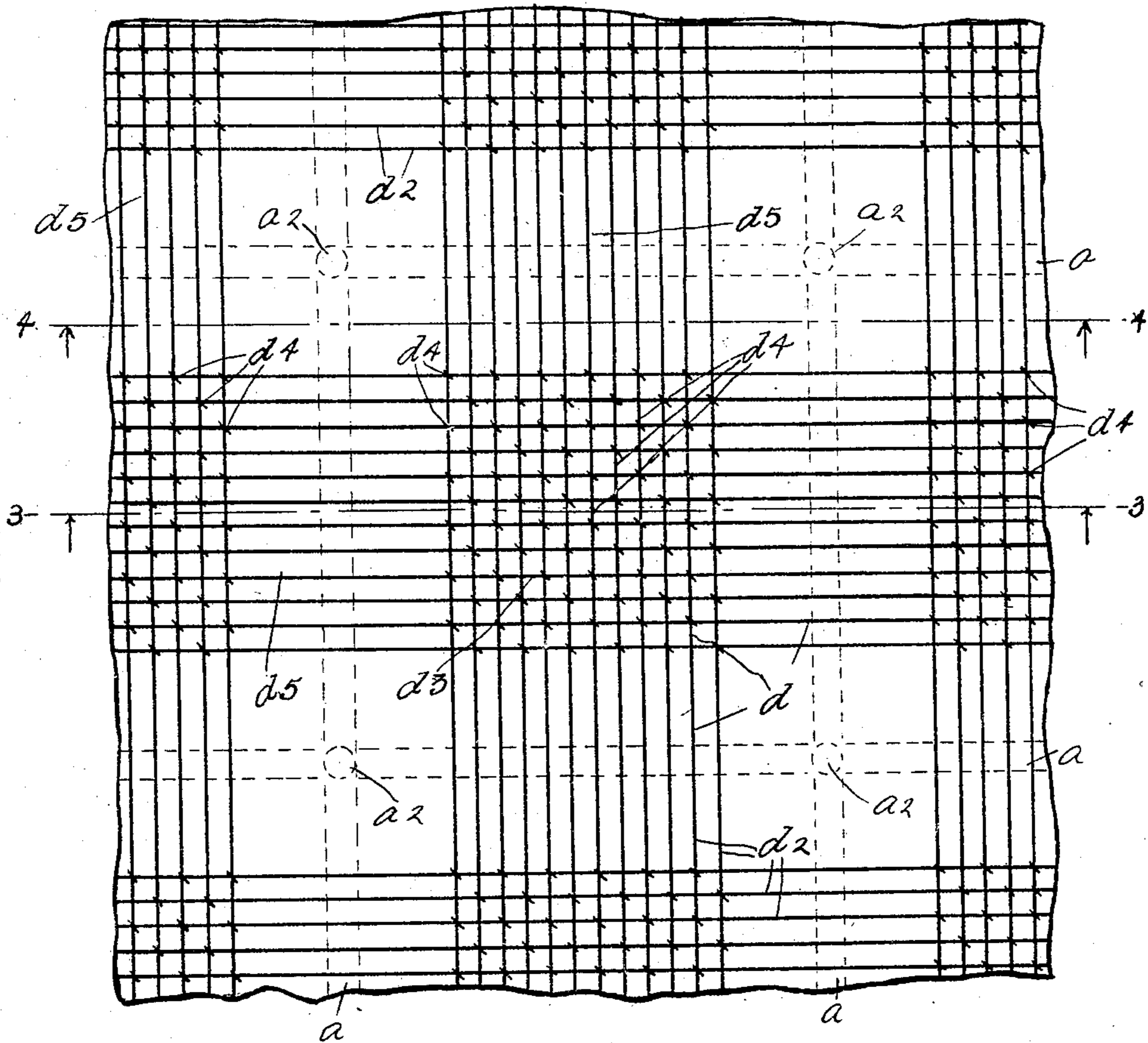
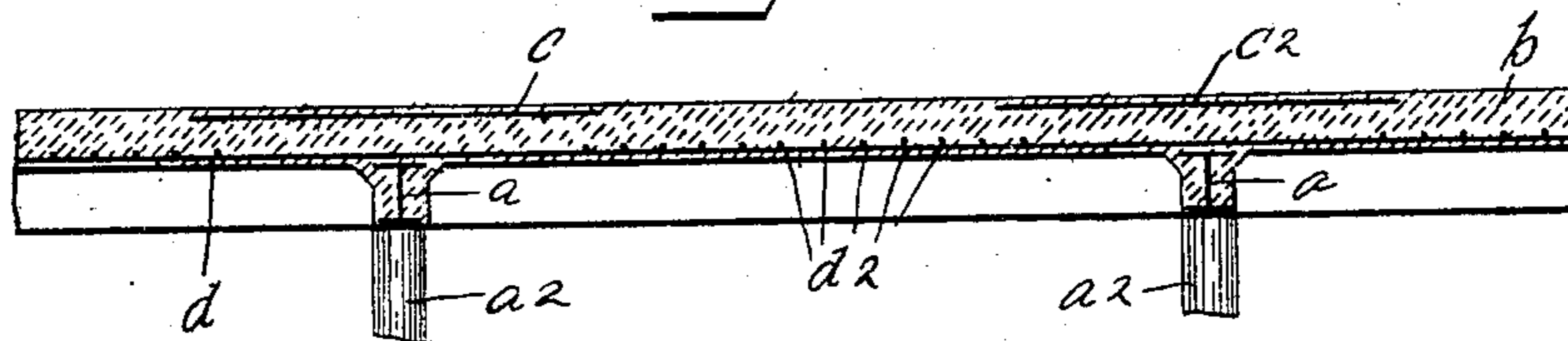


Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 5.

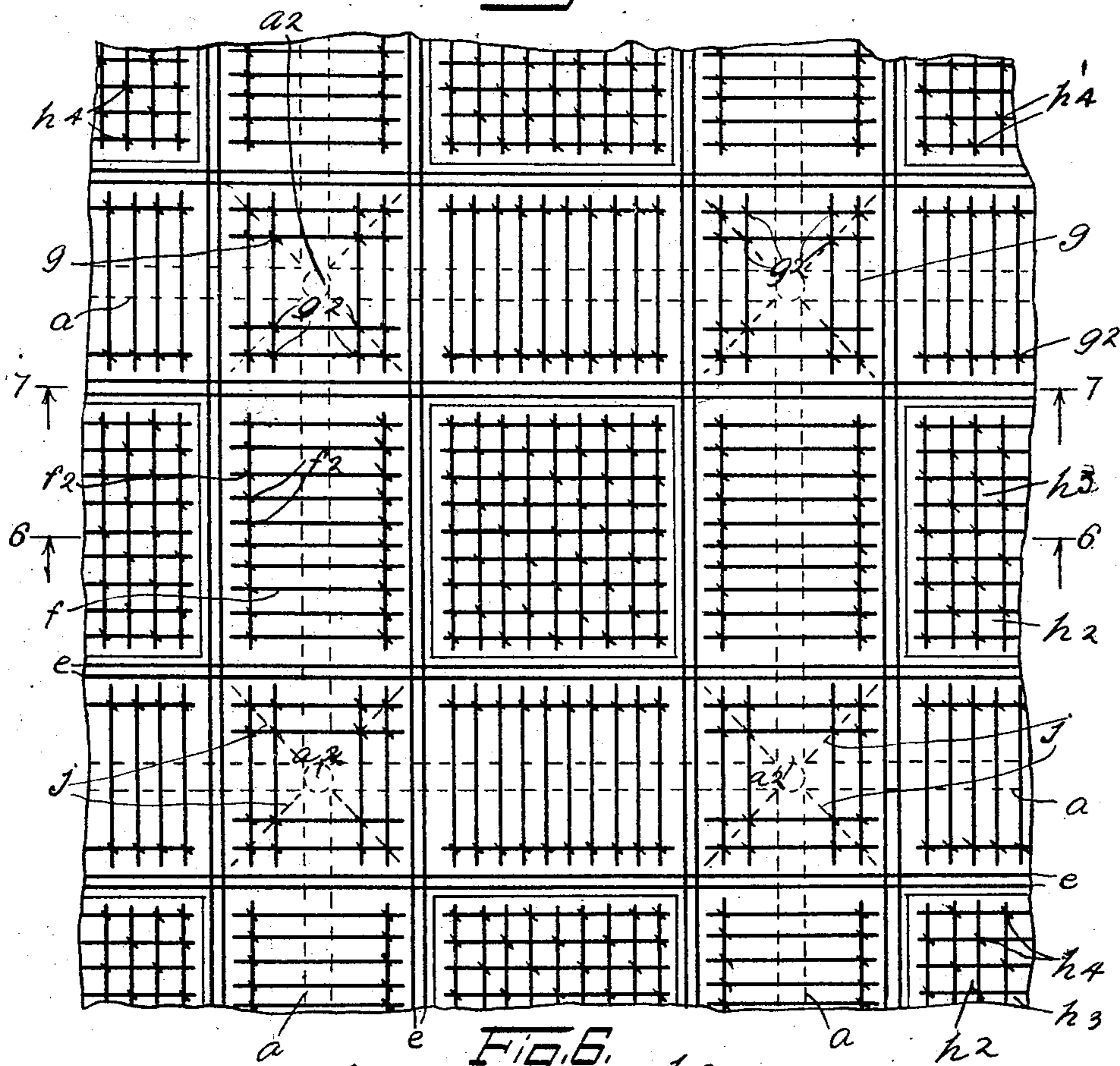


Fig. 6.

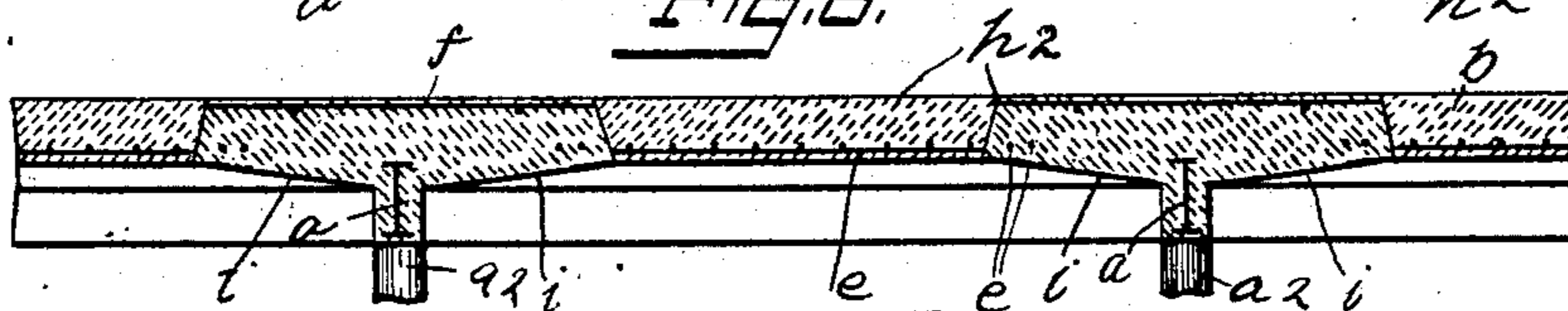
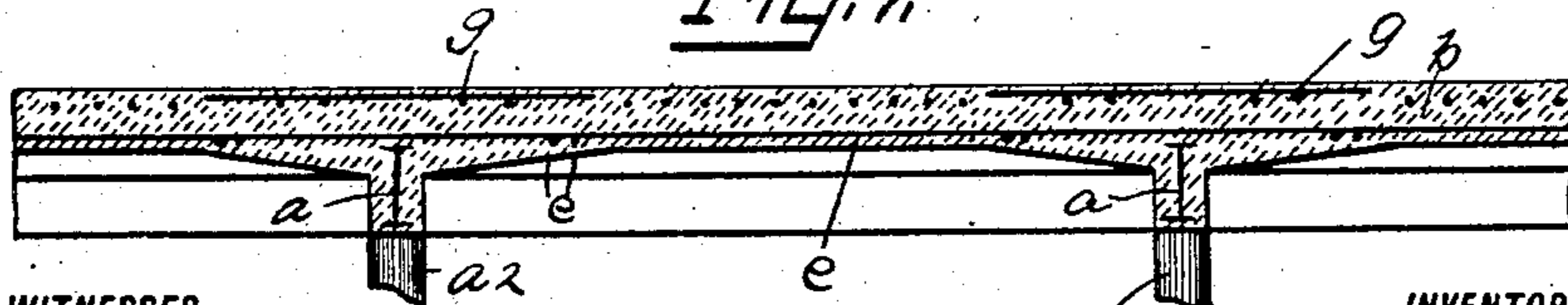


Fig. 7.



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UNITED STATES PATENT OFFICE.

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FLOOR AND CEILING CONSTRUCTION FOR FIREPROOF BUILDINGS.

No. 862,911.

Specification of Letters Patent.

Patented Aug. 13, 1907.

Application filed February 4, 1907. Serial No. 355,530.

To all whom it may concern:

Be it known that I, LEIBU HERMANN, a subject of the King of Roumania, and residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Floor and Ceiling Constructions for Fireproof Buildings, of which the following is a specification, such as will enable those skilled in the art to which it appertains to make and use the same.

10 This invention relates to fireproof buildings which involve the use of reinforced concrete and particularly to the floor and ceiling construction of buildings of this class, and the object thereof is to provide a floor and ceiling construction for buildings of this class which possess the greatest possible amount of strength in proportion to the amount of material employed.

15 In the first form of my improvement, I employ two separate layers of reinforcing material which are embedded in the top and bottom portions of the floor and ceiling construction or the concrete forming the floor and ceiling construction; and when this form of construction is employed the top layer of reinforcing material consists of parallelograms of rods or bars arranged over and between the columns which support the floor and ceiling construction, the rods or bars of the separate parallelograms of the reinforcing material being unconnected, while the bottom layer of reinforcing material consists of continuous rods or bars placed between the columns which support the floor and ceiling construction and arranged at right angles to each other and forming a continuous network, the said rods or bars forming, where they cross each other, parallelograms of lattice work between which are parallelograms of parallel rods or bars which do not cross each other; while the second form of my construction involves a single layer of reinforcing material placed in the concrete of the floor and ceiling construction and comprising rods or bars arranged in parallelograms over the columns which support the floor and ceiling construction and between said columns and in the panels, sections or spaces formed by said columns, the parallelograms of reinforcing material over the columns and between the columns being in the top portion of the concrete, while the parallelograms of reinforcing material in the middle of the spaces or sections formed by the columns being in the bottom portion of the concrete, and in this form of construction I also employ continuous rods or bars which cross each other in opposite direction and which are arranged in the bottom portion of the concrete at the opposite sides of the columns and corresponding floor and ceiling beams and which divide the floor and ceiling construction into parallelograms in which the other reinforcing material is placed.

55 The invention is fully disclosed in the following

specification, of which the accompanying drawing forms a part, in which the separate parts of my improvement are designated by suitable reference characters in each of the views, and in which;—

Figure 1 is a plan view indicating the top layer of reinforcing material in the first form of construction employed; Fig. 2 a view similar to Fig. 1 but indicating the bottom layer of reinforcing material in the first form of floor and ceiling construction which I employ; Fig. 3 a section on the line 3—3 of Figs. 1 and 2 and showing the separate layers of reinforcing material shown in Figs. 1 and 2 combined in a floor and ceiling construction; Fig. 4 a section similar to Fig. 3 but taken on the line 4—4 of Figs. 1 and 2; Fig. 5 a plan view of the reinforcing material employed in my second form of construction; Fig. 6 a section on the line 6—6 of Fig. 5 and showing a section of floor and ceiling construction involving concrete and the reinforcing material arranged as shown in Fig. 5; and, Fig. 7 a section similar to Fig. 6 but taken on the line 7—7 of Fig. 5.

In the practice of my invention as shown in Figs. 1 to 4 inclusive, I provide a floor and ceiling construction for fireproof buildings which comprises I-beams or similar supports a supported by columns a^2 , and the I-beams a are shown in full lines in Figs. 3 and 4 as are also the columns a^2 , and said I-beams and columns are indicated in dotted lines in Figs. 1 and 2. This arrangement of I-beams and columns, as will be understood, divides the floor and ceiling construction into parallelograms, and in Figs. 3 and 4 the concrete b of the floor and ceiling construction is shown in section, and this concrete also incloses the I-beams a .

In the first form of construction employed by me, I provide two separate layers of reinforcing material, said layers being placed in the top and bottom portions of the concrete material b as clearly indicated in Figs. 3 and 4. The top layer of reinforcing material is designated in Figs. 1 to 4 inclusive by the reference character c and the bottom layer by the reference character d . The bottom layer d of reinforcing material consists of continuous rods or bars d^2 arranged midway between the beams a and columns a^2 as clearly shown in Figs. 2 and 3, and these rods or bars cross each other centrally of the spaces or parallelograms formed by the columns a^2 , and where the rods or bars cross each other centrally of said parallelograms or spaces they form a lattice work d^3 and between the columns a^2 and over the beams a the said rods or bars which range in opposite directions form parallelograms d^5 of single or parallel rods or bars, and where the said rods or bars cross each other centrally of the spaces or sections of the floor and ceiling construction formed by the beams a and columns a^2 they are or may be bound together or tied together by wires or other fastening devices d^4 if desired. The top

layer c of reinforcing material employed in this form of construction is made up of small parallelograms c^2 of rods or bars arranged as shown in Figs. 1, 3 and 4. The parallelograms of reinforcing material placed directly over the columns a^2 being composed of rods or bars which cross each other in opposite directions and are preferably tied together where they cross as shown at c^3 , while the parallelograms of reinforcing material placed between the columns consist of a single layer of parallel rods or bars as shown at c^4 , and with this form of construction there are central spaces between the columns a^2 in the top layer of reinforcing material that are not reinforced or which do not contain reinforcing material, said spaces being indicated at c^5 .

Although, I have indicated in Figs. 3 and 4, I-beams of the usual form my invention is not limited to any special form of beams and reinforced beams of concrete may be employed if desired, and by means of the construction shown in Figs. 1 to 4 inclusive, I provide a floor and ceiling construction of reinforced concrete which may be made of any desired strength and which will possess any desired amount of power of resistance, the strength and power of resistance depending upon the thickness or amount of concrete employed and the sizes and proximity of the rods or bars which form the top and bottom layers of the reinforcing material.

In the construction shown in Figs. 5 to 7 inclusive, or the second form of construction which I employ, the arrangement of the beams a and columns a^2 is or may be the same as in the construction shown in Figs. 1 to 4 inclusive, but in this form of construction the floor and ceiling construction or the reinforcing material thereof is divided into parallelograms formed by continuous rods or bars e which cross each other at right angles and which are arranged on the opposite sides of the beams a . The continuous rods or bars e are placed in the bottom portion of the floor and ceiling construction and over each of the columns a^2 and in the top portion of the concrete forming the floor and ceiling construction is placed a parallelogram f of reinforcing material composed of rods or bars which are parallel and which are preferably tied together as shown at f^2 and over the columns a^2 are placed other parallelograms g of reinforcing material which preferably consist of parallel rods or bars which cross each other and may be tied together as shown at g^2 , if desired. In this form of construction, in each of the panels or spaces formed by the beams a and columns a^2 is a central block h^2 which is rectangular in form and which is formed separately and separately reinforced by reinforcing material h^3 placed in the bottom portion thereof and composed of rods or bars which cross each other at right angles and which are preferably tied together as shown at h^4 . In this form of construction, the concrete floor and ceiling construction directly over the columns a^2 and beams a is thicker than elsewhere, and this thickness gradually tapers or grows less as indicated by the lines i in Fig. 6 toward the four sides of the panels formed by the beams a and columns or posts a^2 and this forms four radial corners of the ceiling construction around the tops of the columns a^2 which are indicated by the dotted lines j in Fig. 5.

From the foregoing description it will be seen that the construction in Figs. 5 to 7 inclusive, involves the central blocks or parallelograms h^2 centrally of the spaces formed by the beams a and columns a^2 in which

the reinforcing material is placed in the bottom of the floor and ceiling construction, and that the reinforcing material in the other portions of the floor and ceiling construction is placed in the top portion thereof except in the case of the rods or bars e which cross each other at right angles between the beams a and at a predetermined distance therefrom, said rods or bars e being in the bottom portion of the floor and ceiling construction.

Although I have described the arrangement of reinforcing material shown in Fig. 1 as composed of separate parallelograms or sub-divisions of rods or bars arranged over the columns and beams and some of which consist of rods or bars arranged parallel only and others of rods or bars which cross each other in opposite directions, it will be apparent that these separate parallelograms or sub-divisions of reinforcing material may be composed of wire netting, expanded metal or other equivalent forms of construction and this is also true of the separate parallelograms or sub-divisions of the reinforcing material shown in Figs. 5, 6 and 7, and while I have used the word parallelograms as describing the arrangement of the separate sub-divisions of reinforcing material in the figures referred to the said separate sub-divisions are not necessarily parallelograms as will be understood, and the plan thereof may be of any desired shape or form. The idea of making the central portions of panels shown in Figs. 5 and 6 separate is to obtain a certain location of the point of inflection in the panel; in this second form of my improvement the point of inflection is at the joint. I understand by point of inflection the point where the tensile stress passes from the bottom to the top of the panel. This tensile stress is taken up by the metal reinforcement. The location of the point of inflection being given, the figuring of the floor and ceiling is simpler than in the first form of my improvement, is certain; and I am able to use in this form the least amount of material for the required strength.

In the first form of construction the portions of bottom continuous bars right under the top bars take up part of the compressive stress. In the second form the entire compressive stress in this part of the panel is taken up by concrete necessitating more concrete as shown.

A floor and ceiling construction made in this manner may be made of any desired strength, the strength and resisting quality depending entirely on the amount of material employed and the proximity of the members which make up the separate sub-divisions of the reinforcement or reinforcing material which is placed in the concrete, and it will be observed that the general plan and arrangement of the reinforcing material is the same in each of the forms of construction shown.

The second form of construction shown in Figs. 5 to 7 inclusive is not claimed herein; but is made the subject of a divisional application filed June 5, 1907, Serial No. 377289.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. A floor and ceiling construction for fireproof buildings, said floor and ceiling construction consisting of concrete supported by columns and beams, the beams being arranged so as to divide the floor and ceiling construction into panels and said concrete being provided with inde-

pendent top and bottom layers of reinforcing material, the said reinforcing material in the bottom layer consisting of rods or bars extending through the concrete in both directions between the columns and beams and being omitted over the columns, and the top layer of reinforcing material consisting of rods or bars which are arranged in the form of parallelograms over the columns and beams, the parallelograms of reinforcing material between the columns consisting of rods or bars arranged transversely of the beams and the parallelograms of reinforcing material over the columns consisting of rods or bars which cross each other in opposite directions.

2. A floor and ceiling construction for fireproof buildings, consisting of concrete supported by columns and beams, the beams being arranged so as to divide the floor and ceiling construction into panels, and said concrete being provided with separate top and bottom layers of reinforcing material, the reinforcing material in the bottom layer consisting of separate series of rods or bars extending through the concrete in both directions between the columns and beams and crossing each other in the panels formed by the beams, said rods or bars being omitted over the columns, and the top layer of reinforcing material being arranged in separate sections or divisions over the columns, and over the beams between the columns,

3. A floor and ceiling construction for fire-proof buildings, consisting of concrete supported by columns and beams, the beams being arranged so as to divide the floor and ceiling construction into panels, and said concrete being provided with separate top and bottom layers of reinforcing material, the reinforcing material in the bottom layer consisting of separate series of rods or bars extending through the concrete in both directions between the columns and beams and crossing each other in the panels formed by the beams, said rods or bars being omitted over the columns, and the top layer of reinforcing material being arranged in separate sections or divisions over the columns and over the beams between the columns, and the separate sections or divisions of reinforcing material over the columns, and over the beams between the columns, consisting of rods or bars which cross each other, and rods or bars arranged parallel.

In testimony that I claim the foregoing as my invention I have signed my name in presence of the subscribing witnesses this 1st day of February, 1907.

LEIBU HERMANN.

Witnesses:

C. E. MULREANY,
A. WORDEN GIBBS.