

(No Model.)

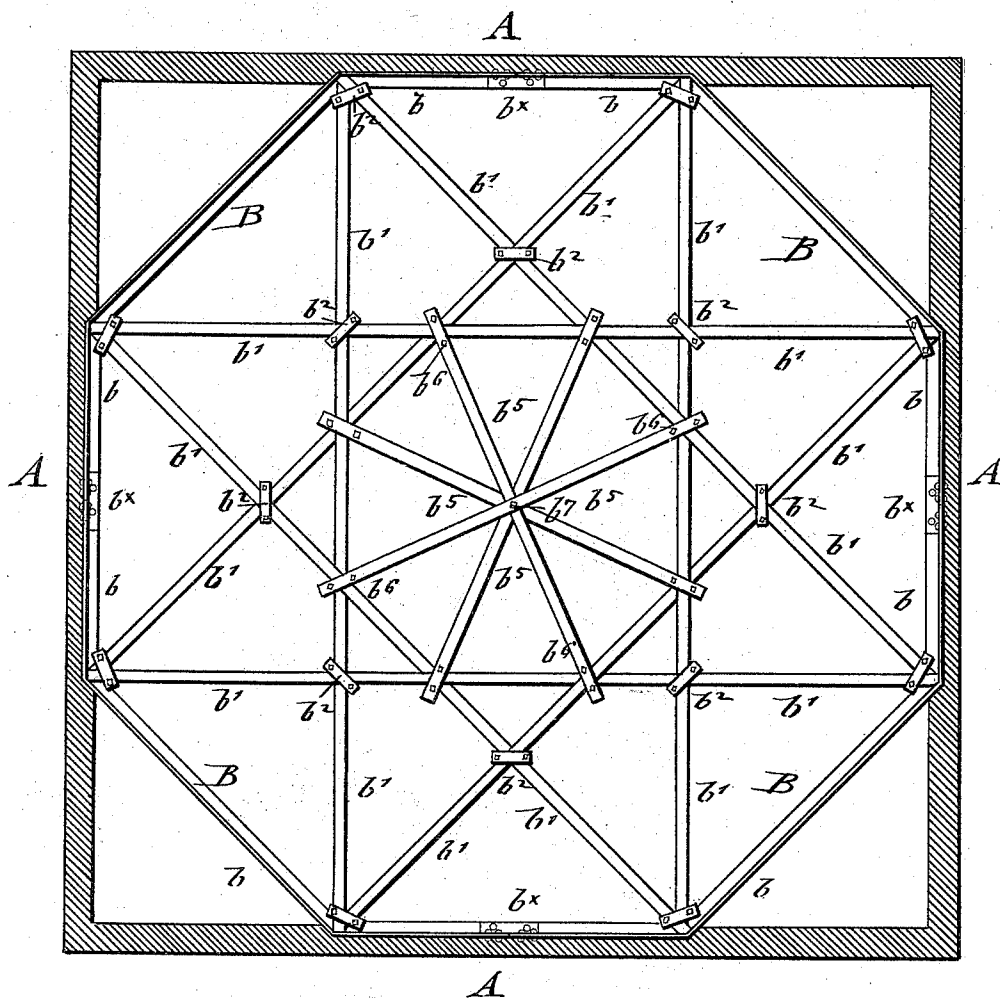
3 Sheets—Sheet 1.

N. POULSON.
FIREPROOF FLOOR OR ROOF.

No. 493,839.

Patented Mar. 21, 1893.

Fig. I.



WITNESSES:
A. Merner
Marion Hall

INVENTOR
Niels Poulsen
BY *George H. Ragsdale*
ATTORNEYS.

(No Model.)

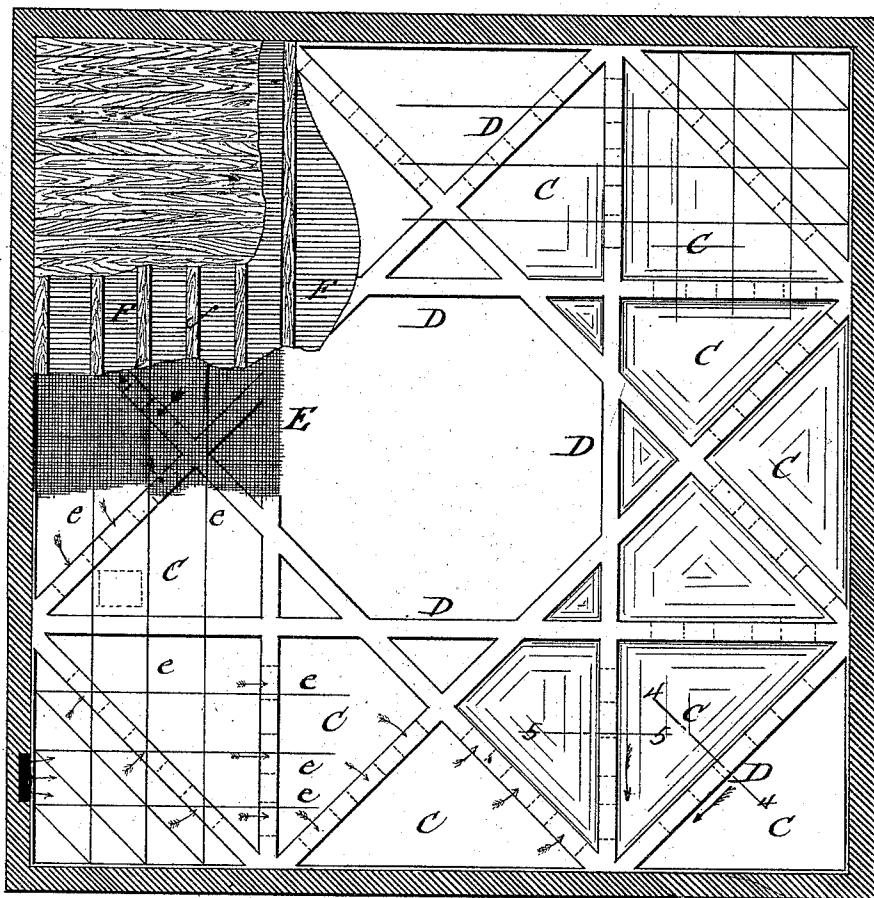
3 Sheets—Sheet 2.

N. POULSON.
FIREPROOF FLOOR OR ROOF.

No. 493,839.

Patented Mar. 21, 1893.

Fig. II.



WITNESSES:

W. H. Hall
Marion Hall

INVENTOR

Niels Poulsen
BY *Super Regeur*
ATTORNEYS.

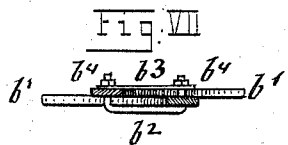
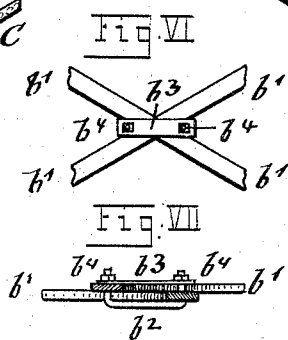
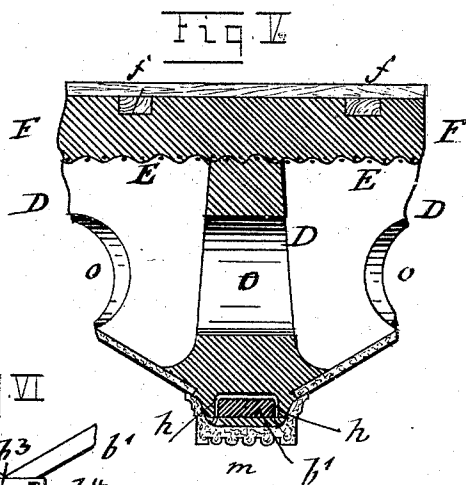
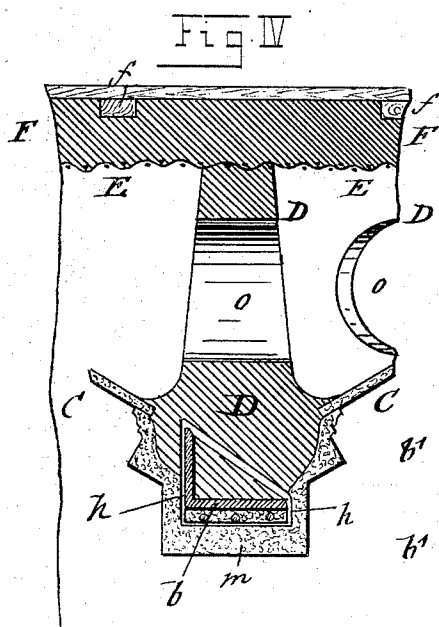
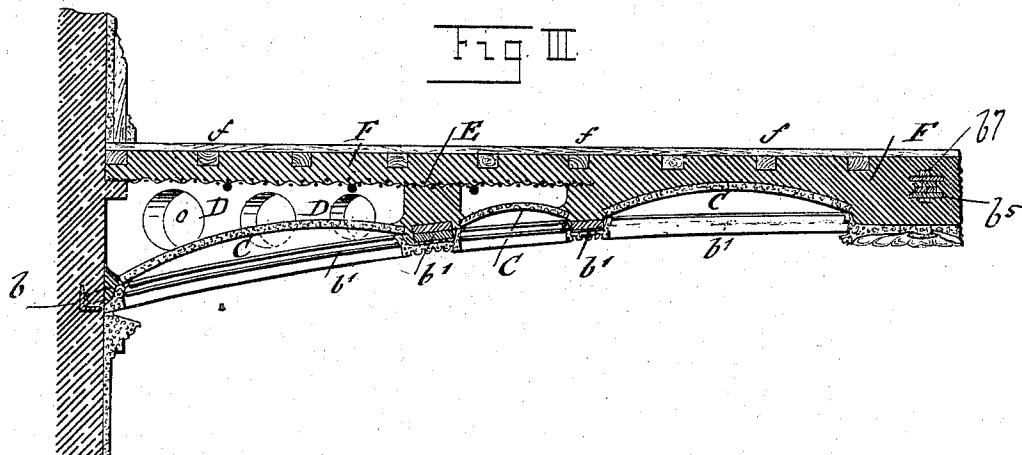
(No Model.)

3 Sheets—Sheet 3.

N. POULSON.
FIREPROOF FLOOR OR ROOF.

No. 493,839.

Patented Mar. 21, 1893.



WITNESSES:

Wm. H. Hall
Marion Hall

INVENTOR

Niels Poulsen
BY *Joseph Regnier*
ATTORNEYS

UNITED STATES PATENT OFFICE.

NIELS POULSON, OF FORT HAMILTON, NEW YORK.

FIREPROOF FLOOR OR ROOF.

SPECIFICATION forming part of Letters Patent No. 493,839, dated March 21, 1893.

Application filed April 10, 1891. Serial No. 388,409. (No model.)

To all whom it may concern:

Be it known that I, NIELS POULSON, a citizen of the United States of America, residing in the town of Fort Hamilton, county of Kings, and State of New York, have invented certain new and useful Improvements in the Construction of Fireproof Floors or Roofs, of which the following is a specification.

This invention relates to an improved construction of fireproof floors or roofs of that type, in which the deck and ceiling are carried on a structure or foundation of iron, and the most prominent example of which is a floor composed of iron beams and brick or hollow tile arches.

The principal object of my invention is to provide an iron foundation wherein the members are disposed to such advantage that adequate strength is combined with such lightness of structure as to attain great economy in comparison with an iron beam construction.

To this end the principal feature of my invention consists of a skeleton frame work which is composed of arched intercrossing bars or ribs, that are preferably made of plain bar-iron, and which frame is suitably supported around its base; and the invention consists further of an improved fire-proof floor or roof that is formed of a polygonal frame of angle T or bar irons, corresponding in shape to the space to be covered, the corners of said frame being connected by arched intersecting braces which are jointed by clasps at their points of intersection. The central space inclosed by the braces is connected by diametrical bars of suitable cross-section which are fastened to the braces and connected at their center by a tie-bolt. The triangular spaces formed by the supporting frame-work are filled by panels made of plaster-of-paris or other suitable material, which are covered by a layer of cement. Above the arched braces of the frame-work are built up cement-ribs which are leveled at their upper parts for supporting the floor. A light wire-netting is then placed over the cement-ribs and supported on strong wires that are stretched across the space between the walls. Over the netting a layer of cement is placed, which layer unites the cement-ribs, and which extends over the middle part of the metallic frame-work at which part no net-

ing is required. In the cement-layer are embedded the floor-timbers to which the floor is applied, or the floor tiles or a finishing layer of cement.

In the accompanying drawings, Figure I represents a plan of the polygonal frame and arched ribs used in my improved construction of fire-proof floors and roofs, said frame and ribs being adapted for a room square in shape. Fig. II is a plan of the same showing the frame-work covered by the cement-ribs and a portion of the wire-netting and floor. Fig. III is a vertical transverse section of a floor made according to my improved method. Fig. IV and V are vertical transverse sections respectively on lines 4, 4, and 5, 5, Fig. III drawn on a larger scale, and Figs. VI and VII are details showing the clasps by which the connection of the intersecting ribs of the frame work is accomplished.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A are the supporting walls of a room of any suitable size, which is to be covered by my improved fire-proof ceiling or roof. The ceiling or roof is supported by a polygonal frame B made of angle, T or bar-irons the frame being constructed of any suitable shape according to the shape of the space to be covered. For a square room the frame is made in the shape of an octagon, the angle beams *b* of which are formed of angle-irons which rest at their angles on the walls and are bolted together by suitable fish-plates *b^x* at the abutting ends, four angle-beams being used for this purpose. The corners of the exterior octagonal frame B are connected by braces *b'* which extend parallel with the sides between opposite corners, said braces being connected at the points of intersection and near the corners of the angle-beams *b* by U-shaped clasps *b²* which extend over the braces and are connected by straps and screw-nuts *b⁴*, which latter are applied to the threaded ends of the U-shaped clasps, as shown in Figs. I, VI and VII. The ends of the braces *b'* rest in the angles formed by the angle-beams *b*, the braces forming with the exterior frame B a stiff frame-work. When rooms having different shapes have to be covered over by ceiling or roof, the metallic skeleton frame formed by the braces is adapted to the

shape of the room, the construction as shown in the drawings being merely one of many different constructions that are within the scope of my invention. The braces b' are bent in the shape of an arch before being placed in position and tied together, and are connected at their inner intersecting points by means of four flat diagonal bars b^5 each of which is provided with five holes two at each end and one at the center, by which said bars are bolted to the braces by means of U-bolts b^6 and by a center tie-bolt b^7 which passes through all the bars b^5 . After the frame-work is thus put together all the strain from the same is carried to the corners of the interior and exterior octagon formed by the braces and angle-beams, so that no strain is exerted on the walls of the building, the frame-work acting as a tie for the same. If the floor or roof is intended for a large building in which there are supporting columns and girders, the ends of the angle-beams will be dispensed with and the angle beams attached directly to the girders so as to form a polygonal frame the corners of which are connected by the arched braces in the same manner as before described.

After the frame-work is thus put in place, the triangular and four-cornered spaces between the individual members of the same are filled up by means of panels of plaster-of-paris or other plastic material, which are either made in separate molds and dropped into the spaces between the braces, or which are cast into the spaces by first closing the same by means of an inflated cushion which is pressed up from below against the braces, so as to form an arch in the opening of the same. As the plaster-of-paris will set in a few minutes, the cushion can be removed and placed in another opening for making another arched panel, or preferably a number of cushions may be used, so that while the plaster is hardening over one of them other panels can be prepared and cast. On the top of the plaster-of-paris panels C a coating of cement may be cast from one to one and a half inch in thickness, so as to strengthen the panels. After the cement has set so as to be hard enough to walk on the same, as many cement ribs D are formed as there are braces in the supporting frame-work. These ribs are made of about the same thickness as the width of the individual braces of the frame-work and are provided with openings o for the purpose of lightening the weight of the ribs or for heating and ventilation. These openings o are arranged at suitable distances from each other and are produced by placing cylindrical molds of sheet-metal or wood in place and casting the cement-ribs D around the same. After the cement has set the sheet-metal or wooden cylinders are removed. When the cement-ribs D are completed, a number of wires e are stretched across the space outside of the interior octagonal portion of the frame-work, which wires e are of considerable

thickness and form a wide-meshed net as shown in Fig. II, on which a light wire or cord netting E is supported. This netting E is extended up to the inner octagonal space, as shown in Fig. III. A layer of cement F is then placed over the netting E and over the arched octagonal center space of the frame-work, so that the latter space is covered by one solid body of cement. The wire-netting E should be sufficiently open so that the cement will bind on the surface of the ribs, while it should be at the same time fine enough to prevent the cement from running into the spaces between the cement-ribs D. After the cement has set sufficiently, if wood floor is wanted wooden timbers f are set into the layer of cement F, to which timbers the floor boards are attached, or the floor is furnished with tiles or with an additional coat of cement, as desired.

When the floor is to be constructed with a view to give to the ceiling a handsome and ornamental appearance, the method of erecting the same will be somewhat different. The iron frame-work B is put in place as before, after which the members of the same are covered with ornamental moldings m of plaster-of-paris or other material, which are suspended from the same. When these moldings are in their proper places so as to cover the members of the frame-work entirely, there are placed over the braces and bars of the frame-work, U-shaped hooks or straps h that are fitted into the moldings which are then filled or backed with plaster-of-paris or cement so as to be fastened with the U-shaped hooks securely to the braces and bars of the frame-work, as shown in Figs. IV and V. The spaces between the frame-work are then filled by the ornamented panels C made of plaster-of-paris or other material, which are supported on the moldings of the ribs and sealed thereby by running in plaster-of-paris or cement. A layer of cement is then placed on top of the panels C and the floor then finished by casting the cement-ribs D, laying on the wire-netting E, casting the covering cement-layer F and laying then the floor as before described.

The advantages of my improved construction of floors and roofs for buildings are that the material is used to the best advantage, the strength of the iron being utilized to its fullest extent and the frame-work being put up with the least expense for time and labor. The angle-irons and braces used for the frame-work are much lighter and cheaper than the ordinary beam-construction, so that a considerable saving in the cost of iron is obtained. The arched panels formed between the arched braces of the frame-work add to the strength of the floor, are in keeping with the general ornamental effect of the structure and impart a unique character to the same. The cement ribs formed above the members of the frame-work for supporting the cement-floor also add to the strength of the structure, though they are made light and with the least possible

quantity of material, so that a floor is obtained which will not weigh over one-third of the weight of a floor of the ordinary construction, while at the same time sufficient space is
5 formed in the floor for ventilating flues and for the laying of steam, water and gas pipes, which can either be put down while the floor is in course of construction, or which can be arranged in trenches formed in the cement-
10 layer so that they can be examined at any time.

Another advantage is the entire fire-proof character of the floor and the effectual exclusion of vermin from the building, as they
15 have no chance to roam from one floor to the other.

My improved construction of floors can be finished in any degree of ornamentation with comparatively little additional expense. Even
20 the plainest forms of panels impart a striking and ornamental appearance owing to the arched character imparted to the ceiling, while by covering the ribs of the frame-work with moldings and using ornamented panels it
25 permits the introduction of any desired style or finish and gives full scope to the taste of the architect and owner.

Having thus described my invention, I claim as new and desire to secure by Letters
30 Patent—

1. A metallic skeleton-frame for floors and roofs, composed of arched intercrossing bars, each of which is supported at its ends, substantially as set forth.

35 2. A metallic skeleton-frame for floors and roofs, composed of arched intercrossing bars that are tied together at their crossings and supported at each end, substantially as set forth.

40 3. A metallic skeleton-frame for floors and roofs, composed of a polygonal base frame and arched inter-crossing bars connecting the corners of the base-frame, substantially as set forth.

45 4. A metallic skeleton-frame for floors and roofs, composed of a polygonal base-frame, arched inter-crossing bars connecting the corners of said base frame and tie-clasps for connecting the arched bars at their points of
50 crossing, substantially as set forth.

5. A metallic skeleton-frame for fireproof floors and roofs, composed of a polygonal base-frame, arched braces connecting the corners

of the base-frame, and diametrical bars connecting the inner intersections of the braces, 55 substantially as set forth.

6. In a fireproof floor or roof, a metallic skeleton-frame, formed of a polygonal base, arched braces connecting the corners of said base, clasps for connecting the braces at their 60 points of intersection, and diametrical bars connecting the corners of the polygonal figure inclosed by said braces, substantially as set forth.

7. A metallic skeleton-frame for fireproof 65 floors and roofs, composed of a polygonal base-frame, arched braces connecting the corners of the base-frame, clasps at the intersections of the braces, diametrical bars connecting the inner intersections of the braces, braces con- 70 necting the ends of said bars to the braces, and a central tie-bolt for the diametrical bars, substantially as set forth.

8. A fireproof floor or roof, composed of a metallic skeleton-frame, panels supported by 75 the members of said frame, cement-ribs above the main-braces of said frame, and a layer of cement extending over the cement-ribs, substantially as set forth.

9. A fireproof floor or roof consisting of me- 80 tallic skeleton frame, panels supported by the members of said frame, cement-ribs above the main-braces of said frame a wire-netting stretched over the cement-ribs, and a layer of cement extended over the netting and the 85 center of the frame, for supporting the floor, substantially as set forth.

10. A fireproof floor or roof, composed of a metallic skeleton-frame formed of a polygonal base, arched braces connecting the corners of 90 said base, and diametrical center bars connecting the intersections of said braces, panels supported on said frame, cement-ribs formed above said braces, a wire-netting extending over the cement-ribs, and a layer of 95 cement extending over the netting and the center-bars of the frame, said cement-layer forming the foundation for the floor, substantially as set forth.

In testimony that I claim the foregoing as 100 my invention I have signed my name in presence of two subscribing witnesses.

NIELS POULSON.

Witnesses:

PAUL GOEPEL,
A. M. BAKER.