(No Model.) 8 Sheets—Sheet 1.

T. HYATT.

ILLUMINATING VAULT COVER OR GRATING TILE AND SURFACES MADE OF THE SAME.

No. 272,383. Patented Feb. 13, 1883.

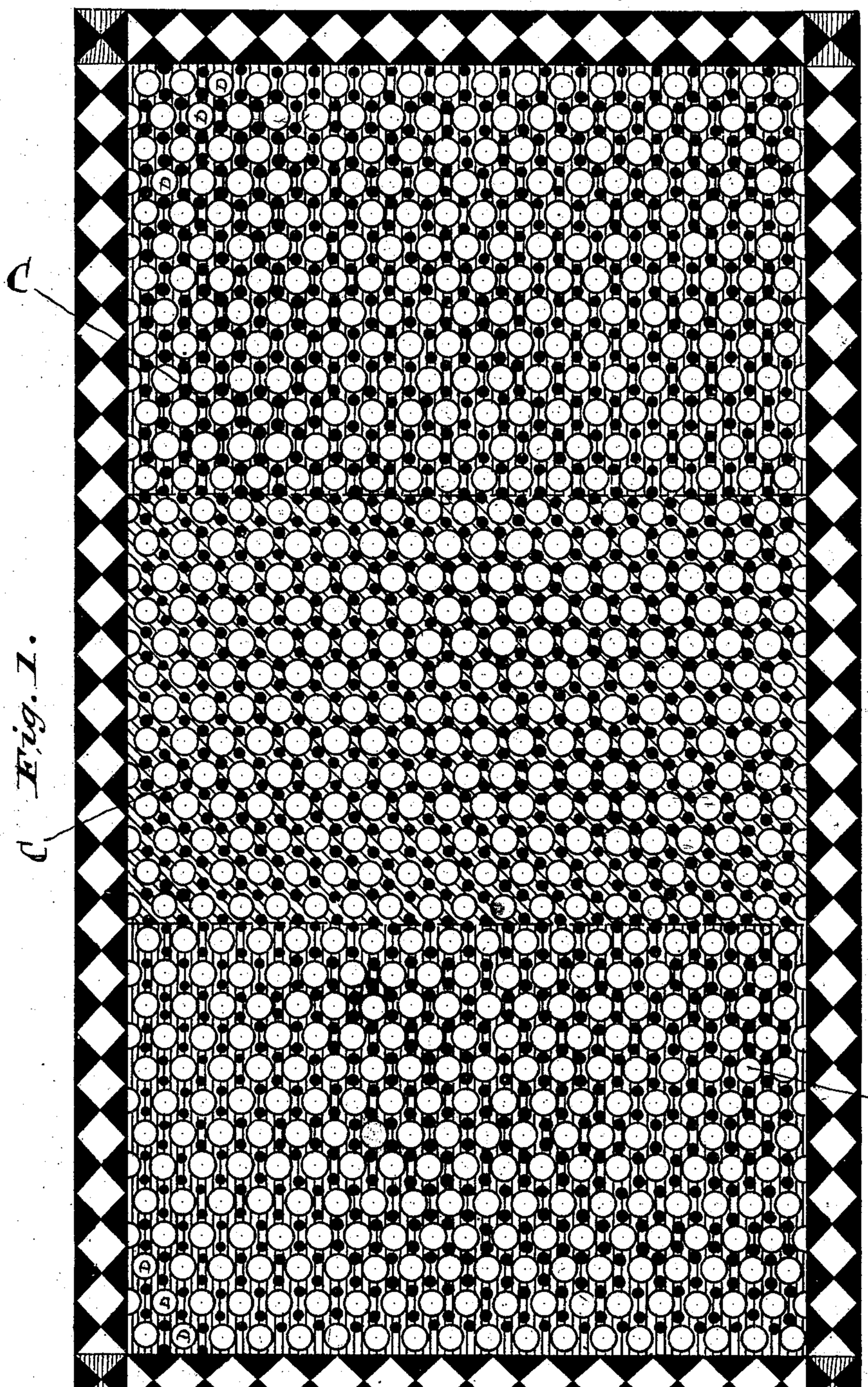


Fig. 1.

Witnesses:
T. C. Brecht
D. F. Kelleher

Inventor
Thaddeus Hyatt

(No Model.) 8 Sheets—Sheet 2.

T. HYATT.

ILLUMINATING VAULT COVER OR GRATING TILE AND SURFACES MADE OF THE SAME.

No. 272,383. *Fig. 2.* Patented Feb. 13, 1883.

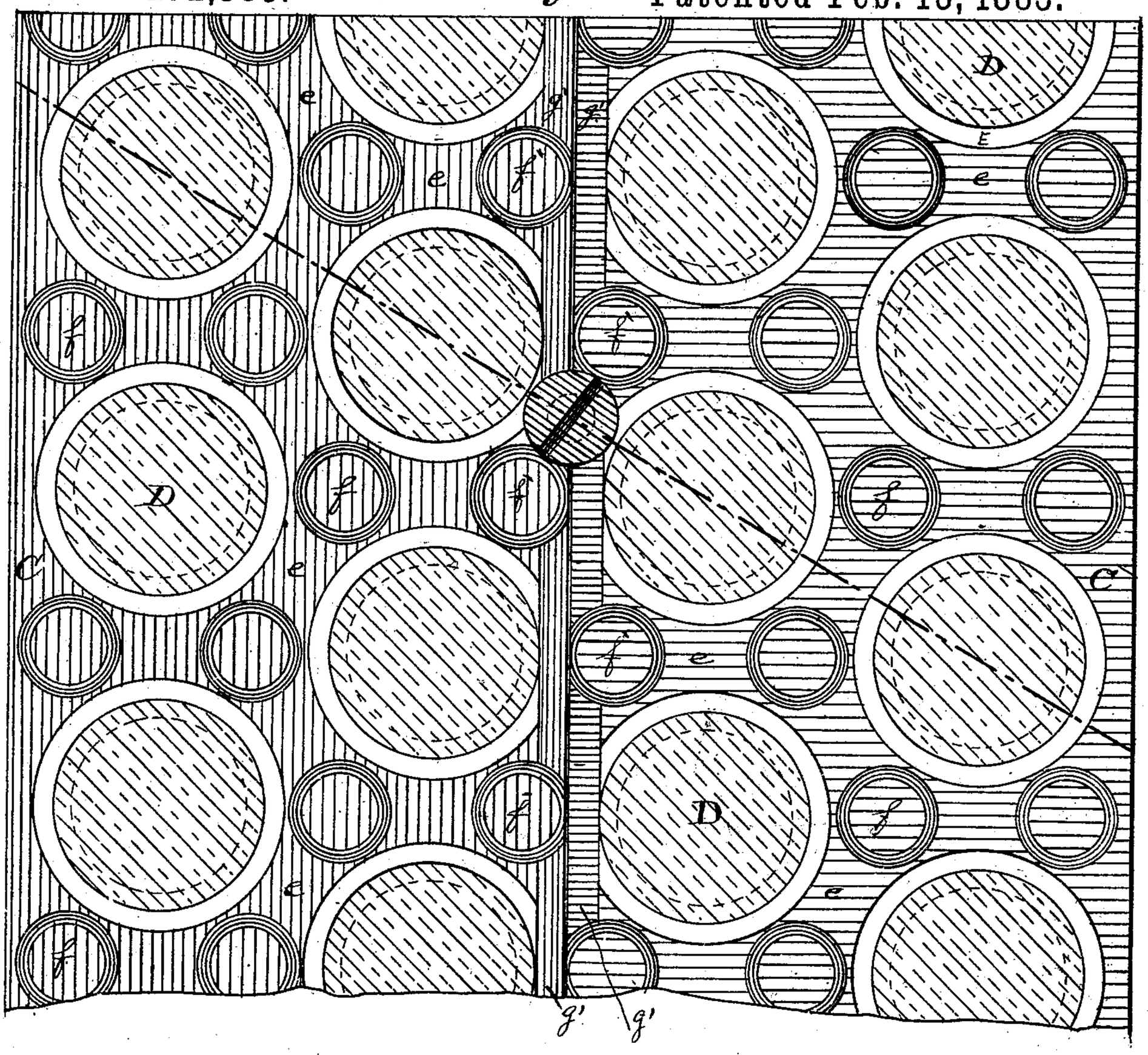
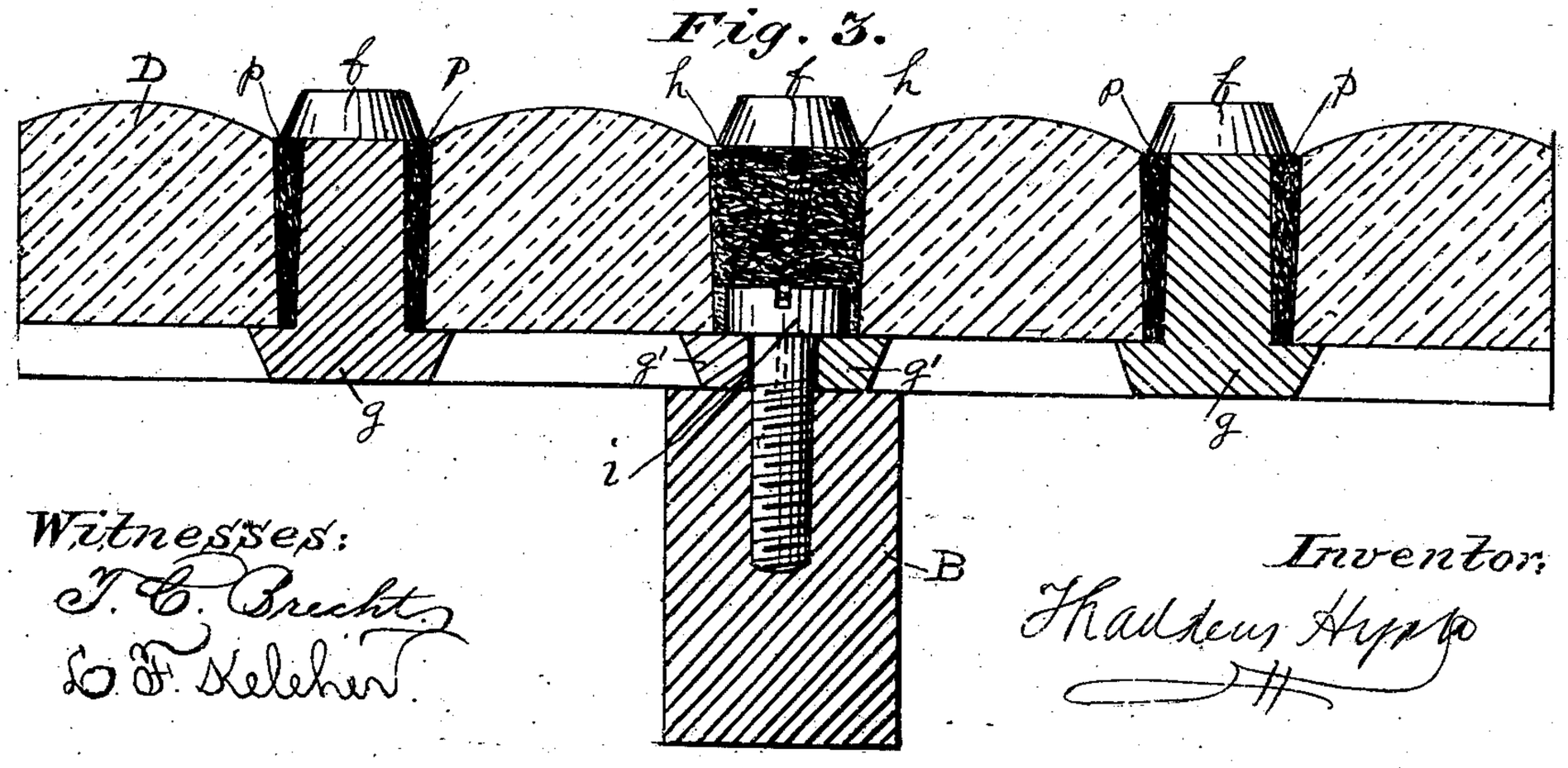


Fig. 3.



Witnesses:
T. C. Brecht
L. F. Kelcher

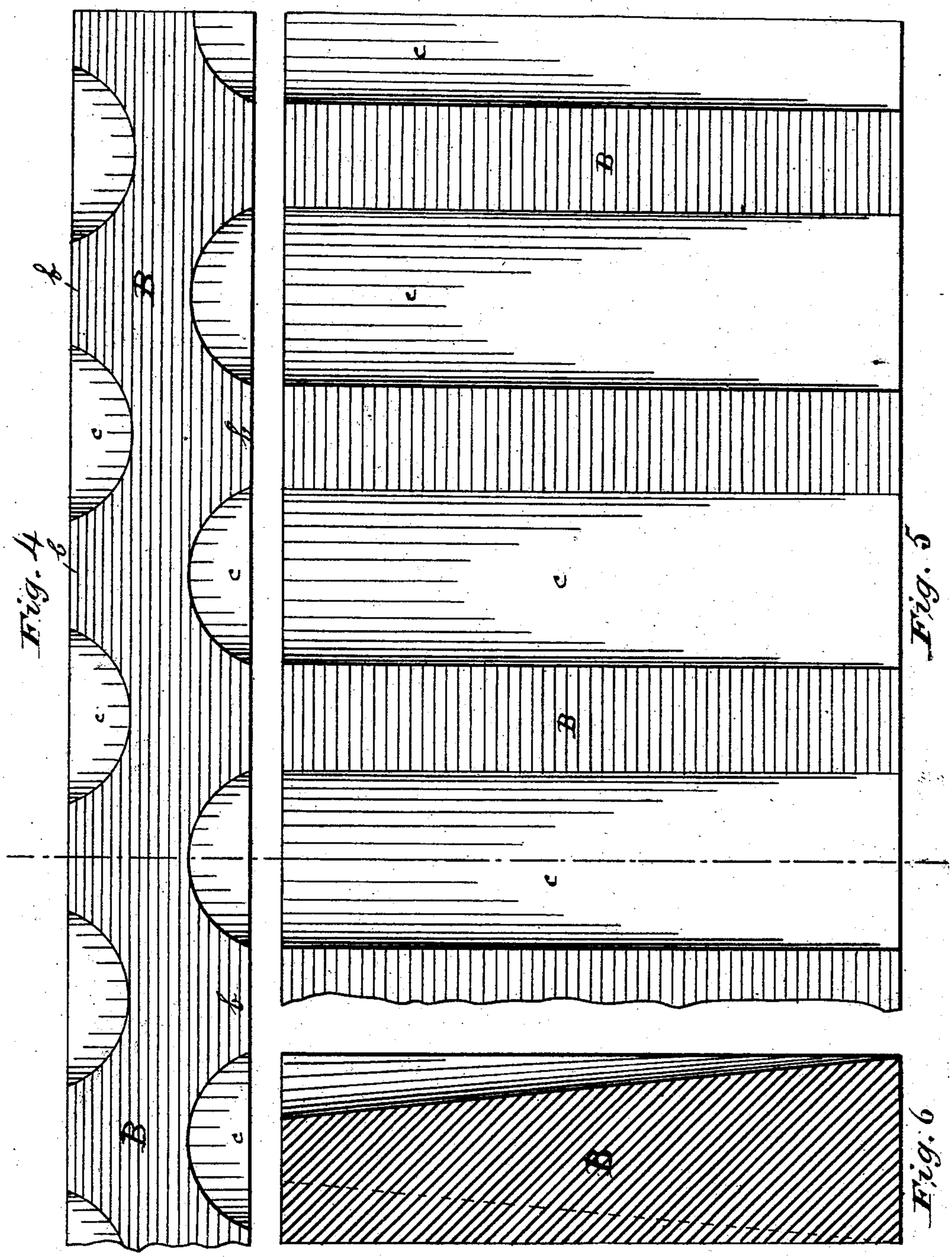
Inventor:
Thaddeus Hyatt

(No Model.) 8 Sheets—Sheet 3.

T. HYATT.

ILLUMINATING VAULT COVER OR GRATING TILE AND SURFACES MADE OF THE SAME.

No. 272,383. Patented Feb. 13, 1883.



Witnesses:
F. C. Brecht.
L. F. Keleher.

Inventor:
Thaddeus Hyatt

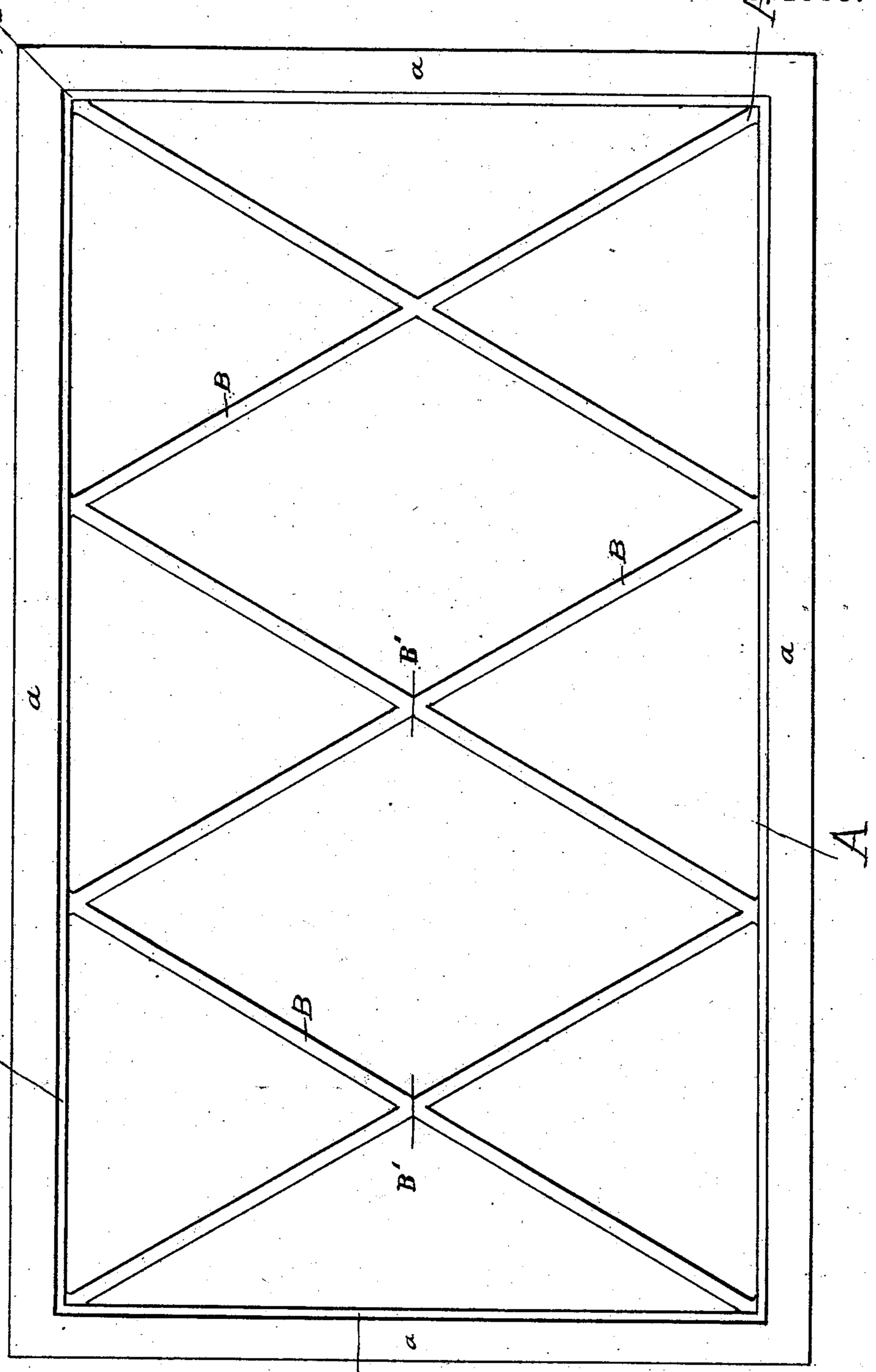
(No Model.) 8 Sheets—Sheet 4.

T. HYATT.

ILLUMINATING VAULT COVER OR GRATING TILE AND SURFACES MADE OF THE SAME.

No. 272,383. Patented Feb. 13, 1883.

Fig. 1.



Witnesses:
F. C. Brecht.
L. F. Delehey.

Inventor
Thaddeus Hyatt

(No Model.) 8 Sheets—Sheet 5.

T. HYATT.

ILLUMINATING VAULT COVER OR GRATING TILE AND SURFACES MADE OF THE SAME.

No. 272,383. Patented Feb. 13, 1883.

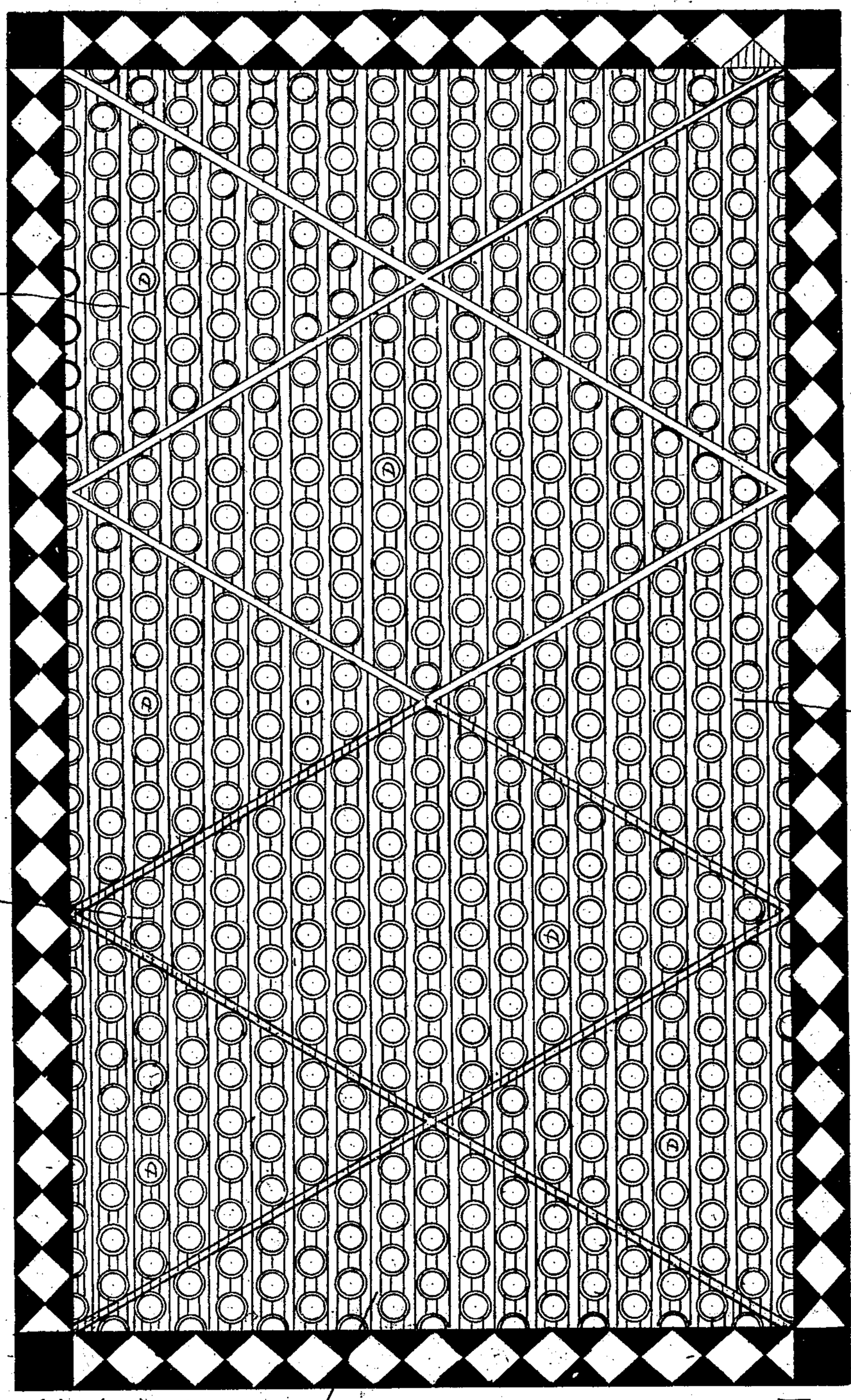


Fig. 8.

Witnesses:
T. C. Brecht
S. F. Kelcher

Inventor:
Thaddeus Hyatt

(No Model.) 8 Sheets—Sheet 6.

T. HYATT.

ILLUMINATING VAULT COVER OR GRATING TILE AND SURFACES MADE OF THE SAME.

No. 272,383. Patented Feb. 13, 1883.

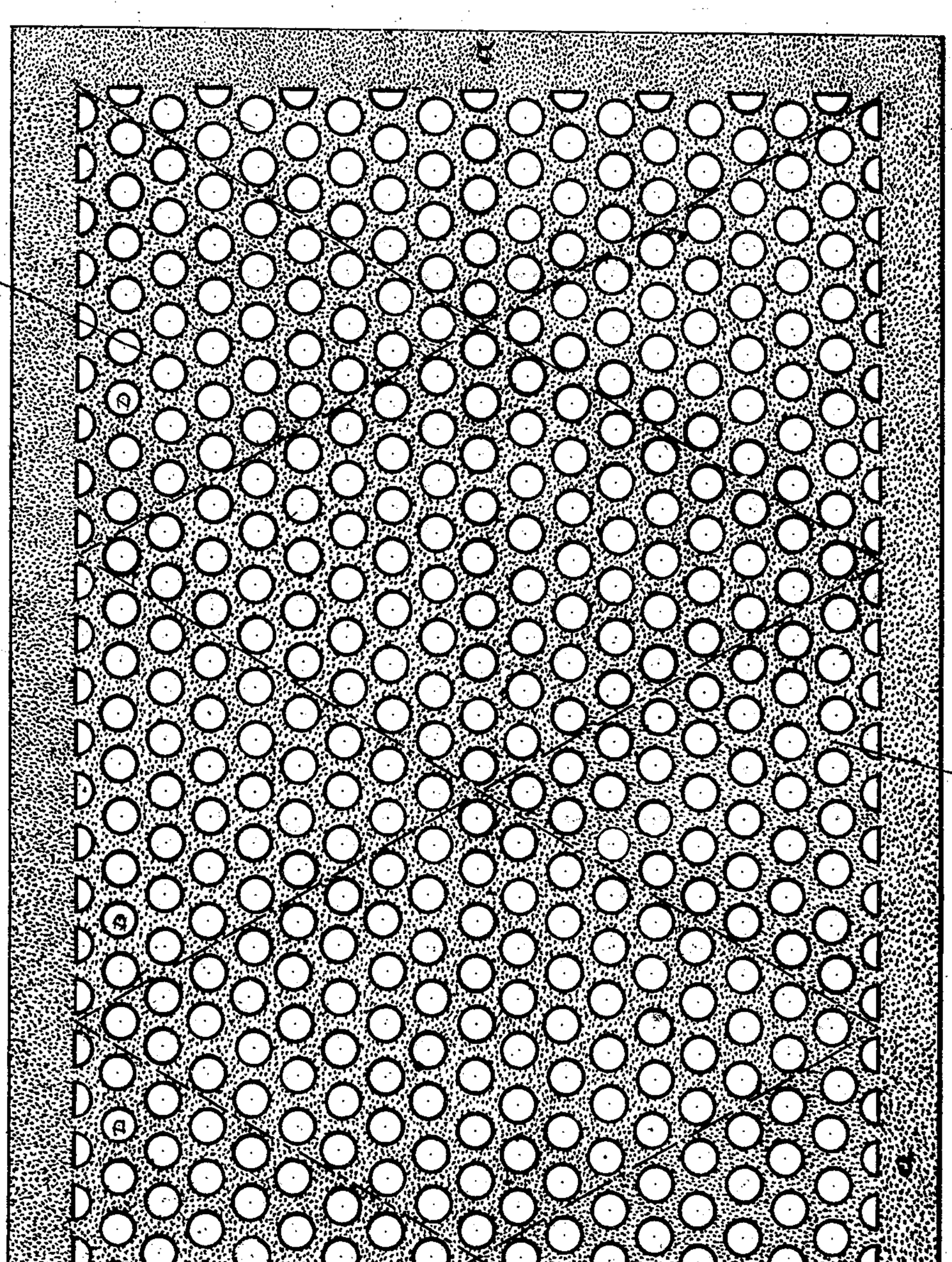


Fig. 9.

Witnesses:
T. C. Brecht.
L. F. Kelther.

Inventor.
Thaddeus Hyatt

(No Model.) 8 Sheets—Sheet 7.

T. HYATT.

ILLUMINATING VAULT COVER OR GRATING TILE AND SURFACES MADE OF THE SAME.

No. 272,383. Patented Feb. 13, 1883.

Fig. 10

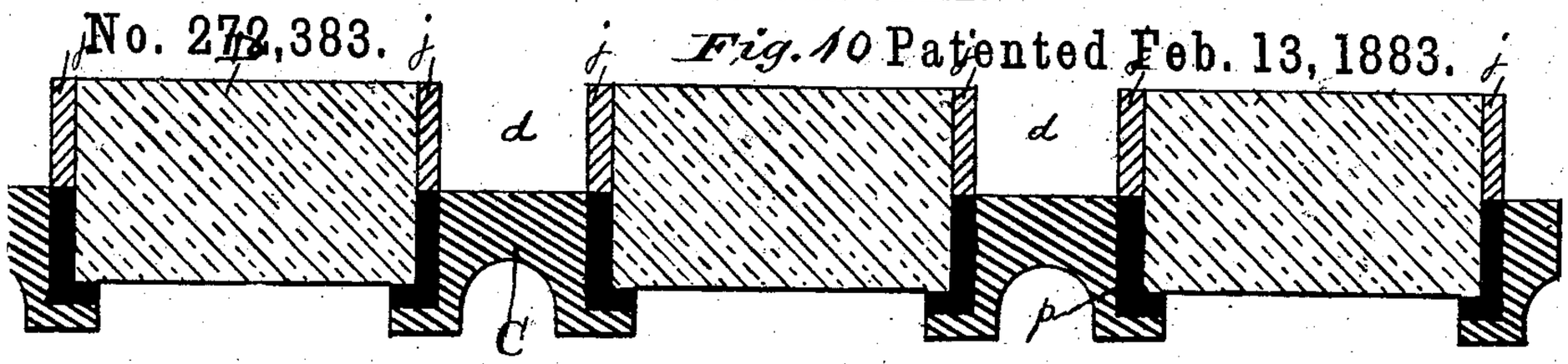


Fig. 10a

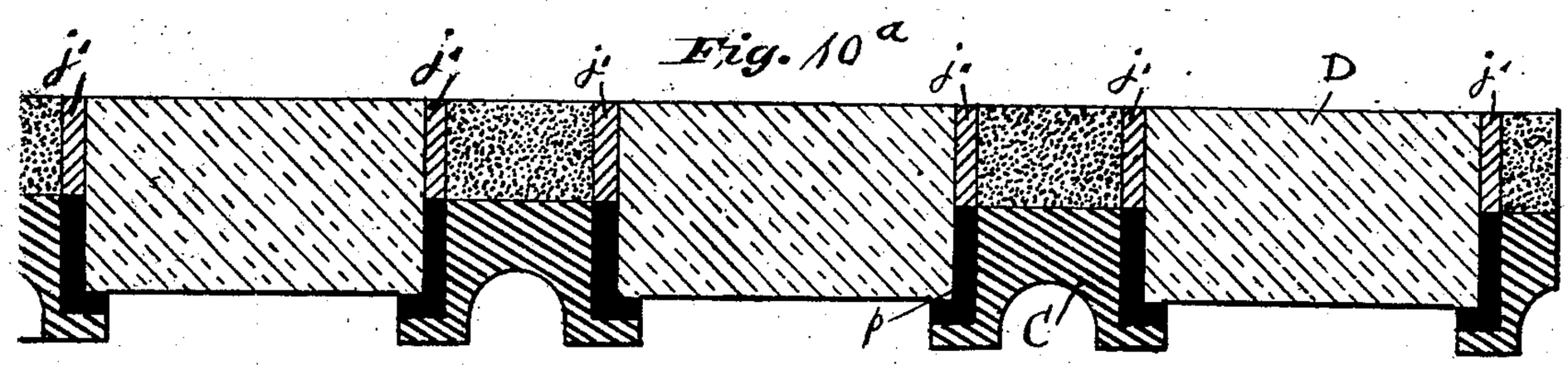


Fig. 10b

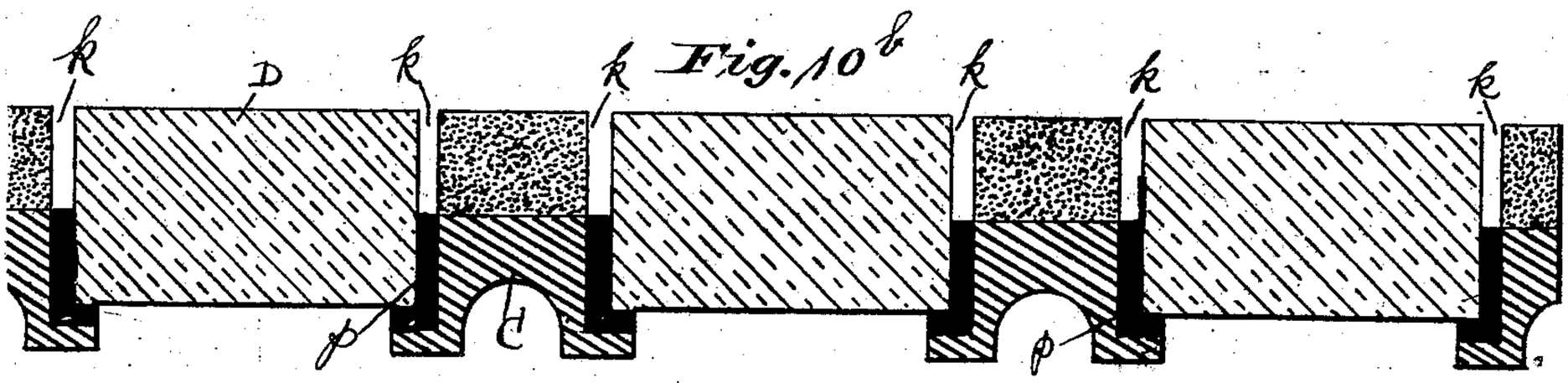


Fig. 10c

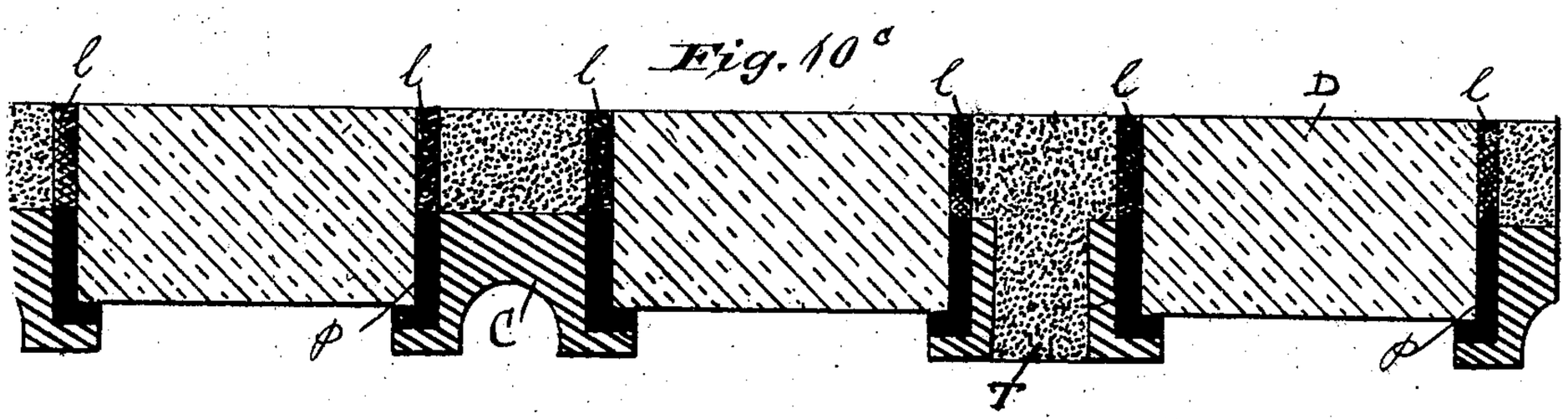
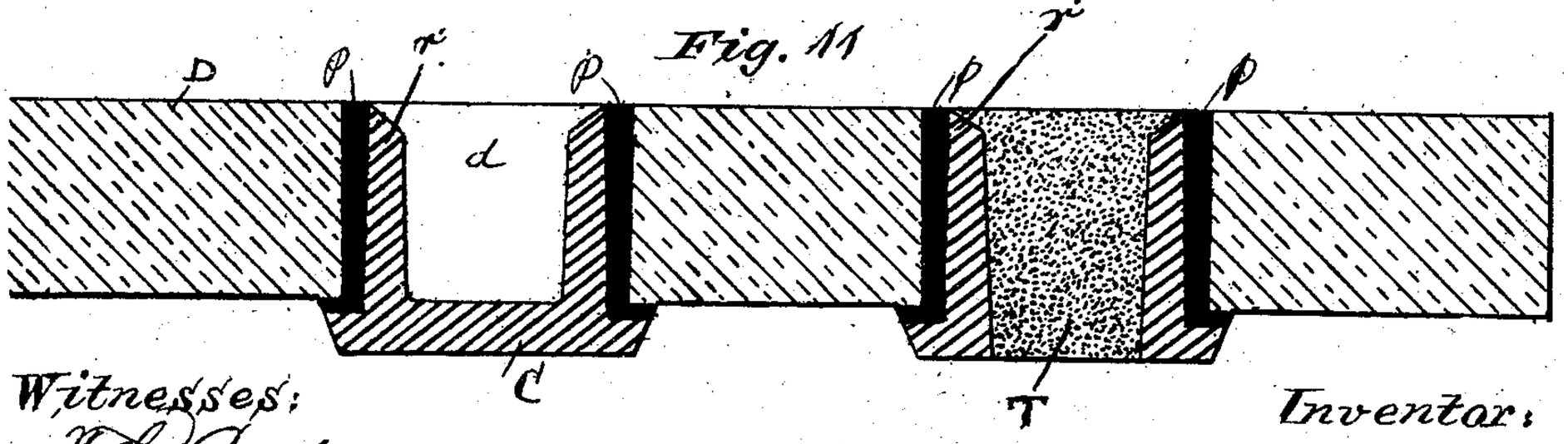


Fig. 11



Witnesses:
J. C. Brecht
D. F. Kelleher.

Inventor:
Thaddeus Hyatt

(No Model.) 8 Sheets—Sheet 8.

T. HYATT.

ILLUMINATING VAULT COVER OR GRATING TILE AND SURFACES MADE OF THE SAME.

No. 272,383. Patented Feb. 13, 1883.

Fig. 12.

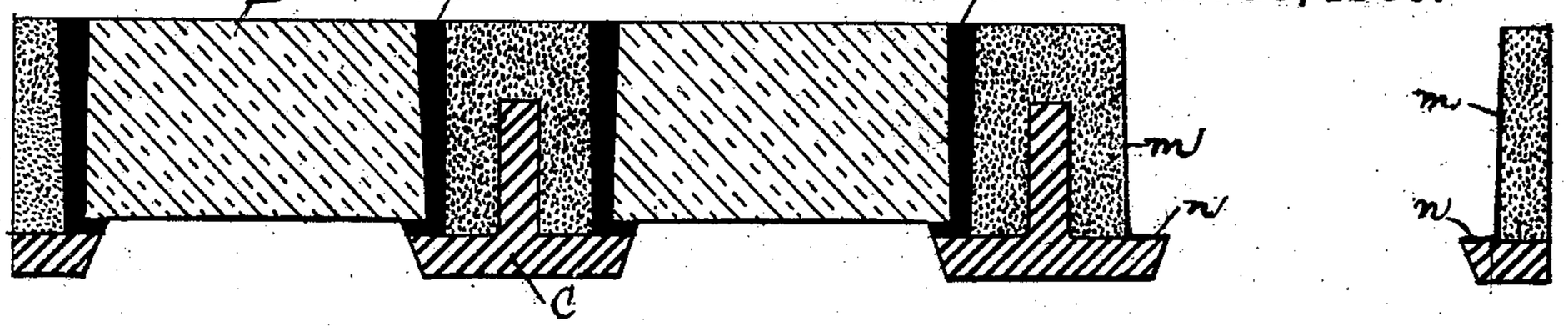


Fig. 13.

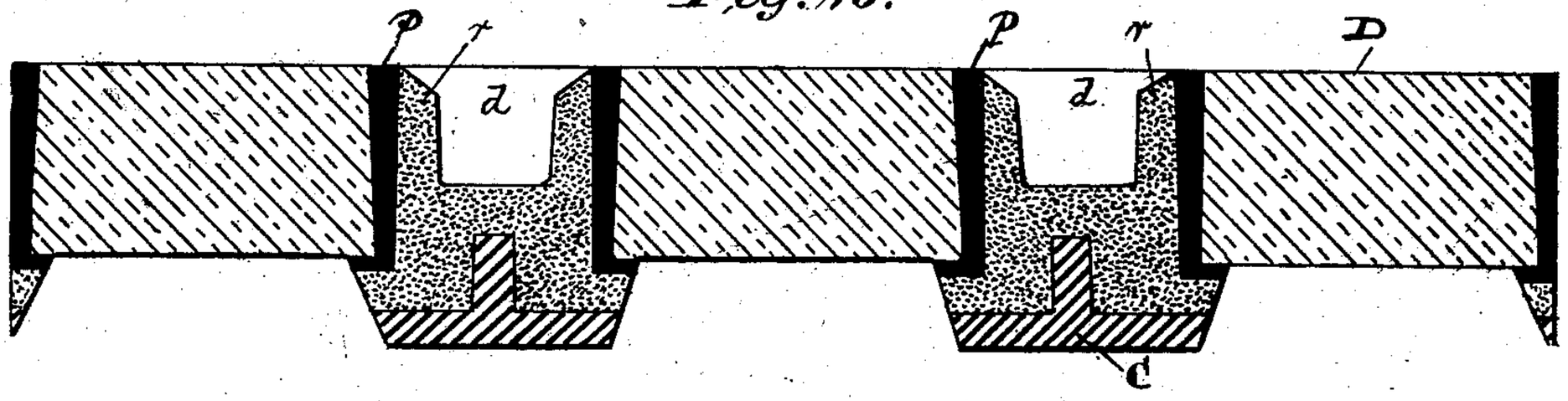


Fig. 14.

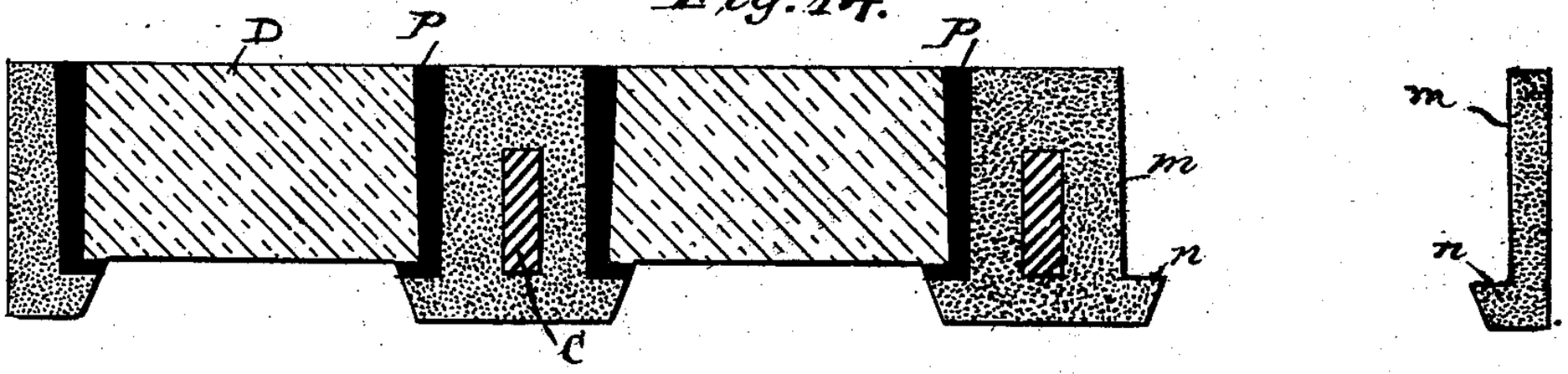


Fig. 15.

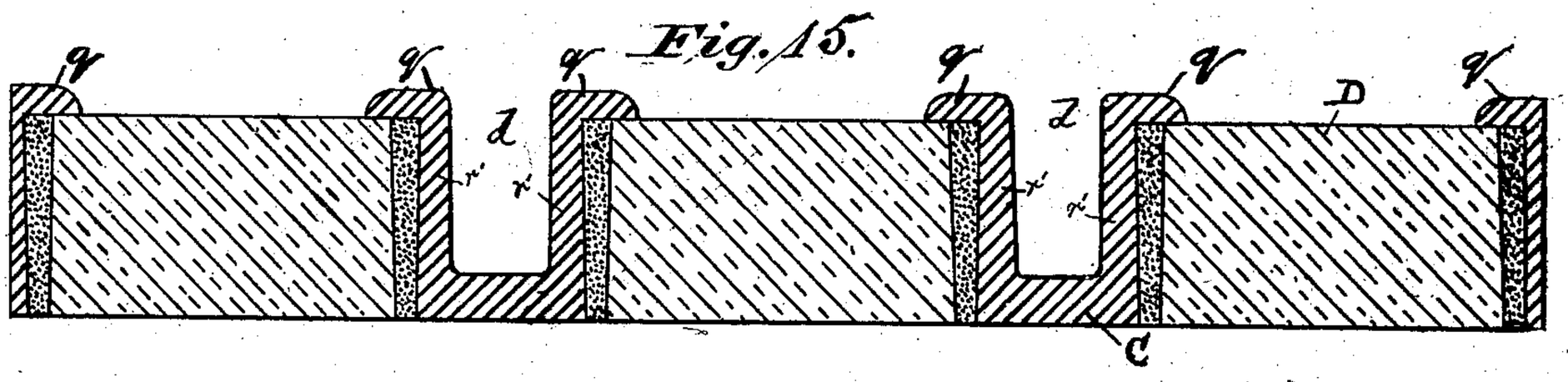


Fig. 16.

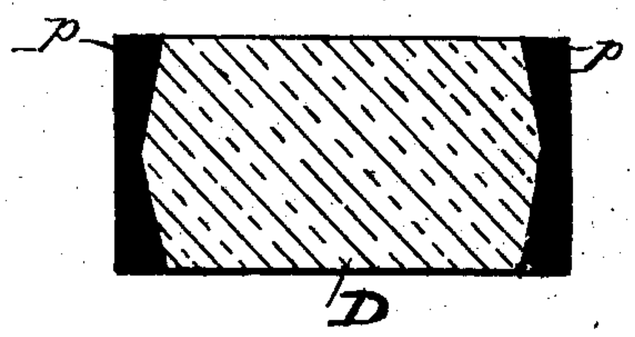
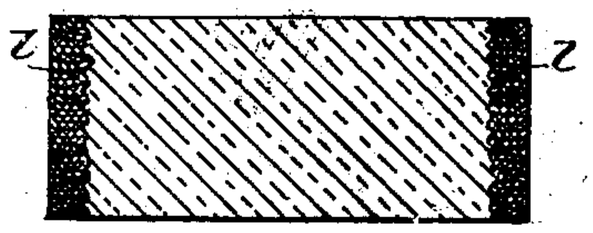


Fig. 17.



Witnesses:
T. C. Brecht,
L. F. Skeleher

Inventor:
Thaddeus Hyatt

UNITED STATES PATENT OFFICE.

THADDEUS HYATT, OF NEW YORK, N. Y.

ILLUMINATING VAULT-COVER OR GRATING-TILE AND SURFACES MADE OF THE SAME.

SPECIFICATION forming part of Letters Patent No. 272,383, dated February 13, 1883.

Application filed January 22, 1883. (No model.)

To all whom it may concern:

Be it known that I, THADDEUS HYATT, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Illuminating Vault-Covers or Grating-Tiles and Surfaces Made of the same, of which the following is a specification.

Vault-covers or grating-tiles set with glasses to give light are manufactured under various modifications having relation to modes of fixing the glasses in the gratings and to forming a safe foot-surface between the glasses, and are known to the trade by the name of "knob-lights," "cement lights," "lead-band lights," and "concrete lights," the knob, cement, and lead band being naked metal, and the concrete being covered metal, these variations, however, making no alteration in the functions of the cover or grating, all still remaining "illuminating-gratings," the combination of a number of such gratings into a large surface also working no change of function, the increased surface being practically only a large vault-cover or grating-tile made up of small pieces for convenience of construction or because of practical difficulties in the way of producing so large a grating by one single casting. The glasses of the naked metal covers or gratings and surfaces made of them have proved universally good after thirty years of constant use, while the glasses of the covered metal or concrete lights have proved universally bad after but few years of use; but the joints between the covers or grating-tiles, where such tiles are combined to produce enlarged surfaces, have been always defective to some degree whether such surfaces are made of naked or of covered metal gratings, and the junction edges of the tiles at such joints have been always defective whether such surfaces are made of naked metal or of concrete gratings, the defects being leakage, loss of light, and architectural disfigurement.

My invention as to the vault-cover or grating-tile relates only to the kind called "concrete lights," or where hydraulic cement is employed to fix the glasses; but as to the surfaces made by combining a number of covers or tiles, my invention relates to them whether made of naked or of covered metal gratings.

The object of my improvement in concrete lights and in gratings where the glasses are fixed by means of hydraulic cement is to make the glasses of such lights as durable as the glasses of cement and lead-band lights; and the object of my invention, with respect to the construction of enlarged surfaces made by combining a number of vault-covers or grating-tiles set with glass, is to prevent leakage at the joints between the tiles, prevent loss of light at the junction edges or borders of the tiles, and secure a uniformly-distributed light-surface, without apparent seam or break over the whole face of the work. I attain these objects by the improved modes of construction illustrated in the accompanying drawings, in which—

Figure 1 represents an illuminating-surface composed of three knob-tiles in combination with a foundation-frame. Fig. 2 represents in full size a portion of two tiles meeting at their junction edges. Fig. 3 represents a cross-section of Fig. 2 on the line *x x*. Fig. 4 represents a top view, Fig. 5 a side view, and Fig. 6 an end view, of one of the cross-bars of a foundation-frame. Fig. 7 represents my improved foundation-frame. Fig. 8 represents an improved foundation-frame set with tiles. Fig. 9 represents an improved foundation-frame set with tiles when finished with a concrete face. Figs. 10, 10^a, 10^b, and 10^c represent my improved process of manufacturing concrete lights to secure durable glasses. Fig. 11 represents a modification of my improved process of manufacturing concrete lights to secure durable glasses. Fig. 12 represents a modification of Fig. 11. Fig. 13 represents another modification of Fig. 11. Fig. 14 represents a stone-light or concrete grating formed with rabbeted seats for glasses and made of concrete and tie metals or core metal. Fig. 15 represents a cast-iron grating combined with glasses got out of plate-glass, fixed in the grating by means of Portland or hydraulic cement and set from the under side of the grating. Fig. 16 represents a glass inclosed in a mount of coal-tar-sulphur cement. The upper half of

the mount may be pure brimestone, if desired. Fig. 17 represents a brimstone mount around a glass.

Like letters refer to like parts in all the figures.

A represents the foundation-frame. B represents the cross-bars of the frame; B′, the X form or duplex character of the bar. C represents illuminating covers or grating-tiles. D represents the glasses of the vault-covers or grating-tiles; *a a*, border of foundation-frame; *b b*, lugs on or solid metal between flutes in the sides of rafters or cross-bars of foundation-frame; *c c*, flutes in cross-bars of foundation-frame; *d d*, recessed or cellular face of vault-cover or grating-tile; *e e*, body of vault-cover or grating-tile between light-holes; *f f*, iron knobs between glasses of cast-iron grating-tiles; *g g*, under side of vault-cover or grating-tile; *g′ g′*, junction edges of the under side of grating-tile; *h h*, channel or seam over junction edges, made water-tight by a filling of coal-tar-sulphur cement; *i*, screw fastening two tiles to cross-bar; *j j*, inelastic rings around upper section of glasses before putting on of concrete; *j′ j′*, inelastic rings around glasses while concrete sets and hardens; *k k*, annular space left around glasses by removal of rings; *l l*, brimstone rings around glasses closing annular spaces; *m n*, rabbeted seats in grating-tiles; *m*, bottom of seats; *n*, sides of seats; *p p*, coal-tar-sulphur cement; *q q*, covered joint knobs or rings; *r r*, cast-iron rings.

Figs. 1 to 6 represent my improvements in the construction of illuminating-surfaces of the kind ordinarily made by the makers of patent lights to cover sunk areas at the front of buildings. The tiles shown are of the knob-light kind, (the ones mostly made and sold.) Fig. 1 represents a surface formed of three tiles, C C C, the length of each tile being equal to the width of the foundation-frame between the ornamental border of the same, and the width of each tile being equal to one-third the length of the foundation-frame between the border of the same, this shape of the tiles corresponding with the shape of the spaces between the cross-bars of the frame. As ordinarily made, three distinct panels would be seen, whereas in Fig. 1 the appearance is that of a single tile. This improvement is effected by forming the tiles without dead material at the junction edges—a feature claimed herein only in combination, inasmuch as my Patent No. 257,712, dated May 9, 1882, contains the broad claim to such tiles. The absolutely new features in the construction illustrated by Figs. 1 to 6 are to be seen in Figs. 2, 3, 4, 5, 6, where B represents a cross-bar of a foundation-frame, 4 5 6 illustrating the improvement in the bar, which consists in cutting lightways *c c* or flutes in the sides of the bar to permit the passage of all the light-rays that enter the rows of glasses at the junction edges, where they overlap the supporting-bar B, as seen in Fig. 3. The solid metal *b b* between the flutes may be extended in the form of lugs to any desired extent underneath the tiles, on either side of the bar B, to give additional support and bearing to the under face of the tiles.

Fig. 2 represents in full size a small portion of two gratings where they rest upon the top of a cross-bar such as is represented by Fig. 4, the rows of glasses along the junction edges of the tiles overlapping the cross-bar B, as shown in Fig. 3, the light of which would be lost but for the lightways *c c* made in the bars, as described. The novel feature in the junction edges of the tiles is shown in Fig. 3 at *g′ g′* and in Fig. 2 at *g′ g′*, where *g′ g′* represent a part of the dead metal at the junction edges of the tiles that is not cut away, but preserved as a bearing-surface to rest upon the top of the bar B and to furnish material for the screws *i* to take into in fastening the tiles to the bar, the cut-away portion of the junction edges above *g′ g′* making a channel, *h h*, Fig. 3, for the waterproofing cement *p p*, Fig. 3. Another novel feature, and a very important one, is represented by the buttons *f′ f′*, the under portion or body of which juts out into the channel *h h*, filled with the coal-tar-sulphur cement *p p*, Fig. 3, and thus maintains the regularity of the rows of knobs *f f* in their distribution over the face of the tiles, the combination of knobs and glasses in regular order all over the face of the tiles producing the unity of design in the surface necessary to make it monomorphous.

Fig. 7 represents an improved method of constructing the foundation-frame to insure rigidity and prevent leakage at the joints of the tiles. Fig. 8 represents the same when the triangular and lozenge-shaped spaces of the frame are closed by tiles, and Fig. 9 shows the same when finished. The construction represented is concrete; but the tiles employed may be naked metal of the knob style, or any other. The cross-bars of Fig. 7 are drawn with no flutes in the sides; but I design to make them so; and Figs. 4, 5, 6 are to be considered as illustrating the bars of the new frame as well as the bars of the old. B′ indicates the duplex character of the supporting-bars B.

Fig. 8 represents an illuminating-surface construction as the parts are put together at the building. The tiles are all made with no dead borders. Where the tiles come together at their junction edges a recessed surface exists, as is represented by the channel *h h*, Fig. 3. Where the tile is cast-iron, as in Fig. 3, the recess is a channel, because the surface of the body of the tile between the glasses is in the same plane with the surface of the glasses, as shown in Fig. 3; but the tiles in Fig. 8 are to be faced with concrete, and this concrete facing is to cover all the tiles and all the joints between the tiles and all the junction edges of the tiles, concealing the entire metal of the structure as effectually as a coating of plaster conceals the laths and joints behind it on a plastered ceiling. The face of the tiles of Fig. 8 over the entire work is there-

fore of the kind represented by Figs. 10, 11, and 13, where *d* indicates the cellular or recessed face, this cellular space forming a sunk surface between the glasses that is continuous over all the tiles and joints between the tiles; and my improvement in the construction of illuminating concrete surfaces consists in fixing the glasses in the tiles at the works or manufactory, leaving them with a sunk surface to be filled up and finished at the building, the unfinished tiles being taken to the building and there made fast to the foundation-frame; and Fig. 8 represents the work at this stage, Fig. 9 representing it after the concrete face has been put on, the dotted face in Fig. 9 indicating concrete, and the broken lines across the face indicating the diagonal cross-bars of the frame below, that are not seen.

Figs. 10 to 16 refer wholly to concrete lights and glasses set in iron by means of hydraulic or Portland cement and illustrate my improvements to make the glasses of this style of light as durable as the glasses of the cement and lead-band lights have proved to be.

Figs. 10, 10^a, 10^b, 10^c represent a method where the glasses are fixed to the iron vault-cover or grating-tile, and made water-tight by means of sulphur-coal-tar cement, the upper section of the glasses standing clear of the face of the cover or tile, thus creating a sunk surface all over the plate between the glasses, for the reception of concrete. To secure the glasses from contact with the wet concrete when it is put on, each glass is encircled by the ring *j*. This ring I prefer to make of brimstone, which is hard and inelastic, and I prefer to run it hot around the glass before the concrete is put on, the ring remaining permanently in place; but the method represented by the figures represents a process where removable rings of metal or other material are employed, the brimstone ring being subsequently put in. Fig. 10 represents the cover or surface ready to receive concrete. Fig. 10^a represents the same after the concrete has been put on. Fig. 10^b represents the rings removed, leaving the annular channels *k* around the glasses. Fig. 10^c represents the channels filled with brimstone *l*, poured in a fluid state around the glasses after the concrete has become hard.

Fig. 11 represents a cast-iron vault-cover or grating-tile, where the rabbeted seats for the glasses are made by the rings *r*, cast upon the cover or plate, the space *d* between the rings over the surface of the cover forming a sunk surface to receive concrete, the face of the glasses and tops of the encircling-rings *r* forming the level to be finished by the filling of concrete. My improvement on this description of cover or tile consists in setting the glasses within the rings *r* by means of a cement composed of brimstone and coal-tar, poured while in a hot and fluid state around the glasses; also making such covers (when for use as tiles to be combined into extended surfaces) without dead borders and rims at the edges, the sunk face *d* between the rings *r* extending to the very edge of the plate, so that when any number of such plates are joined together the sunk surface becomes continuous over the whole face of the work.

Figs. 12 and 13 represent a cast-iron vault-cover or grating-tile faced with concrete before the glasses are fixed, the concrete itself forming the light-holes and rabbeted seats for the glasses in part or whole—in part as shown in Fig. 12, where the bottom of the seat is iron, *n*, and the sides concrete *m*, and wholly as represented in Fig 13, where the seat *m n* is concrete. My improvement, as illustrated by Figs. 12 and 13, consists in the mode of facing cast-iron vault-covers or grating-tiles with concrete and fixing the glasses, for instead of placing the glasses over the light-holes, as is commonly done, and then adding the concrete, the glasses serving as cores for molding the plastic concrete around, I employ "sand cores" or other cores for the light-holes and mold the plastic concrete around such cores within a proper "flask," somewhat after the manner of casting iron in a flask to make cast-iron gratings or vault-covers to be afterward set with glass, as in cement-light making. The product of this process is a concrete grating, the bottom iron and the top concrete, with proper rabbeted seats, like an iron casting, for the glasses. When the concrete has become sufficiently dry and hard, the glasses are then put in place and fixed by pouring hot coal-tar-sulphur cement around them, as in common cement-light work, and glasses combined with concrete by this method will be as durable as though the grating or cover were wholly of iron, as are the gratings of the cement-lights.

Fig. 14 differs from Figs. 12 and 13 in being an actual stone grating regularly cast out of concrete, as iron gratings are cast in molds or flasks, the metal being tie metals that give to the concrete in compression the tensile strength of the metal. This sort of a grating having been already patented by me, my improvements in it now consist in casting the grating with rabbeted seats and fixing the glasses in such seats by means of coal-tar-sulphur cement poured around the glasses in a hot and liquid state while the glasses are in the seats of the grating, the fluid cement making a water-tight joint with the concrete sides of the seat when the concrete is sufficiently dry; and when it is not I then employ glasses that have been previously belted with brimstone or with a mount made of coal-tar-sulphur cement, as represented by Figs. 16 and 17, such mounted glasses being readily attached to the green concrete by hydraulic grout. The same is true, also, of the cover represented by Figs. 12 and 13, the same method being applicable to them when the concrete face is green. When the stone gratings are designed for making illuminating-surfaces, as represented by Fig. 8, and also when the concrete-faced gratings

represented by Figs. 12 and 13 are designed for such a purpose, I cast the concrete with a sunk surface, *d*, as represented in Fig. 13, the concrete around the light-holes being then in the form of rings *r*, like the cast-metal rings *r'*, that produce the sunk surface *d*, as represented in Fig. 11, my improvement here consisting in forming the face of a stone grating, or concrete-faced iron grating, with concrete rings *r* around the light-holes to form rabbeted seats for the glasses and a sunk surface, *d*, between the glasses.

Fig. 15 represents a method of making illuminating-vault covers or grating-tiles with durable glasses, notwithstanding the employment of concrete or Portland cement put directly in contact with the glasses. To attain this object I employ glasses got out of plate-glass—a kind of glass so well annealed as to be capable of withstanding the destructive effects of the wet concrete during its process of hardening. My improvement represented by Fig. 15 consists in a method of concealing the ragged edges of the cut glass, so as to make such gratings acceptable to public taste, the invention consisting in the covered joint-knobs or flat rings *q q*, that stand like either rings of buttons or flat rings above the face of the tile or cover, whether such face be concrete or whether it be iron. Fig. 15 represents a cast-iron cover or grating-tile cast with light-holes that receive the glasses from the under side of the casting, the sunk surface *d* of the plate to receive concrete being formed by the standing rings of metal *r' r'*, cast around the light-holes to form receptacles for the glasses, *q q* being at the top of such rings and sufficiently overlapping the ragged edges of the glasses as to hide their defects. The glasses rest upon nothing, the "side adhesion," or adherence of the hydraulic cement or concrete to the sides of the glass and the sides of the iron, producing a "bond" equal to that of brick bonded by mortar to brick, and maintaining the glass so firmly in place as to defy anything but absolute violence, and then the glass would break before leaving its place. Where I make such covers or tiles with no concrete face the sunk surface *d* is made on the under side of the plate.

Fig. 16 represents a glass surrounded with a mount made of coal-tar-sulphur cement, the upper half of which I sometimes make of brimstone. When the mounts are bituminous and formed in the manner of belting with lead I line the mold with paper to prevent the cement from sticking to the sides of the mold. This paper may be afterward removed from the mount by wetting it.

Figs. 1 and 8 represent my improvement in the borders of naked-metal illuminating-surfaces and in concrete illuminating-surfaces, the improvement consisting in forming a tessellated in place of the ordinary checkered iron borders in common use, the addition of such a border to a monomorphous illuminating-surface adding to the architecture of the building a valuable feature as to ornament and finish. Where a foundation-frame is employed I recess the border of the frame and inlay it with colored tiles to form the tessellation, this mode of forming the foundation-frame with an inlaid border constituting a part of my invention. Fig. 9 represents a concrete border made by recessing the border of the foundation-frame and inlaying it with concrete, this also constituting a part of my invention.

In constructing illuminating-roofs where no foundation-frame is employed, as in the case of rear-extension roofs to the ground floor or principal story of the building, and which, in general, are of curved form, my improvement, as represented by Fig. 7, consists in making cast-iron rafters in duplex or X form, the joining together of such X-rafters producing the same shaped spaces and the same sort of support to the tiles as where they form a part of the foundation-frame, as represented by B', Fig. 7. Where the roof is curved I cast the X-rafters curved.

In the construction of "stone lights," as represented by Fig. 14, in place of "tie metal" made of wrought-iron to give tensile strength, I sometimes employ cast-iron as a strengthening-core, where square glasses are used the metal core consisting of cross-bars, like a sash; but where circular glasses are used the frame or core consists of a collection of separate circular rings held to each other by bands, the distance of the rings from each other being determined by the width of the concrete between the glasses, the circular cast-iron rings being nearly at the center between the glasses, the concrete inclosing the metal completely, as represented in Fig. 14; or the rings may form the actual rabbeted seats for the glasses, in which case the distance between such rings will be as represented in Figs. 10^c and 11, where the concrete not only forms the face of the cover between the glasses at top, but also extends downward between and sometimes under the rings, and thus forms a substantial portion of the body of the grating, as shown in Fig. 14, the cast-iron becoming, in fact, core metal.

Fig. 16, as I have already observed, is designed to represent a glass inclosed in a mount that may be composed wholly of coal-tar-sulphur cement, or of coal-tar-sulphur cement in part, with part brimstone, or that may be wholly made of brimstone—the coal-tar-sulphur cement being yielding and elastic, the brimstone mount unyielding and non-elastic. When I employ glasses set in coal-tar-sulphur mounts I combine them by preference with molded and hardened concrete gratings; but they may be safely combined with plastic concrete, which also I propose to do; and when I employ glasses set in brimstone mounts I usually combine them with molded and hardened concrete gratings, but propose to also employ them in making concrete lights by the ordinary wet or plastic process.

Fig. 17 represents a glass inclosed in a brim-

stone mount. The sides of the glass are preferably fluted or roughened, and before the melted brimstone is put around the glass I prefer to paint the sides of the glasses with coal-tar to make the bond between the glass and brimstone complete. Glasses thus treated are capable of withstanding the destructive effects of plastic concrete during its process of induration, notwithstanding the fact that such mounts are hard, unyielding, and inelastic, the cause of the breakage of the glasses of concrete lights not being for the want of some soft, yielding, and elastic substance "interposed between glass and concrete," as some erroneously imagine.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. Illuminating-surfaces made of vault-covers or grating-tiles, in which the distance between the rows of glasses at the junction edges of the tiles is the same as the distance between any two rows of glasses in the body of the tile, when such tiles are combined with supports formed with lightways produced by fluting the sides of the supports, or by means of lugs upon the sides of the supports, substantially as and for the purposes herein set forth and illustrated.

2. Illuminating-surfaces made of vault-covers or grating-tiles of lozenge and sections of lozenge shape, in which the distance between the rows of glasses at the junction edges of the tiles is the same as the distance between any two rows of glasses in the body of the tile, when such tiles are combined with supports formed with lightways produced by fluting the sides of the supports, or by means of lugs upon the sides of the supports, substantially as and for the purposes herein set forth and illustrated.

3. Foundation-frames made with X or duplex cross-bars for supporting illuminating-tiles in combination with the same, substantially as and for the purposes herein set forth and illustrated.

4. Cast-iron X or duplex rafters or supports for the construction of roofs and roof-pavements, in combination with illuminating vault-covers or grating-tiles, substantially as and for the purposes herein set forth and illustrated.

5. Foundation-frames with recessed borders inlaid with *tesseræ* or "geometrical tiles," or with concrete, in either plain or ornamental design shapes, in combination with illuminating monomorphous surfaces, substantially as and for the purposes herein set forth and illustrated.

6. Illuminating monomorphous surfaces combined with tessellated or ornamental border, substantially as and for the purposes herein set forth and illustrated.

7. Illuminating concrete surfaces formed of sunk-surface vault-covers or grating-tiles combined *in loco*—that is to say, at the building or place of permanency where the construction is to be a fixture—and there completed and rendered monomorphous by a continuous concrete surface, substantially as and for the purposes herein set forth and illustrated.

8. Molded and hardened concrete or stone gratings and metal gratings or plates, made with a facing of molded and hardened concrete, formed with rabbeted seats, in part or entirely concrete, for the reception of glasses, and setting the glasses therein by means of coal-tar-sulphur cement, substantially as and for the purposes herein set forth and illustrated.

9. Illuminating concrete and concreted vault-covers or grating-tiles in which the glasses as to their lower sections are fixed by means of coal-tar-sulphur cement, and as to their upper sections are surrounded by a band or ring of brimstone, substantially as and for the purposes herein set forth and illustrated.

10. The mode or process of making concrete lights illustrated by Figs. 10, 10^a, 10^b, and 10^c, as herein set forth and described.

11. Durable glass illuminating vault-covers and grating-tiles in which the glasses are fixed by means of concrete or Portland cement on the covered-joint method, substantially as and for the purposes herein set forth and illustrated.

12. Concrete lights made by combining glasses with concrete in either its plastic state or in a molded and hardened state, the glasses having previously been inclosed in mounts composed of coal-tar-sulphur cement, substantially as and for the purposes herein set forth and illustrated.

13. Concrete lights made by combining glasses with concrete in either its plastic state or in a molded and hardened state, the glasses having been previously inclosed in mounts made by pouring the brimstone in melted state around the glasses, (as in lead-belting glasses,) substantially as and for the purposes herein set forth and illustrated.

14. Stone or concrete lights made with a strengthening-core of metal cast in the form of rings for seating the glasses, the rings being held to each other by connecting bands or bars, that leave open spaces for the concrete to pass through, and thus form the whole or a portion of the under face of the grating or plate, as represented at T T, Figs. 10^c and 11, substantially as and for the purposes herein set forth and illustrated.

THADDEUS HYATT.

Witnesses:
T. C. BRECHT,
L. F. KELEHER.