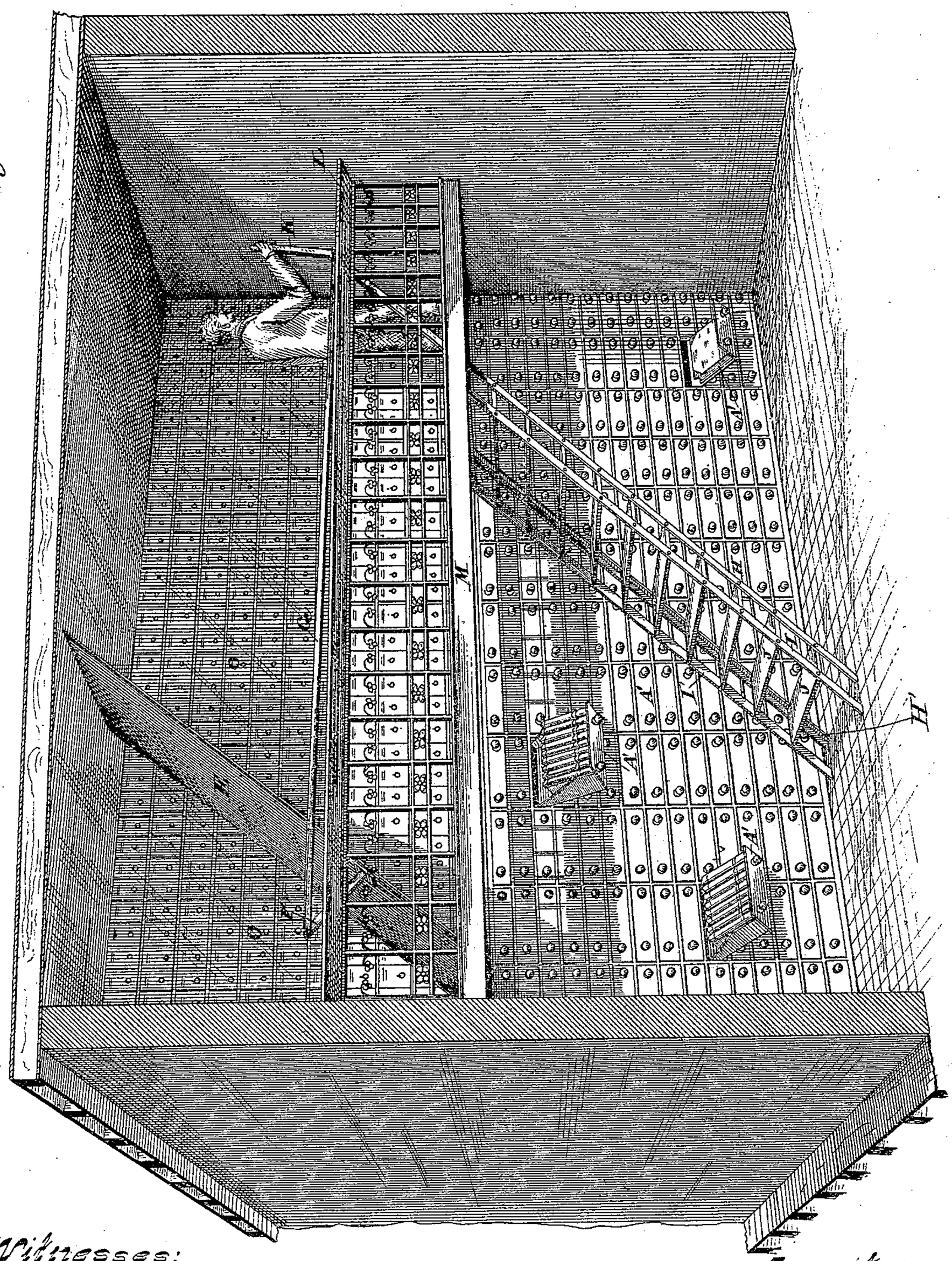
(No Model.) 5 Sheets—Sheet 1.

H. J. HOFFMAN.

ADJUSTABLE SHELVING.

No. 309,951. Patented Dec. 30, 1884.



Witnesses:
E. G. Davis
R. Platz.

Inventor:
Horace J. Hoffman
By Stout & Underwood
Attorneys.

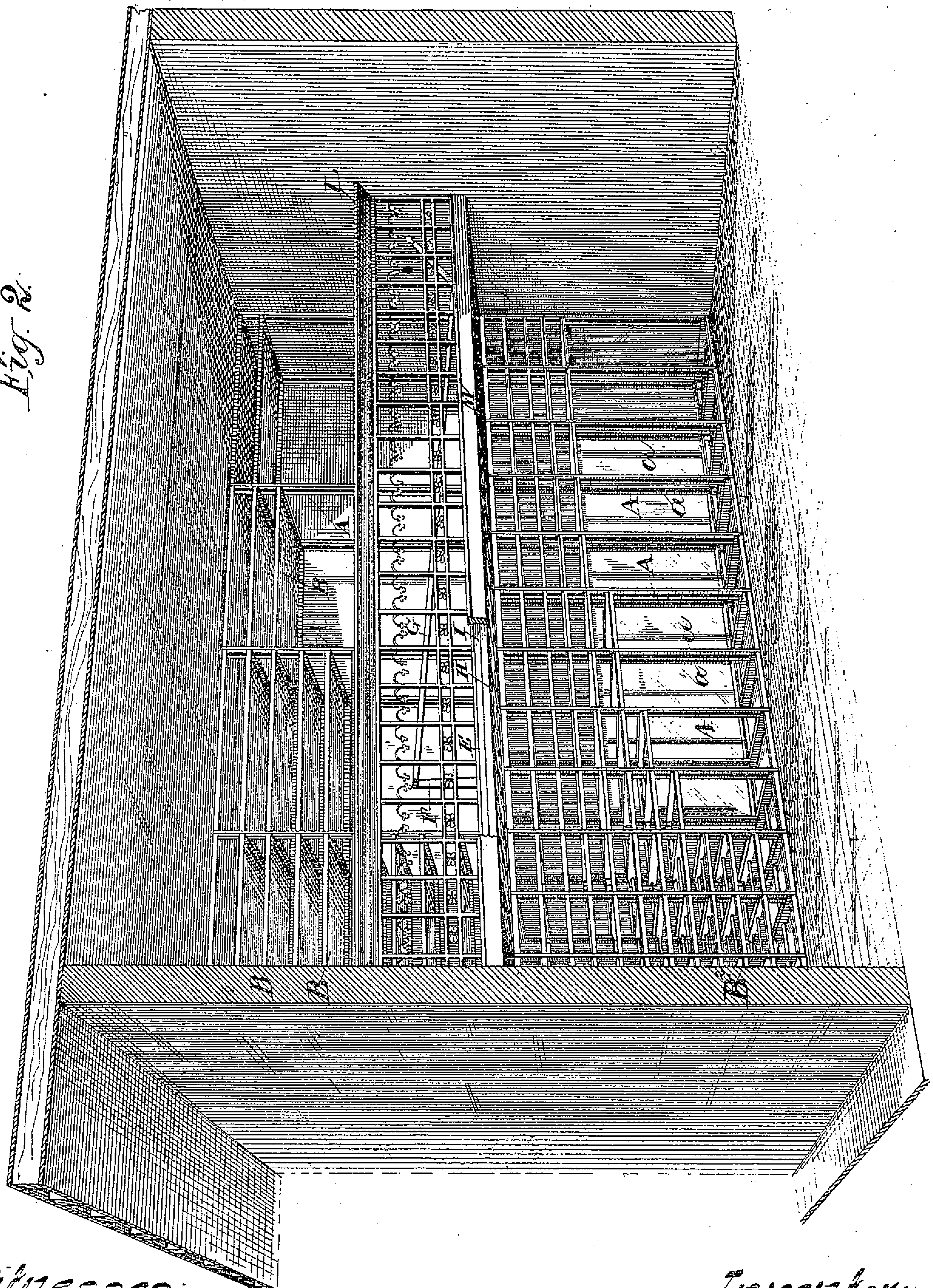
(No Model.) 5 Sheets—Sheet 2.

H. J. HOFFMAN.

ADJUSTABLE SHELVING.

No. 309,951. Patented Dec. 30, 1884.

Fig. 2.



Witnesses:
E. G. Asmus
R. Platz

Inventor:
Horace J. Hoffman
By Stout & Underwood
Attorneys.

(No Model.) 5 Sheets—Sheet 3.

H. J. HOFFMAN.

ADJUSTABLE SHELVING.

No. 309,951. Patented Dec. 30, 1884.

Fig. 3.

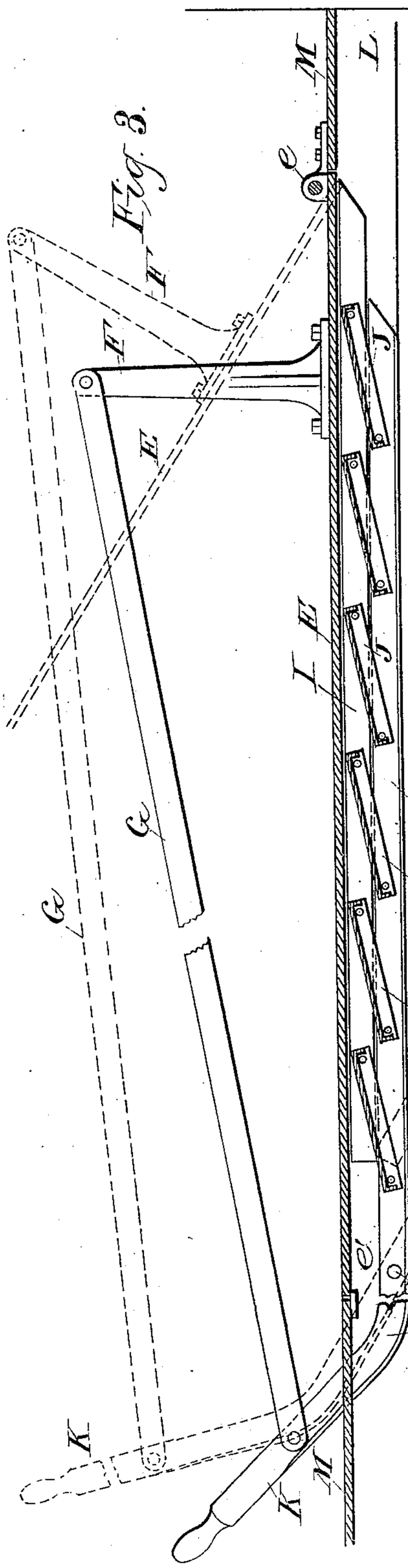


Fig. 4.

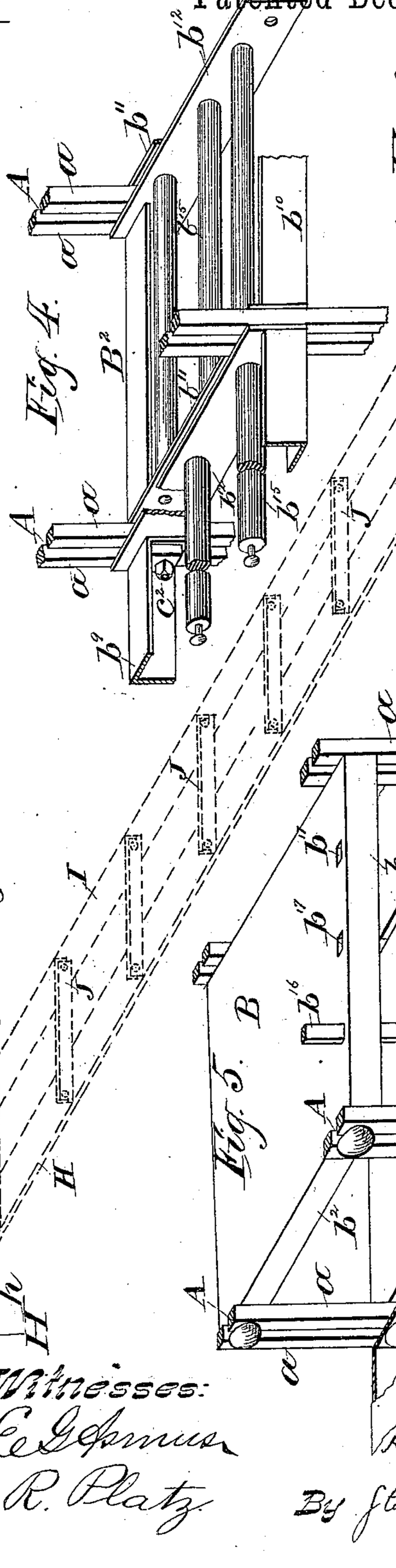


Fig. 6.

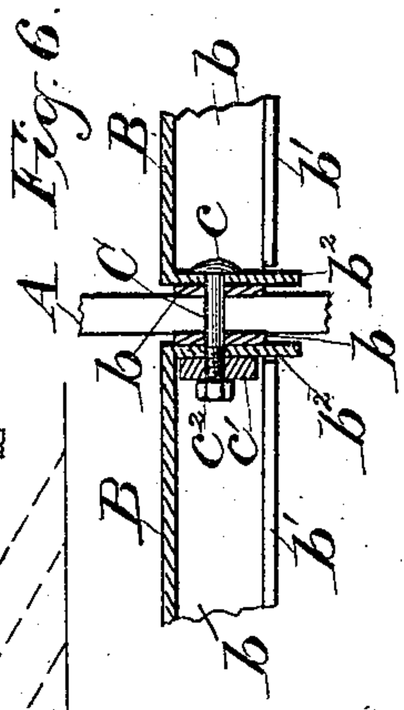
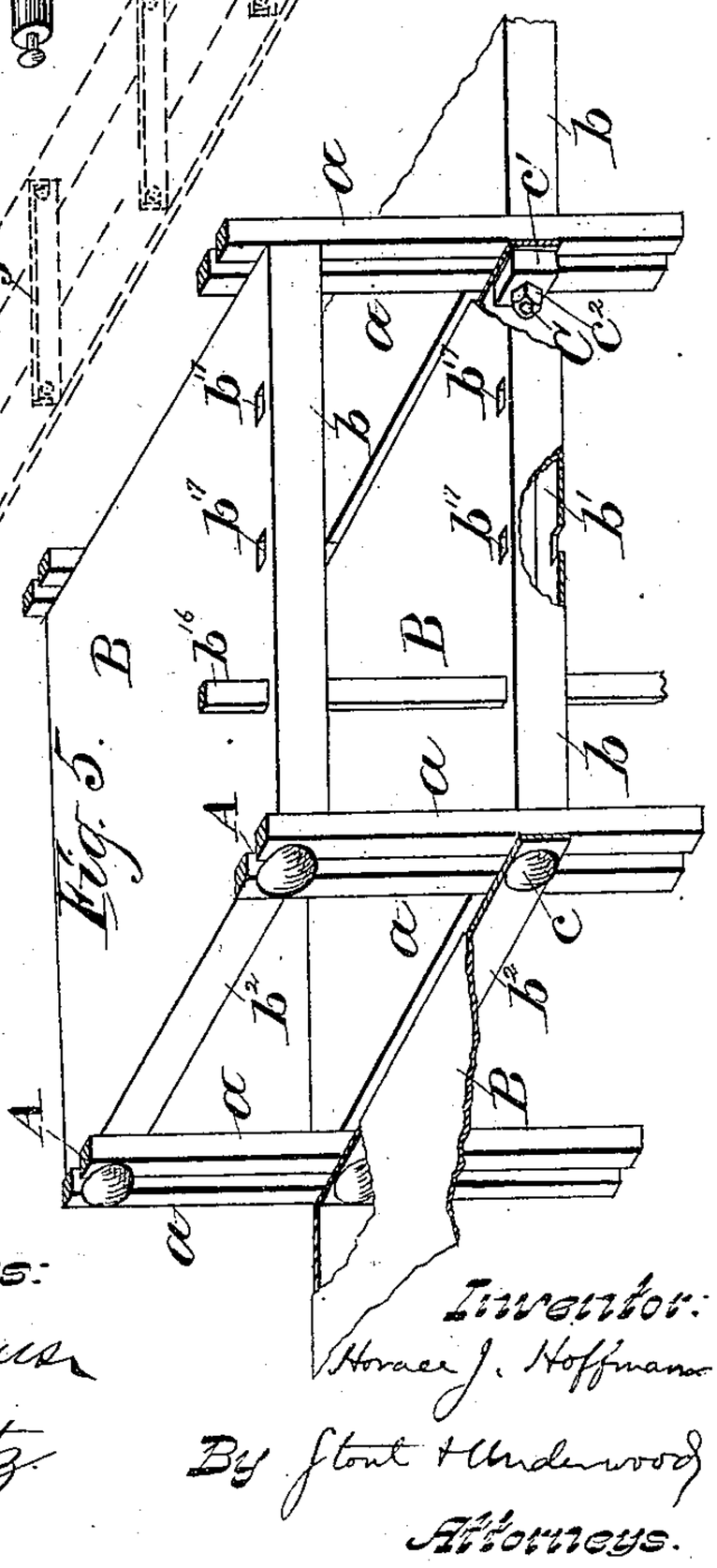


Fig. 5.



Witnesses:
E. G. Spruce
R. Platz.

Inventor:
Horace J. Hoffman
By Stout & Underwood
Attorneys.

(No Model.) 5 Sheets—Sheet 4.

H. J. HOFFMAN.

ADJUSTABLE SHELVING.

No. 309,951. Patented Dec. 30, 1884.

Fig. 7.

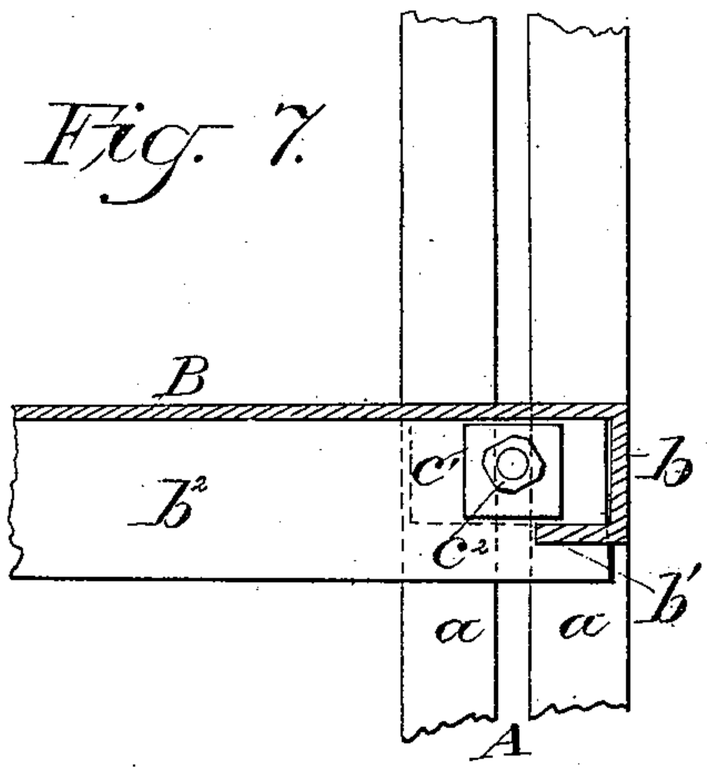


Fig. 12.

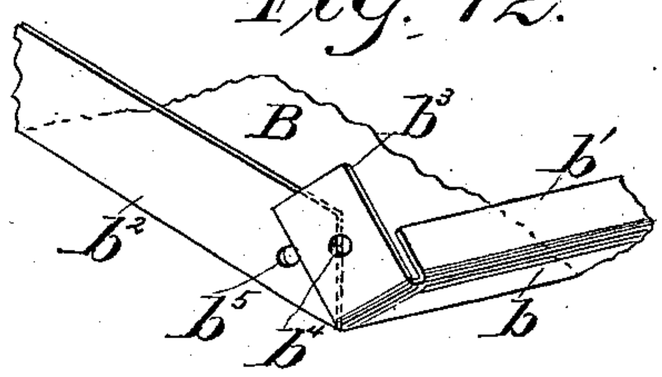


Fig. 11.

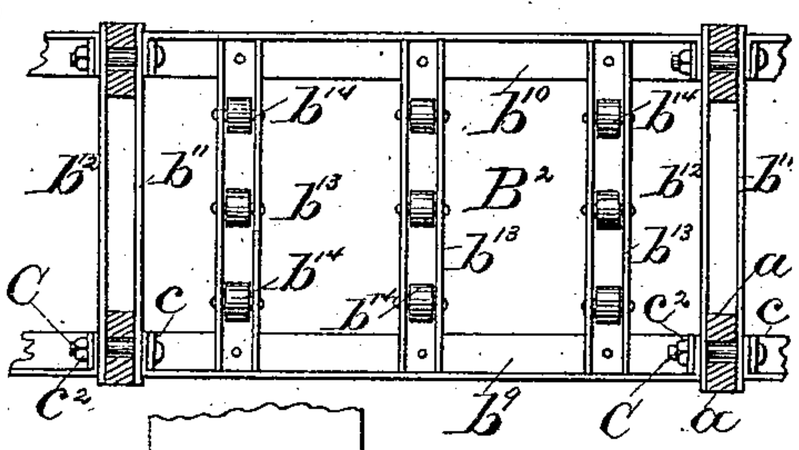


Fig. 8.

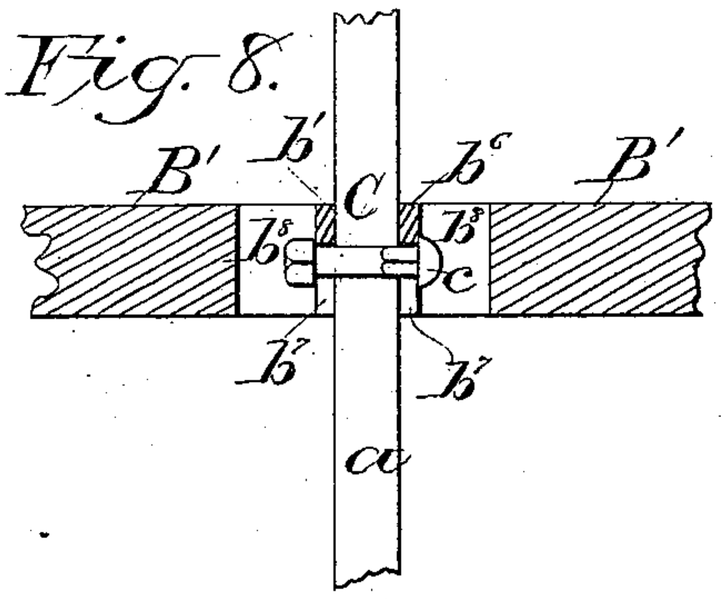


Fig. 10.

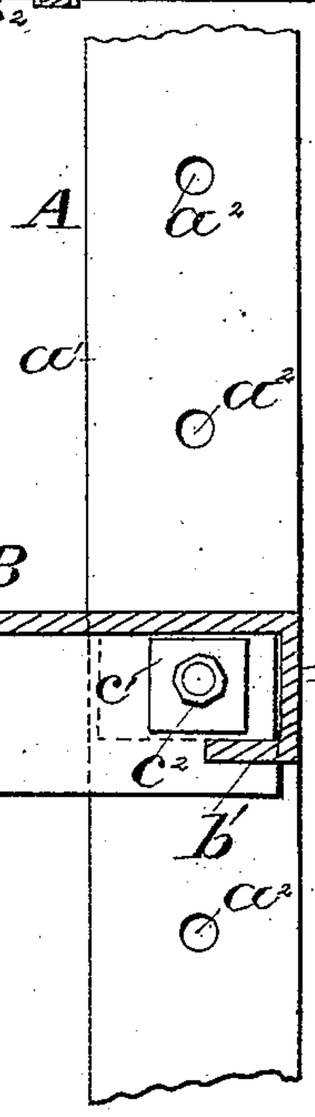


Fig. 9.

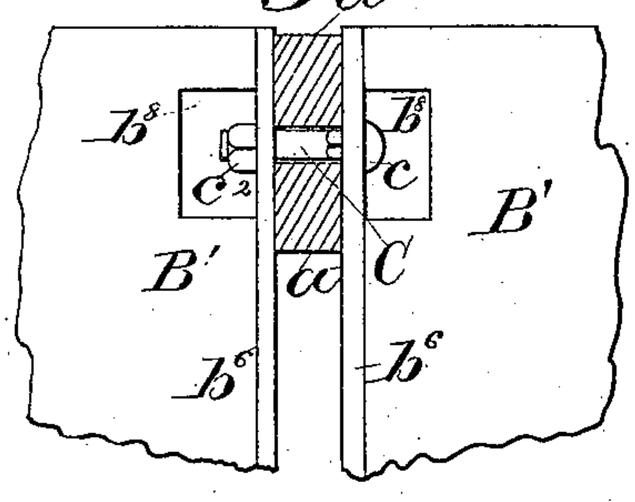
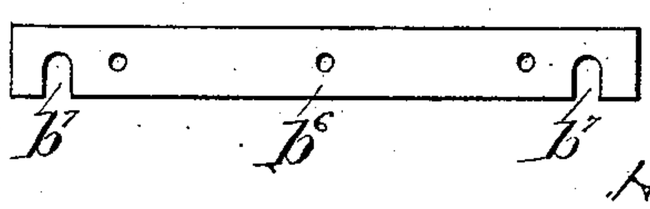


Fig. 13.



Witnesses:
E. L. Jones
R. Platz.

Inventor:
Horace J. Hoffman
By Stout Underwood
Attorneys.

(No Model.) 5 Sheets—Sheet 5.

H. J. HOFFMAN.

ADJUSTABLE SHELVING.

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Fig. 14.

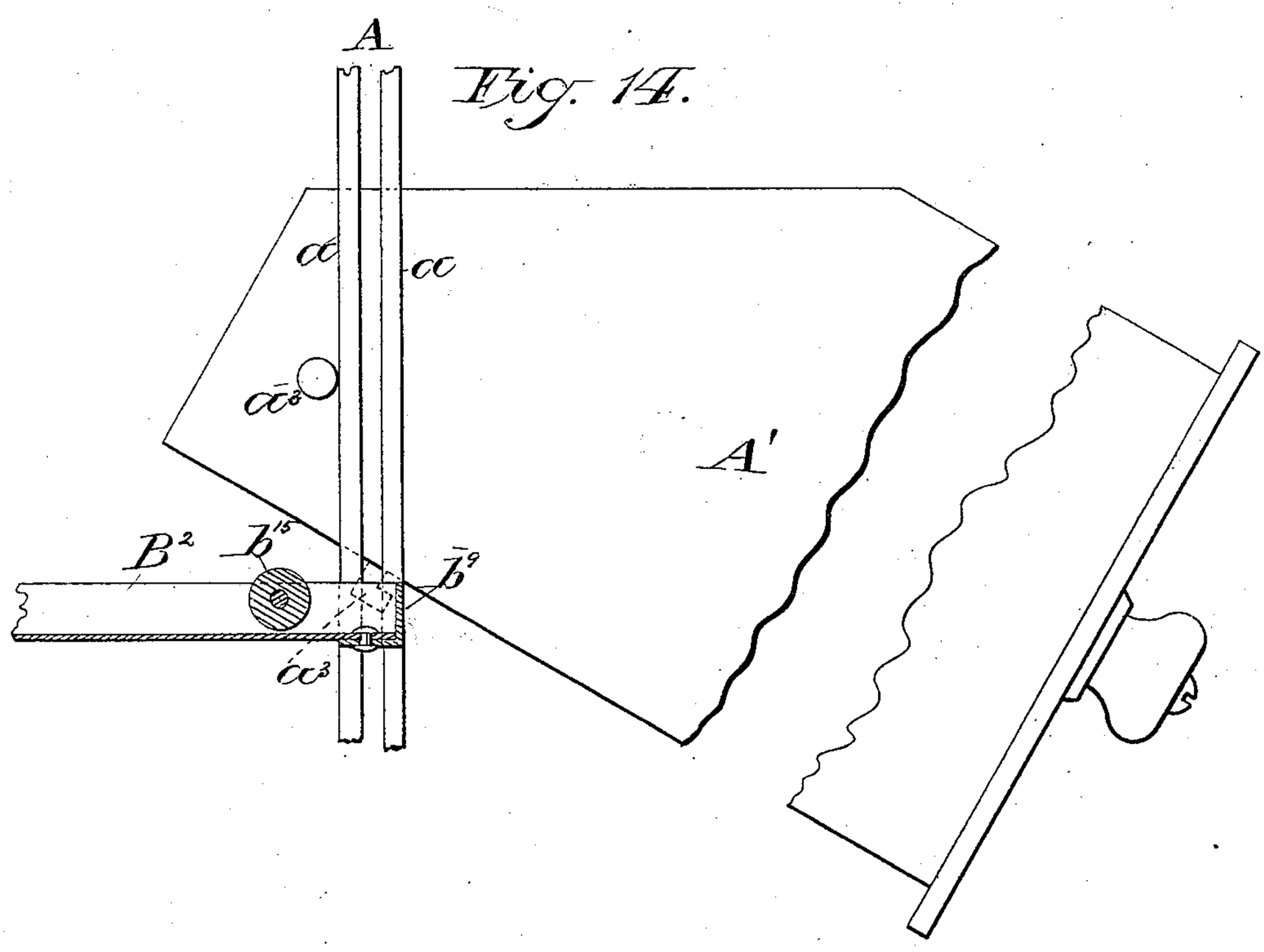
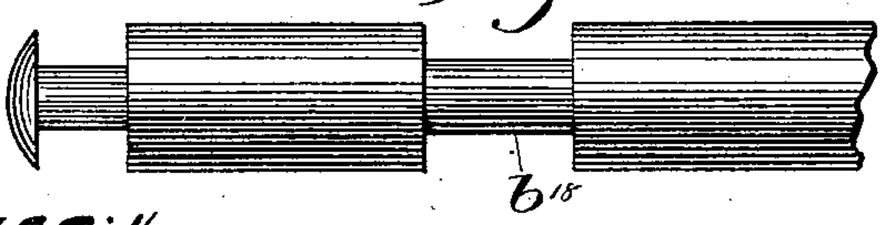


Fig. 15.



Witnesses:

E. G. Sommers

R. Platz

Inventor:

Horace J. Hoffman

By Stout & Underwood

Attorneys.

UNITED STATES PATENT OFFICE.

HORACE J. HOFFMAN, OF MILWAUKEE, WISCONSIN.

ADJUSTABLE SHELVING.

SPECIFICATION forming part of Letters Patent No. 309,951, dated December 30, 1884.

Application filed May 27, 1884. (No model.)

To all whom it may concern:

Be it known that I, HORACE J. HOFFMAN, of Milwaukee, in the county of Milwaukee, and in the State of Wisconsin, have invented certain new and useful Improvements in Adjustable Shelving; and I do hereby declare that the following is a full, clear, and exact description thereof.

My invention relates to combined adjustable shelving and folding staircase; and it consists in certain peculiarities of construction, as will be more fully described hereinafter.

In the drawings, Figure 1 is a perspective view of my combined device with the staircase down in position for use. Fig. 2 is a like view of my shelving with the adjustable staircase closed up. Fig. 3 is a broken vertical section of the gallery, showing the working parts of the staircase as closed up and open for use, this latter position being represented in dotted lines. Fig. 4 is a broken perspective view showing the roller-shelves for account-books, trays, or drawers. Fig. 5 is a like view illustrating the construction of the shelves and the manner of connecting them with the upright posts. Fig. 6 is a detail of the same in section; Fig. 7, a broken vertical sectional view of the same. Fig. 8 is a vertical section showing the construction of my wooden shelves. Fig. 9 is a horizontal sectional view of the same. Fig. 10 is a vertical sectional view showing the modified form of upright posts. Fig. 11 shows a top view of my improved roller-shelf for book trays or drawers. Fig. 12 is a broken perspective view of a metallic shelf-plate as viewed from under. Fig. 13 is an elevation of the bars used for the sides of the roller-shelves and for the wooden shelves. Fig. 14 is a sectional view through the shelving, showing a book-tray drawn out of a roller-shelf. Fig. 15 shows a part of the tray-roller.

The object of my invention is to provide means whereby shelving for stoves, safe-vaults, libraries, museums, &c., may be put up in place, altered, or modified, or knocked down and packed for storage or transportation as conveniently and readily as can be done with regard to articles of common "knockdown" furniture. This part of my invention is an improvement on the adjustable shelving for which Letters Patent No. 291,513 were granted to me January 8, 1884. As a further improvement on said system of shelving I propose to combine with it an adjustable or folding staircase, which will make it very convenient, especially in safe-vaults or similar places where floor and wall space has to be utilized in the best manner possible. In such places galleries are provided, access to which is had by straight or spiral staircases. Heretofore, as far as is known to me, these staircases have been made stationary or fixed, and much of valuable space has thus been necessarily diverted from its use both in the lower and upper tier of the vault. The adoption of my folding or adjusting staircase will absolutely avoid this loss of shelving-room, and will add to my adjustable shelving a material improvement over the system now in general use.

A A A indicate the standards which I have devised to support the shelves in place. Each of these standards consists of two square bars, *a a*, set one behind the other in the division-line of the shelves, an air-space, which may be nearly equal in width to the thickness of said bars, being left between them for the passage of the fastening-bolts used to support the shelves on the standards. In place of these spaced bars *a a*, which may be either of wood or metal, I may use the flat bars *a'*, part of one of which is represented in Fig. 10, and in the central longitudinal line of these are made the perforations a^2 a^2, which serve the same purpose as the air space left between the square bars *a a*.

The shelving, which the standards A of either one of the forms described above are designed to support, consists either of the metallic shelf-plates B of the wooden shelves B', or of the roller-shelves B^2. The two first-mentioned forms are adapted, especially, for the storing of deed-boxes, as shown at O O O in Fig. 1, while the roller-shelves are designed for books—such as ledgers, record-books, and the like—as shown at A'. The shelf-plates B are preferably made of sheet-iron, and are flanged on all sides. The flange *b* on their front and rear is formed by bending downward at right angles a certain portion of their edges. A cut of a length equal to the width of the flange *b* is made at the opposite ends of the same in the angle it forms with the plate. A portion of said flange *b* is bent at right angles inward to form the strengthening-flange

b', and as much of the ends of this latter is cut out as stands opposite the cuts made in the angle formed by the flange b and the plate B, as shown in Fig. 12. The flange b^2 of the sides of said plate is then formed by bending downward at right angles also as much of their edges as the cut metal will allow, and, lastly, the ends b^3 of the flange b are bent inward over the latter, and a round hole, b^4, is made in the center of these bent ends b^3, to coincide with another hole, b^5, made at each end of the flange b^2. The perspective view of Fig. 12 shows one corner of the plate B in an inverted position, and the flange b as not completely bent in place. In the finished plate, as shown in section in Figs. 6, 7, and 10, it will be observed that the edge of the flanged side b^2 projects slightly below the lower face of the strengthening-flange b'. This is done for the purpose of providing guides for the deed-boxes and drawers.

The construction of the wooden shelves B′ is shown in Figs. 8, 9, and 13. A metallic plate, b^6, having the notches b^7 b^7 made in its under side, is fastened by means of screws on the edges of the board, which is notched at suitable points, as at b^8 b^8, to leave room for the head or threaded end of the bolt C, by means of which the shelves are attached to the standards A.

Figs. 4 and 11 illustrate the arrangement of the roller-shelves B^2, the latter showing an improvement on the rollers described in the specification forming part of the Letters Patent alluded to above. The front and rear bars, b^9 b^{10}, are made of strips of sheet-iron bent at right angles inward in the line of their length. They may be strengthened by bending a portion of their edges inward at right angles, as in the case of the flange b' on the rear and front of the shelf-plates B, or simply bending said portion flat against the inner face of said edges. As in the shelf-plates B, a cut is made at each end of the angle-bars b^9 b^{10}, so as to permit the bending of the vertical end at right angles inward, and of the adjoining horizontal end, also at right angles upward and against each other. The corner so formed is punched centrally to receive the fastening-bolt C. The side bars, b^{11} b^{12}, are strips of sheet metal, one on each side of the standards A, and perforated or notched in their lower edges, in the same manner as shown in Fig. 13, for the side plates, b^6, of the wooden shelves B′. b^{13} b^{13} are strips of sheet metal fastened in the front and rear bars, b^9 b^{10}, and bent in the forms of channels, wherein are journaled the small rollers b^{14} b^{14}. When long rollers b^{15} are used, they are journaled on the side bars, b^{11} b^{12}, and the channeled bars b^{13} b^{13} are dispensed with.

The head c of the bolt C, which I propose to use to support either form of the above described shelves, is preferably made nearly flat and of a sufficient width or diameter to cover most of the face of the standard A when the bolt is inserted in place in the open space left between the bars a a of the same. In continuous shelving, as shown in Fig. 5, each bolt serves, obviously, to support on a standard one side of a shelf, and the opposite side of the adjoining shelf, one of said shelves being pressed against the standard by the head of the bolt, while a square washer, c', inserted over the threaded end of the bolt C, is used to press the other shelf against the opposite face of the standard as the polysided nut c^2 is screwed onto the bolt. In the handling of the roller-shelves the front and rear bars, b^9 b^{10}, are bolted to the standard; but the nut c^2 is not tightened until the side bars, b^{11} b^{12}, are fixed in place between the perforated ends of the bars b^9 b^{10} and the standard A, by slipping their notches over the bolt. The wooden shelves B′ are manipulated in about the same manner—that is, the bolt is put in place with its washer and fastening-nut, and this is tightened in place only after the metallic plate b^6, screwed onto their sides, has been set in place and its notched ends b^7 b^7 inserted over the body of the bolt C, either between the head c of said bolt and one face of the standard or between the fastening-nut c^2 and the other face of said standard. In both cases the tightening of the nut c^2 will leave the shelves ready for use.

The perspective view of Fig. 5 shows the manner in which the shelf-plates B may be divided or pigeon-holed as ordinary shelving. This division is obtained by means of vertical bars, as the one shown in position at b^{16}, and for which rectangular openings b^{17} b^{17} are made in suitable points close to the edge of the plate B. and in corresponding points of its strengthening-flange b'. These vertical bars will materially add to the rigidity of the shelving, and being removable as the other parts of the shelving, their position may be readily changed, when desired, according to circumstances.

The construction of my adjustable or folding staircase is fully illustrated in Figs. 1 and 2, but the sectional view of Fig. 3 shows the details of the same.

L indicates the gallery, and M is the floor of the same, in which a sufficient portion is cut out to afford ample walking-space therethrough up to the upper part of the shelving. This portion is, however, kept close, according to requirements, by means of the trap E, hinged at e in any suitable manner to the flooring M of the gallery at the edge of the opening opposite the one selected for the landing of the staircase. When the hinged trap E is closed, its free end is supported flush with the flooring by means of the strip e', fastened in the under face of said flooring, and a sufficient portion of which is projected over the opening for that purpose.

Firmly bolted onto the upper face of the trap E and at a slight distance from its hinge e is the vertical standard F, the upper part of which is freely connected to one end of the bar G. The opposite end of this bar is also freely jointed with either one of the hinged

bars H H′ of the staircase. The bar selected is preferably the outer side bar, H, as, in whatever position the staircase is brought to, the hand-lever K, made integral with it or otherwise firmly connected to it, will thereby be clear of the shelving. The bars H H′ are hinged at *h* in the flooring of the gallery, just opposite the free end of the trap E, and a suitable slot is made in said flooring to receive a portion of the hand-lever K or the bent upper end of the stair-bar H, of which the said lever may form a continuous part. This lever is used to raise the staircase up from above, as shown in Fig. 1. The stair steps or treads J may be made in any suitable manner; but I prefer to make them in the form described for the shelf-plates B. This enables me to construct a very light staircase, and to, at the same time, materially reduce the volume of the same. so as to completely hide it when not wanted. To the bars H H′, which then are used to support the rear edge of the treads J, I add the bars I I′, parallel to the bars H H′, and which support the front edges of the treads J.

To connect the flanges of the treads to the stair-bars H H′ I I′, I use the same kind of bolts C and nuts c^2 as have been described for the attachment of the shelf-plates to the standards A. In this case, however, unless it is desired to have the staircase made absolutely rigid, the nuts c^2 are screwed tight enough onto the bolt C to keep the parts suitably connected to one another; but they must not work too tight, so as to prevent the hinge movement of the treads, which will cause the lower bars, I I′, to be brought close against the upper ones, H H′, when the staircase is closed. I may also, in place of the bolts C, use rods of sufficient length to hinge both ends of the treads J to their respective bars.

My system of shelving is of considerable advantage in libraries on account of the room it saves; and to further adapt the same to that use, I provide book-trays A′, as shown in detail in Fig. 14. These are made of any suitable size according to the size of the books for which they are intended. The books are preferably placed therein with their long edges down and with their backs standing up flush with or slightly below the upper edges of the tray-sides. The trays being rolled back in place on the roller-shelves B^2, the books are thus kept entirely out of sight and protected from the light and from dust. When any book is wanted, the tray containing the same is drawn out in the position shown in Figs. 1 and 14, wherein it is retained by means of the stops a^3 a^3, fastened in their sides close to the rear end of the same, as shown in the full lines of Fig. 14, or else to the bottom of the tray, as shown in dotted lines same figure, or both, which stops, when the tray is drawn out, come in contact with the rear face of the standards A, or with the front upper edge, b^9, of the roller-shelf B^2, (or with both when particularly heavy books are employed or when a limited given inclination of the tray is desired.) When the bottom stops are employed, the rollers b^{14} or b^{15} may be recessed, as shown at b^{18} in Fig. 15, to admit the passage of the said stops.

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

1. In combined adjustable shelving and folding staircase, flanged metallic plates adapted by means of bolts and nuts to be attached to perforated or spaced bars, and to be used as shelf-plates or stair-treads, substantially as set forth.

2. In adjustable shelving, a standard to support the shelves, formed of two square bars set one in front of the other in the division line of the shelves, and having an air-space left between them for the body of the bolts used to fasten the shelves thereon, substantially as set forth.

3. In adjustable shelving, the combination, with standards, of a shelf having flanged sides with perforations or notches at intervals to receive the bolts by means of which the shelf is fastened to the shelving-standard, substantially as set forth.

4. In adjustable shelving, a screw-bolt having a wide head the inner face of which is adapted to press the inner face of the flange or plate of one side of the shelf against the corresponding face of a standard, while a nut screwing on the threaded end of the bolt presses the inner face of the flange or plate of the opposite side of the adjoining shelf against the other face of the standard, substantially as set forth.

5. In adjustable shelving, in combination with a standard having spaces or perforations for the admission of fastening-bolts, shelf-plates having suitable perforated flanges on their sides, or roller frames or wooden shelves, both of which are provided with notched or perforated plates on their sides, and a wide-headed screw-bolt adapted by means of a nut or of a nut and a washer to press and support against the opposite faces of the standard one side of one shelf and the opposite side of the other shelf, substantially as set forth.

6. In adjustable shelving, the combination of the flanged shelf-plates, having rectangular slots cut close to their front edge and in corresponding points of their strengthening-flange, and of bars adapted to be fitted through the plate-slots, whereby, as pigeon-hole divisions are made in the shelf, the strength of the same is materially increased, substantially as set forth.

7. In combined adjustable shelving and folding staircase, the combination, with a trap hinged in the flooring of a gallery, and adapted to stand in the plane of the flooring when desired, of a staircase hinged in said flooring opposite the free end of the trap, and adapted, by means of connection with the said trap, to raise up the latter when the staircase is itself lowered down for use, while the closing of the staircase will at the same time lower the trap

to be used as part of the flooring and remove said staircase out of the way, substantially as set forth.

8. In adjustable shelving, the standards A, consisting of two spaced bars, *a a*, substantially as shown and described, and for the purpose set forth.

9. In adjustable shelving, the shelf-plate B, having flanges *b b'* on its front and rear, and guide-flange b^2 on its sides, and perforations b^4 b^5 at the ends of both, substantially as shown, and for the purpose set forth.

10. In adjustable shelving, in combination with the standards A, having spaces or perforations for the admission of fastening-bolts, the shelves B B' B^2, having perforated or notched flanges on their sides, the bolts C C, having wide heads *c* and threaded ends, the nuts c^2, and square washers *c'* interposed between the nuts and the shelf-flanges, substantially as shown and described, and for the purpose set forth.

11. In combination with the standards A, having spaces or perforations for the admission of the fastening-bolts, the roller-shelf frame B^2, having front and rear angle-bars, b^9 b^{10}, side bars, b^{11} b^{12}, perforated or notched in their ends, and rollers journaled in said frames, substantially as shown and described, and for the purpose set forth.

12. The combination of the tread J, bolt C, washer *c'*, and nut c^2, with the stair-bars H H' I I', substantially as shown and described, and for the purpose set forth.

13. The combination of the shelf-plates B, having the flanges *b b'* and rectangular perforations b^{17} b^{17}, with the dividing bars b^{16}, substantially as shown and described, and for the purpose set forth.

14. In combined adjustable shelving and folding staircase, the combination of the gallery-flooring M, having trap E, hinged at *e*, with the stair-bars H H' I I', having treads J J, the hand-lever K, connecting-bar G, standard F, and stop *e'*, substantially as shown and described, and for the purpose set forth.

15. In adjustable shelving, in combination with the standards A and roller-shelves B^2, the book-trays A', having retaining-stops a^3 a^3, substantially as shown and described, and for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand, at Milwaukee, in the county of Milwaukee and State of Wisconsin, in the presence of two witnesses.

HORACE J. HOFFMAN.

Witnesses:
S. S. STOUT,
H. G. UNDERWOOD.