

(No Model.)

3 Sheets—Sheet 1.

J. T. HOUGH & J. A. HARPER.
BANK VAULT.

No. 294,626.

Patented Mar. 4, 1884.

Fig. 1.

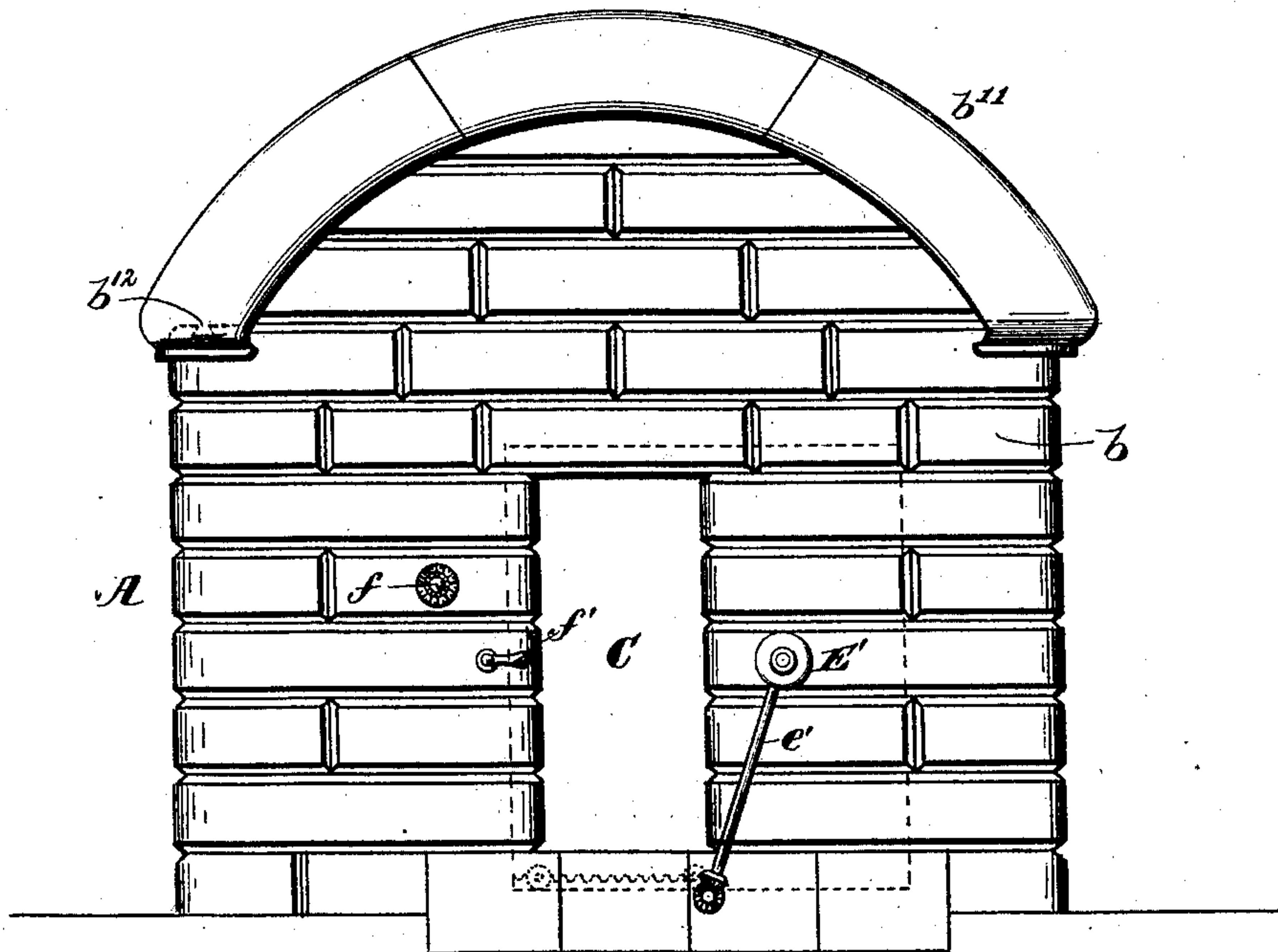
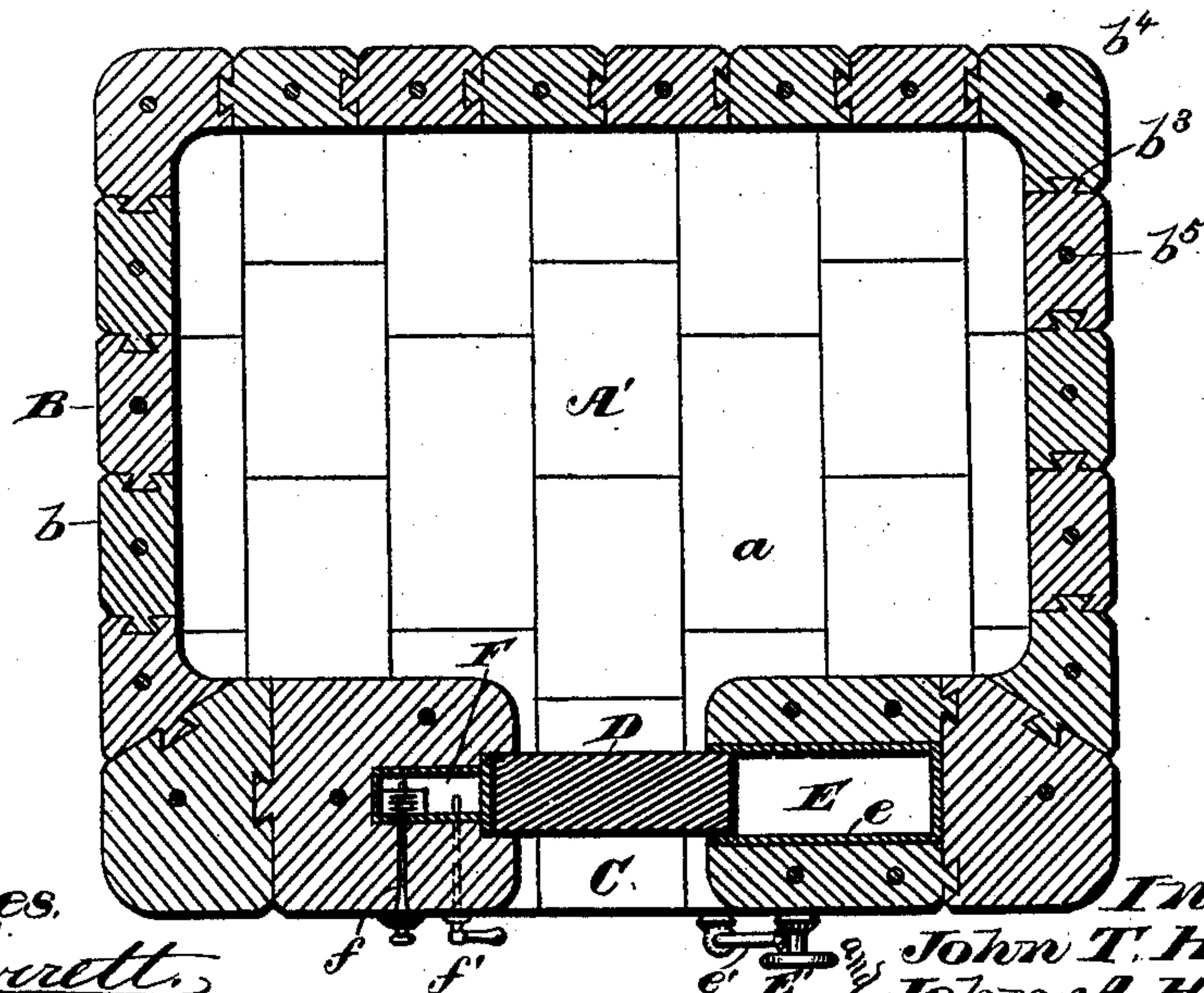


Fig. 2.



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Fig. 3.

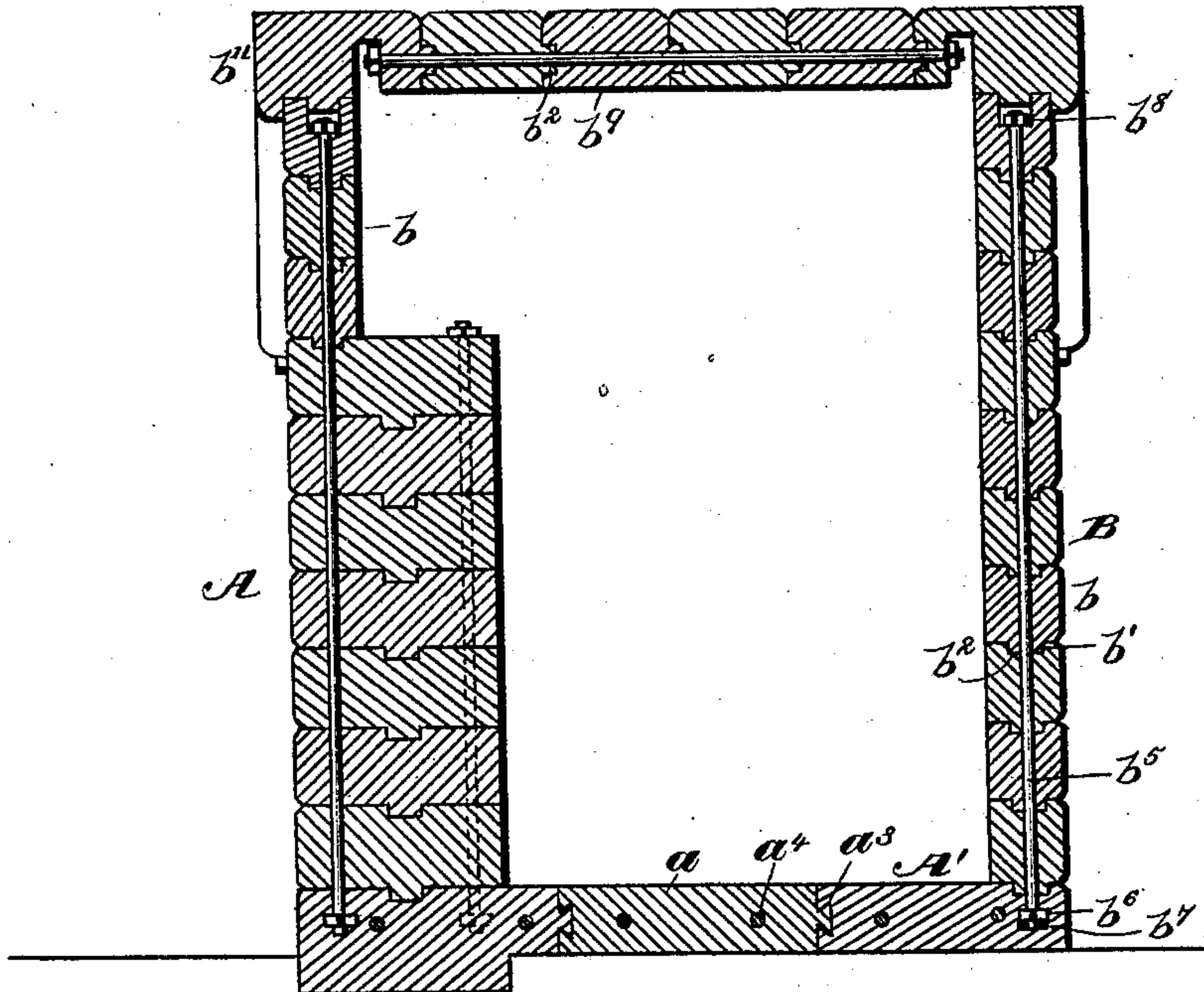


Fig. 4.

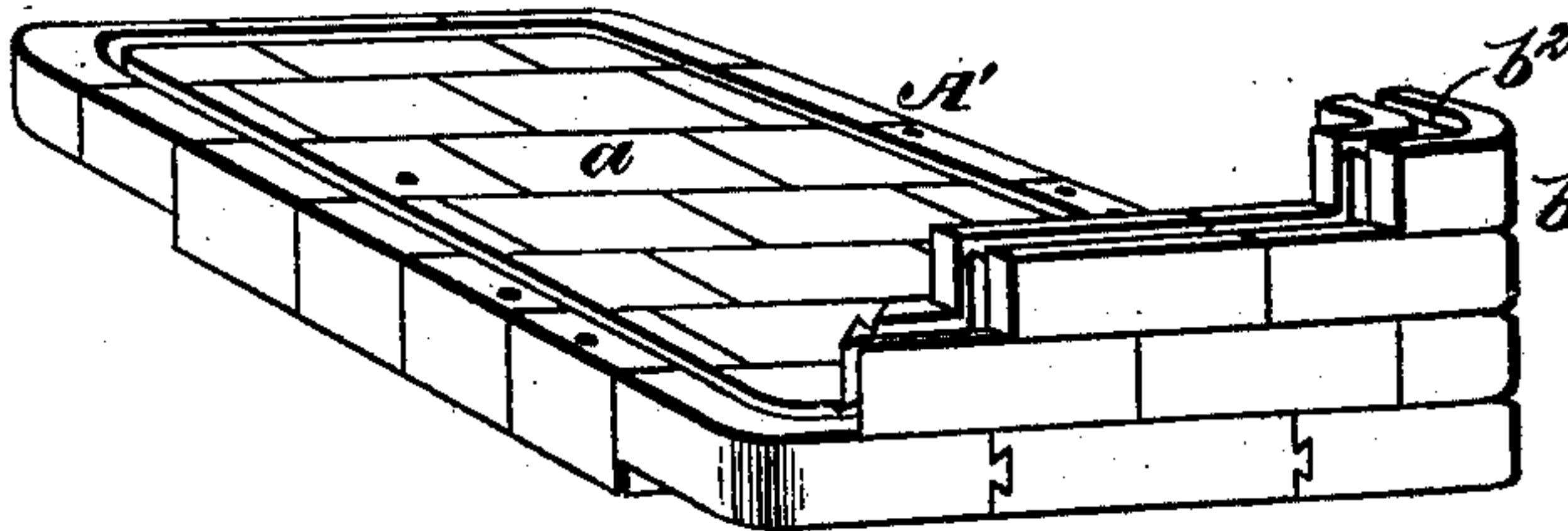
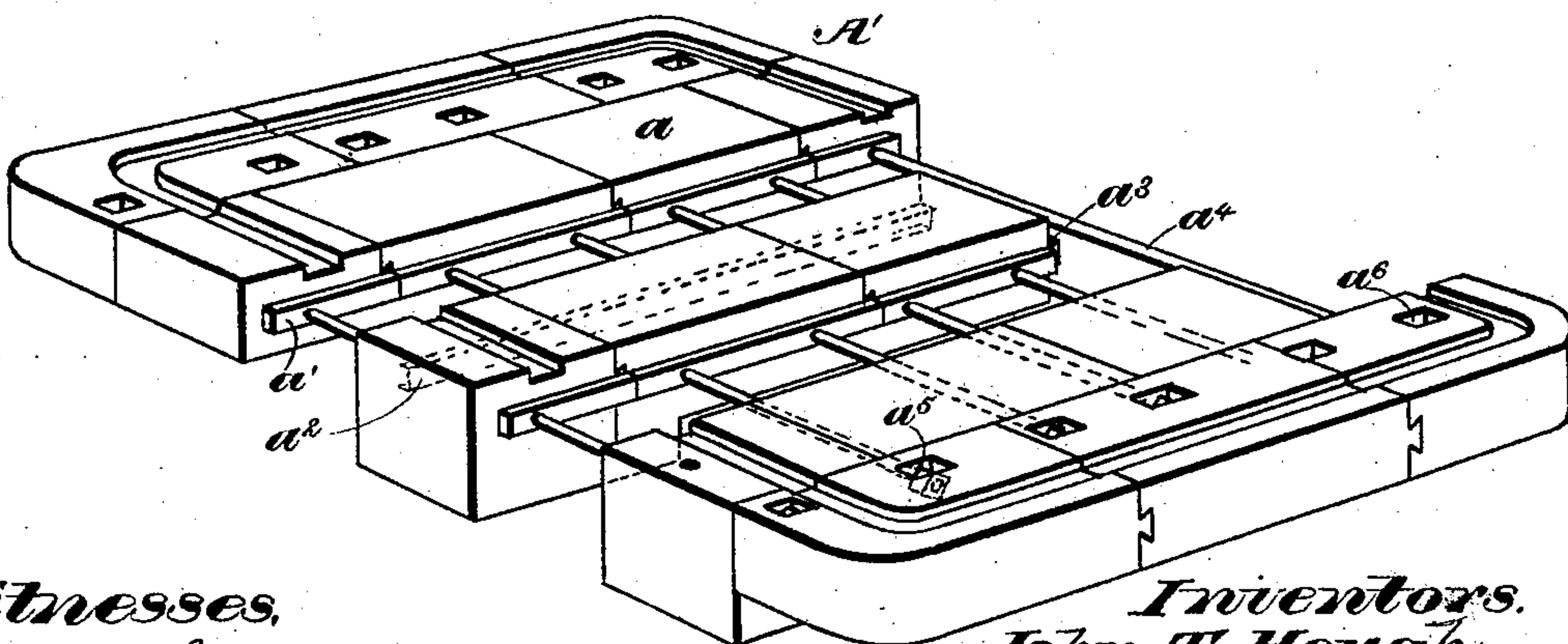


Fig. 5.



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Fig. 5.

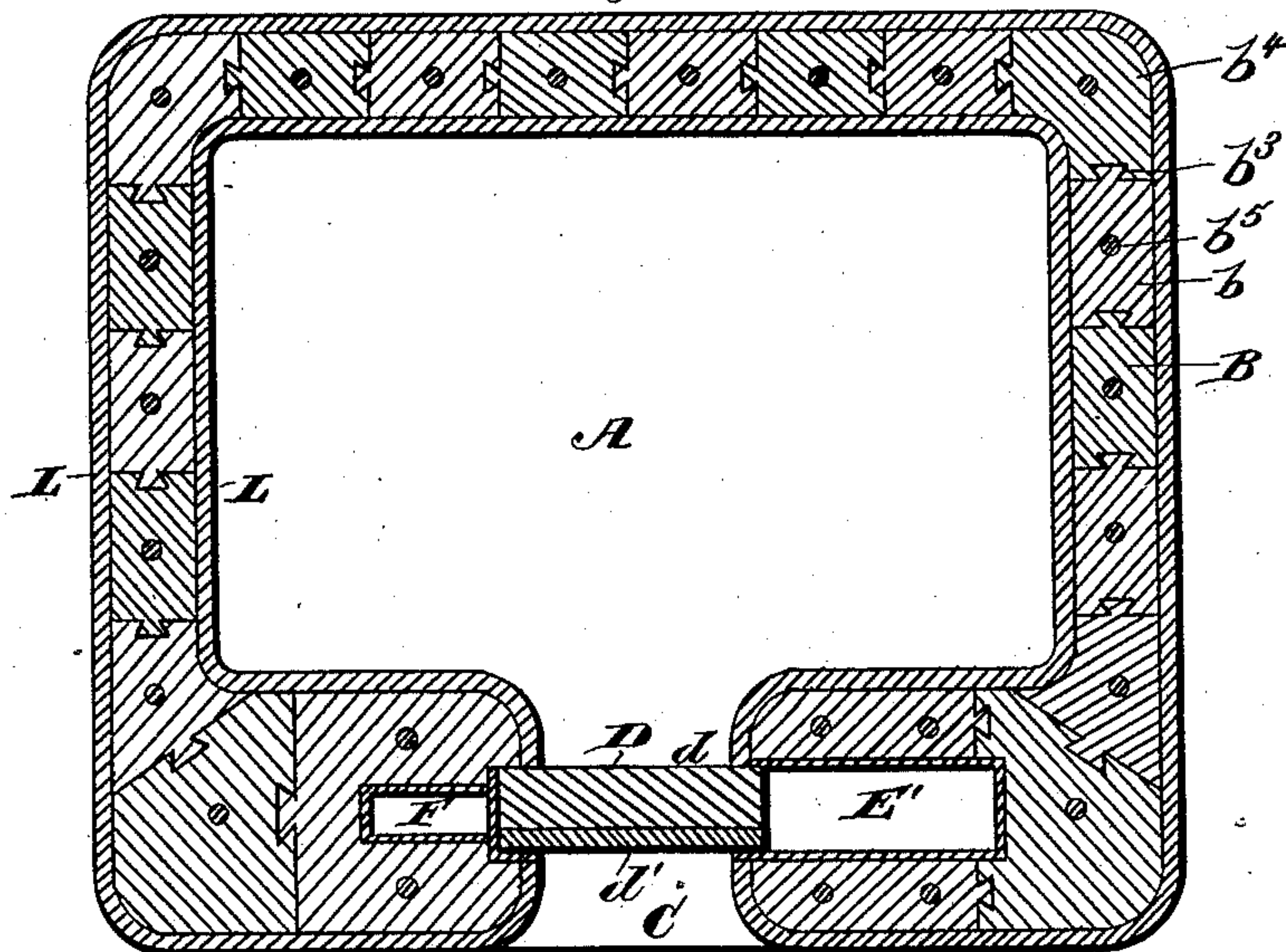


Fig. 6.

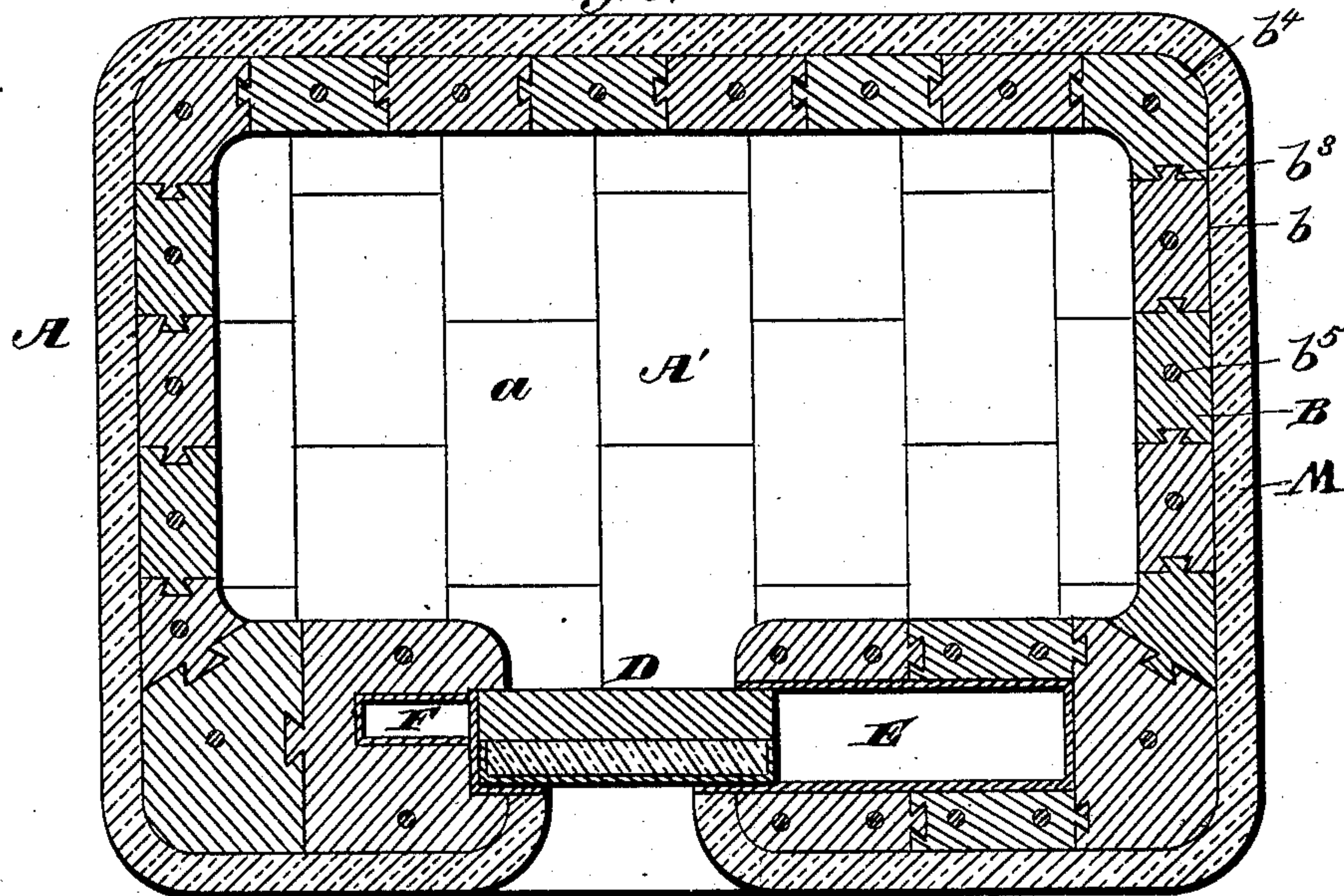
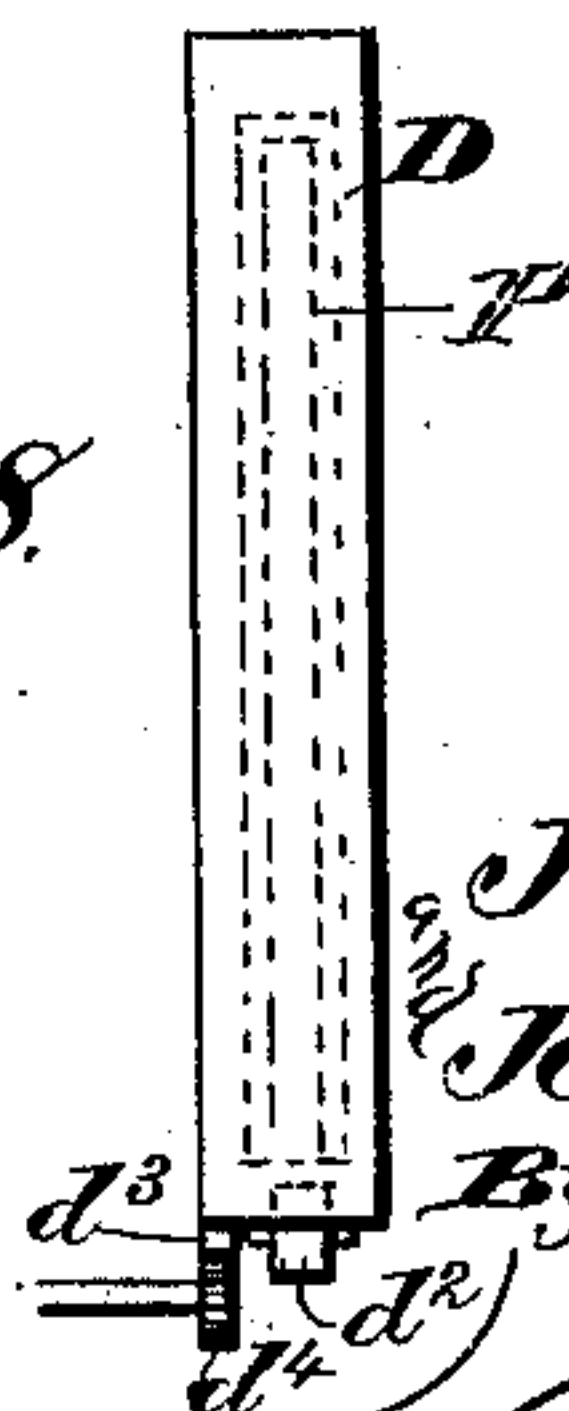
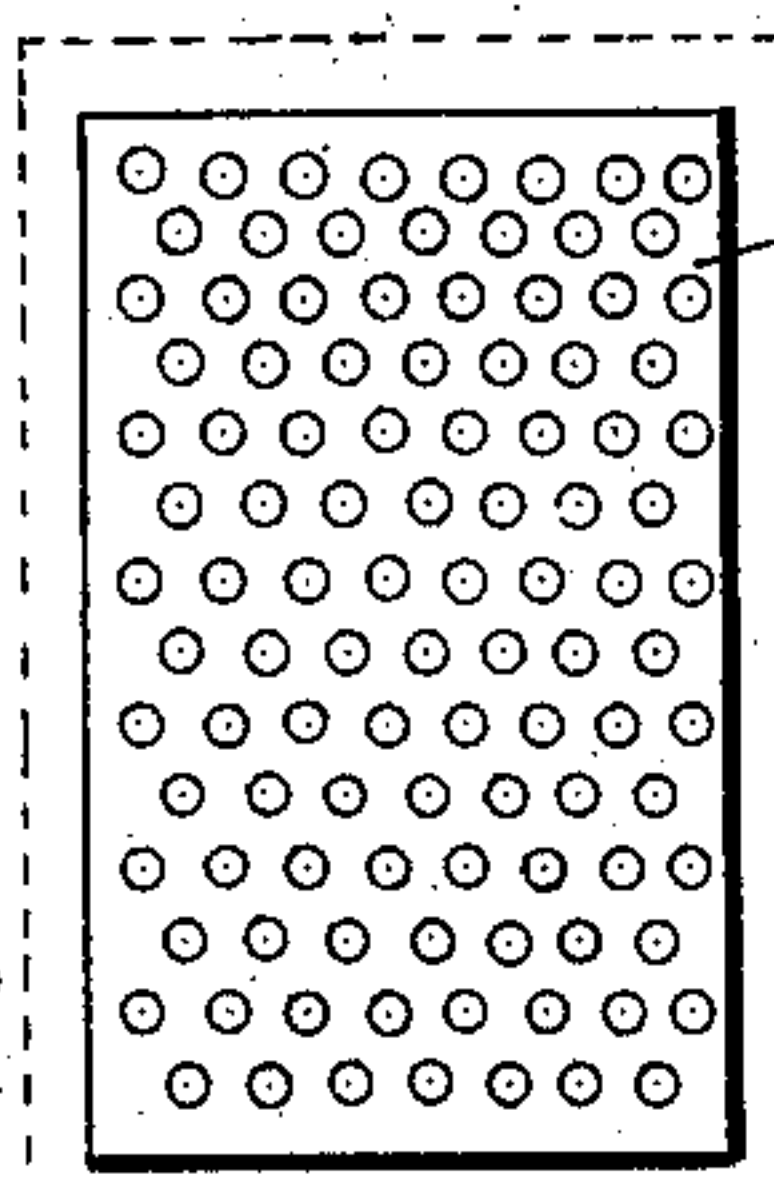


Fig. 8.



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UNITED STATES PATENT OFFICE.

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BANK-VAULT.

SPECIFICATION forming part of Letters Patent No. 294,626, dated March 4, 1884.

Application filed September 18, 1883. (No model.)

To all whom it may concern:

Be it known that we, JOHN T. HOUGH, a citizen of the United States, residing at Chicago, Cook county, Illinois, and JOHN A. HARPER, a citizen of the United States, residing at Pittsburg, Allegheny county, Pennsylvania, have invented new and useful Improvements in Bank-Vaults, of which the following is a specification.

Our invention relates to bank-vaults and similar structures for storing money and articles of value, the purpose being to provide a construction in which the component parts mutually interlock, and are so bound together as to make substantially a homogeneous structure, in which case parts may be removed by the builders and replaced by duplicate blocks, the door being set within a steel-lined recess in the solid wall, and the lock and bolt-work set in a similar recess, whereby tampering with the latter is prevented.

Our invention consists in the construction and combination of parts described in the following specification and shown in the accompanying drawings, in which—

Figure 1 is a front elevation; Fig. 2, a plan view in section. Fig. 3 is a central vertical section. Fig. 4 is a detail perspective. Fig. 5 is a horizontal section, showing a modification in construction. Fig. 6 is a horizontal section, showing a modified construction. Fig. 7 is a perspective showing the manner of connecting the parts forming the floor. Fig. 8 is a detail view, front and edge, showing a modification in construction of the door.

A in said drawings represents a vault or similar structure composed of a series of blocks built up in the manner hereinafter set forth.

A', Figs. 2, 4, 5, 6, and 7, indicates the flooring of the vault, which is composed of rectangular blocks a , formed of hardened metal—such, for example, as hard cast-iron—although the same construction may be employed with blocks of stone without departing from our invention. Each of said blocks is formed, as shown in Fig. 7, with a tongue, a' , upon one fitting within a groove, a^2 , in the adjacent block, said tongue-and-groove connection running in one direction, and with a dovetail joint, a^3 , formed to unite the faces which run

at right angles to the tongue and groove. The several blocks thus joined together are further united and bound in a solid mass by steel tie-rods a^4 , running from end to end of the floor, and engaging with wrought-iron nuts a^5 , cast in pockets a^6 in the end blocks. By turning up the nuts a^5 upon the other end of each rod, the stones or hard cast-iron blocks a are drawn closely together, and the whole floor is made into a substantially homogeneous mass.

B represents the side walls, which are composed also of separate blocks, b , each block having a tongue, b' , and a corresponding groove, b^2 , upon their adjacent horizontal faces, and a dovetail joint, b^3 , upon the adjacent vertical faces. The corner blocks, b^4 , are rounded outwardly, as shown, but are jointed to the contiguous blocks in the manner described. Tie-rods b^5 are passed vertically through each course of wall-blocks, the lower ends of said rods engaging with wrought-iron nuts b^6 , set in pockets b^7 in the lower course, and having nuts b^8 turned upon their upper ends. As the blocks in each course alternate, as shown in Fig. 3, these rods bind the several courses and the individual blocks in each into a solid mass more than equivalent in strength to a single block of equal size.

The roofing of the block may be of any suitable form. We have here shown it as a slitted arch, the blocks composing it being jointed together and united by tie-rods in the manner already described.

The manner of forming the roof is shown in Figs. 1 and 3, the wall-blocks b , in front and rear, being so formed as to coincide with the arch. The roof proper is formed of blocks b^9 , keyed in the usual manner, the adjacent vertical walls or abreuvoirs, running transversely of the arch, being joined by a tongue and groove, b^2 , while the adjacent faces, running longitudinally, are united by a dovetail joint, tie-rods b^{10} being used in the manner already described. The blocks b^{11} , forming the face of the arch, rest upon the wall-blocks b , with which they have a tongue-and-groove joint. The faces of these blocks extend below the edges of the blocks b , upon which they rest and conceal the joint, their corners being rounded off. At the springings of the arch the

blocks are joined to the side walls by a dovetail, b^{12} . Upon that side containing the door the blocks are made of extra thickness, as shown in Figs. 2, 5, and 6, and may, if desired, have a double dovetail joint. The doorway C may be arranged to suit convenience, the door D being arranged to move transversely across it. In order to provide for this movement, a recess, E, is formed in the blocks and lined with steel e . The recess is of such dimension vertically that the top and bottom of the doorway extend above and below the entrance-space, and likewise as to the breadth. The door D is formed of a heavy backing, d , of hard cast-iron, with a perforated wrought-iron case, upon which the body of the door is cast, and may also be provided with a strong steel outer plate, d' , of hardened steel, which is impervious to drills and cannot be attacked by the blow-pipe. The course of blocks beneath the door, which are of suitable thickness, is recessed to receive the bottom of the door, which is provided with rolls d^2 , upon which the door moves, and with a rack, d^3 , which meshes with a pinion, d^4 , set in the recess, and operated by a hand-wheel, E' , which, by a miter-gear upon the end of its shaft, revolves a vertical shaft, e' , which in turn moves the pinion d^4 . Upon the side of the doorway opposite the recess E is formed a steel-lined recess, F, for the combination-lock and bolt-work, the lock-spindle f being placed in the block, with the knob and dial outside. The handle f' , connecting with the bolt-spindle, has a similar arrangement. By this construction it is impossible to remove the lock-spindle and insert a wire by which the combination may be picked out.

A modified form of construction is shown in Fig. 5, wherein L represents an interior and exterior steel lining extending completely around the structure and giving additional strength. The construction set forth gives great strength and security to the vault and renders it burglar-proof. It can neither be mined, drilled, wedged, nor blown open, as the joints are all concealed. There are no salient angles to be broken away, and no orifices for the insertion of an explosive. It is impossible to drill the door, and the nature of the material renders it a hopeless task to remove a block by piecemeal. The entire structure is so bound and jointed together that it is in effect a solid mass of the most refractory, the toughest, hardest, and most endurable material.

A bank-vault constructed in the manner and of the material described will, when once completed, endure for ages, and is practically indestructible by any means. At the same time it is possible, in case of necessity, to remove any individual block and replace it by another, should circumstances require, since, in case of necessity, the vault can be unkeyed, taken apart, and repaired, or it may be enlarged or made smaller, the parts being so

formed that duplicates can be furnished at any time.

Instead of making a door with an inner body of hard cast-iron and an outer lining of steel, we prefer in all cases to construct the same with an inner case of perforated wrought-iron plates, P, Fig. 8, and casting the body of the door around the same.

We propose to use upon the door described in this application a lock of peculiar construction and operation, which will form the subject of a separate application. We do not, however, confine ourselves to any special construction thereof, as we may use, in connection with the vault and door, an ordinary combination-lock or time-lock, with a suitable bolt-work to secure the same.

If preferred, the vault may be provided with an exterior casing, M, of asbestos or other suitable fire-proof composition. This casing may be placed around the outer lining of steel or immediately around the steel blocks composing the vault, the drawings representing it as around the blocks only.

Having thus described our invention, what we claim is—

1. A bank-vault or similar structure composed of blocks of hard cast-iron or equivalent material, said blocks being tongued and grooved upon one face and dovetailed upon the faces at an angle thereto, and united by tie-rods, substantially as described.

2. The combination, in a bank-vault, of the blocks jointed in the manner described, the rods binding the several courses together, and nuts set in pockets in the end blocks to receive the ends of the tie-rods, substantially as described.

3. The combination, with the walls composed of hard cast-iron blocks united in the manner set forth, of a door moving in a steel-lined recess in the wall, and a lock and bolt-work set within a corresponding steel-lined recess upon the opposite side of the doorway, substantially as described.

4. The combination, with the blocks forming the side wall, of the angular corner blocks, dovetailed to the adjacent blocks upon their vertical faces, and having a tongue-and-groove joint upon the other faces, the outer corners of said blocks being rounded and tie-rods being passed through the whole course, substantially as described.

5. The combination, with the door moving in a steel-lined recess in the body of the thickened wall, having a perforated wrought-iron case in the center, and having friction-rolls supporting it, of a rack-bar attached to the bottom of said door, a pinion engaging therewith, and means for rotating the latter, substantially as described.

6. The combination, with the recessed wall, of a door moving therein and extending beyond the limits of the doorway in all directions when closed, said door being composed of a solid block of hard cast-iron and a perfo-

rated wrought-iron case in the center, upon which the body of the door is cast, substantially as described.

7. The combination, with a bank-vault
5 composed of hard cast-metal blocks jointed together by tongues and grooves and dovetails in the manner set forth, and having tie-rods binding the individual blocks and several courses together, of an inner and outer
10 lining of steel, substantially as described.

In testimony whereof we have hereunto set

our hands in the presence of two subscribing witnesses.

JOHN T. HOUGH.

J. A. HARPER.

Witnesses to the signature of John T. Hough:

JOHN C. CUMMINGS,

M. DUSILLENE.

Witnesses to the signature of John A. Harper:

WM. LITTLE,

C. S. GRAHAM.