

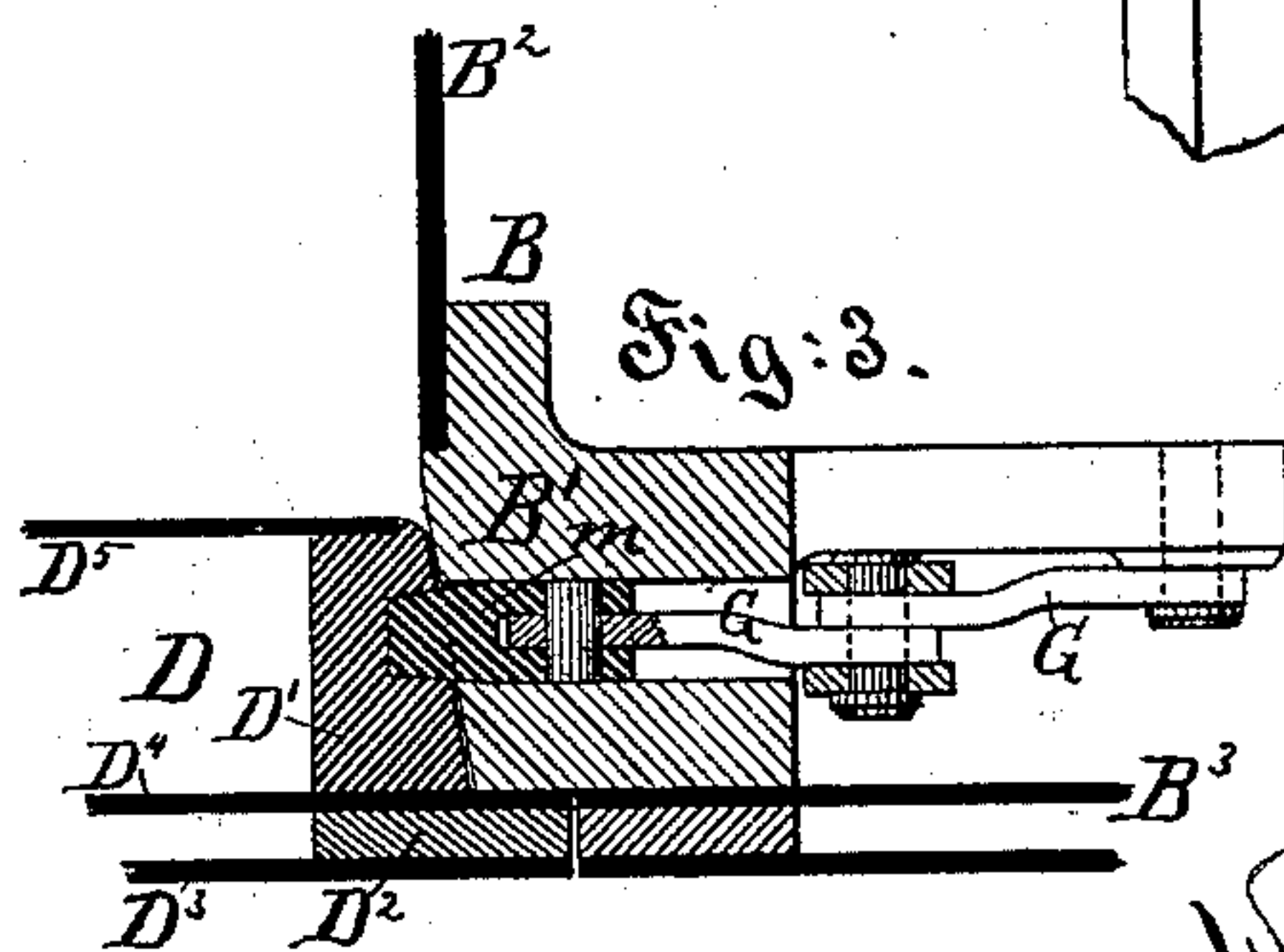
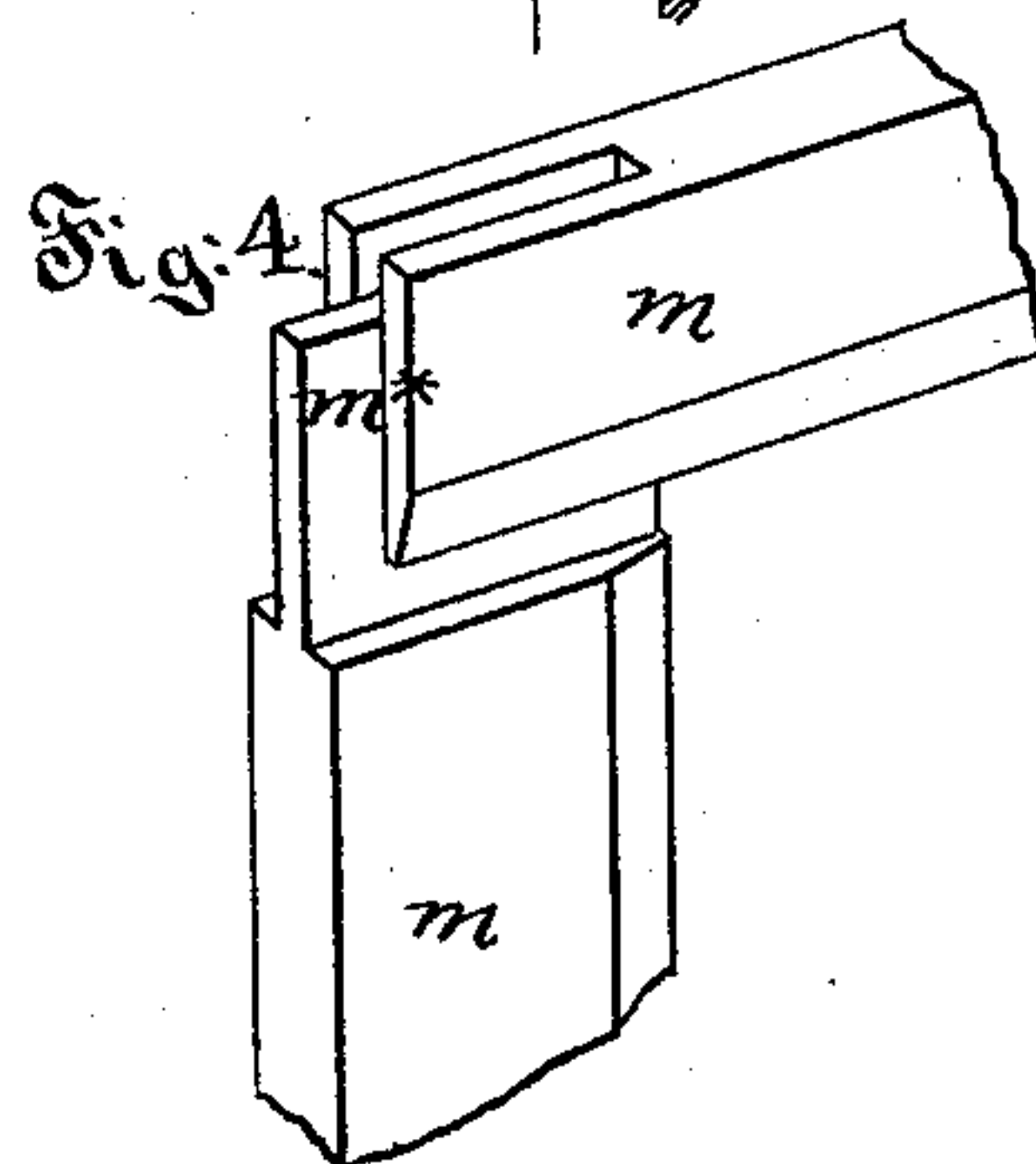
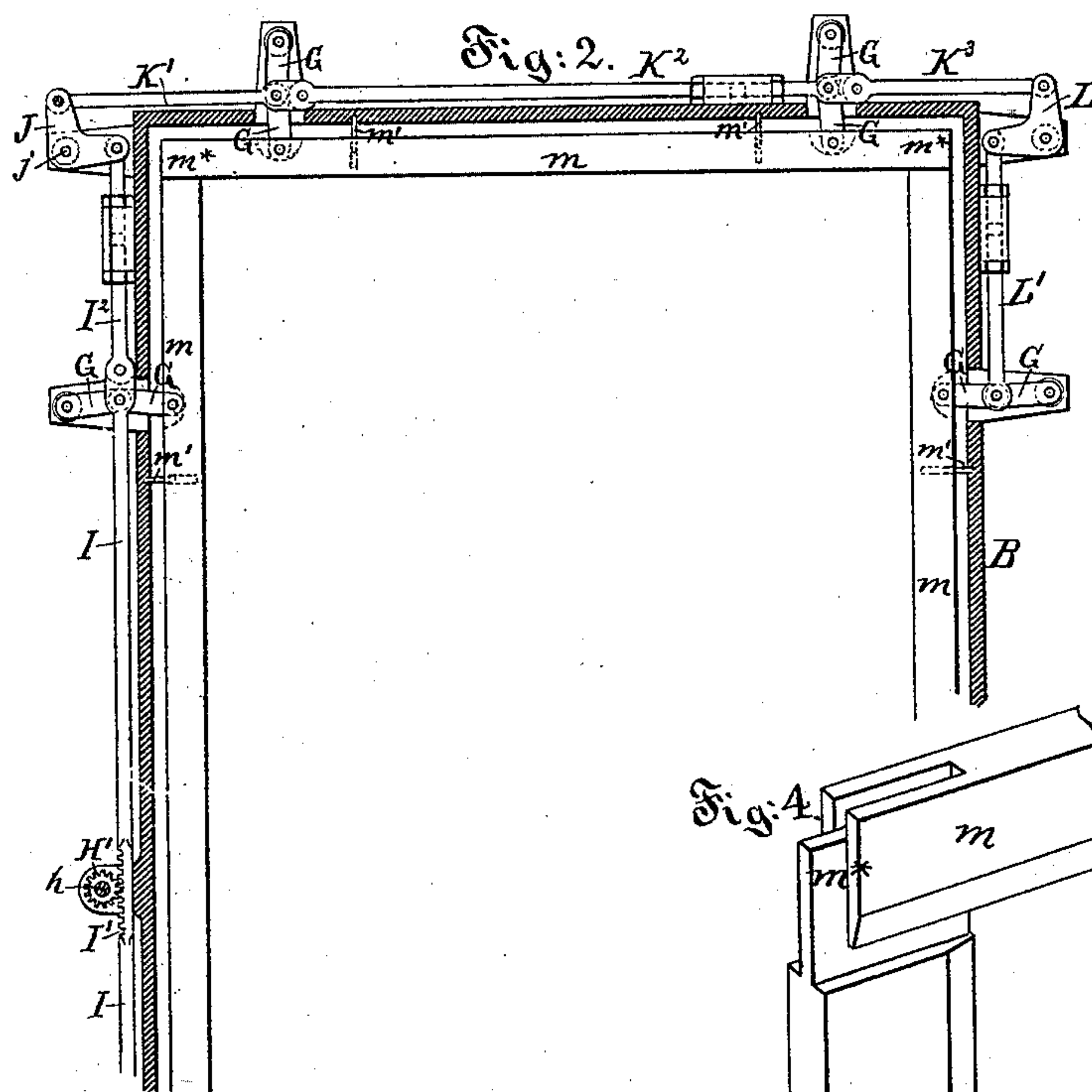
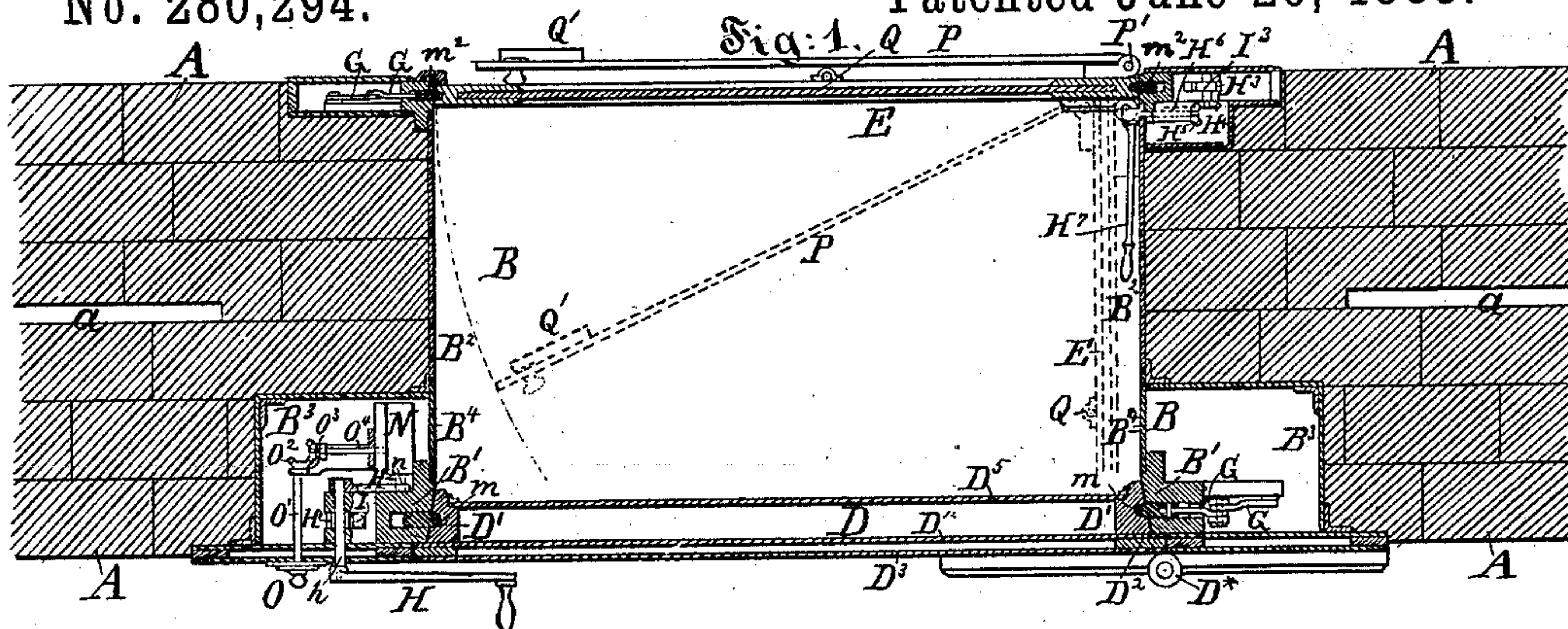
(No Model.)

2 Sheets—Sheet 1.

W. CORLISS.
FIRE PROOF STRUCTURE.

No. 280,294.

Patented June 26, 1883.



WITNESSES
Charles R. Searle.
H. H. Searle.

INVENTOR
William Corliss.
His attorney
Thomas D. Sisson

(No Model.)

2 Sheets—Sheet 2.

W. CORLISS.
FIRE PROOF STRUCTURE.

No. 280,294.

Patented June 26, 1883.

Fig:6.

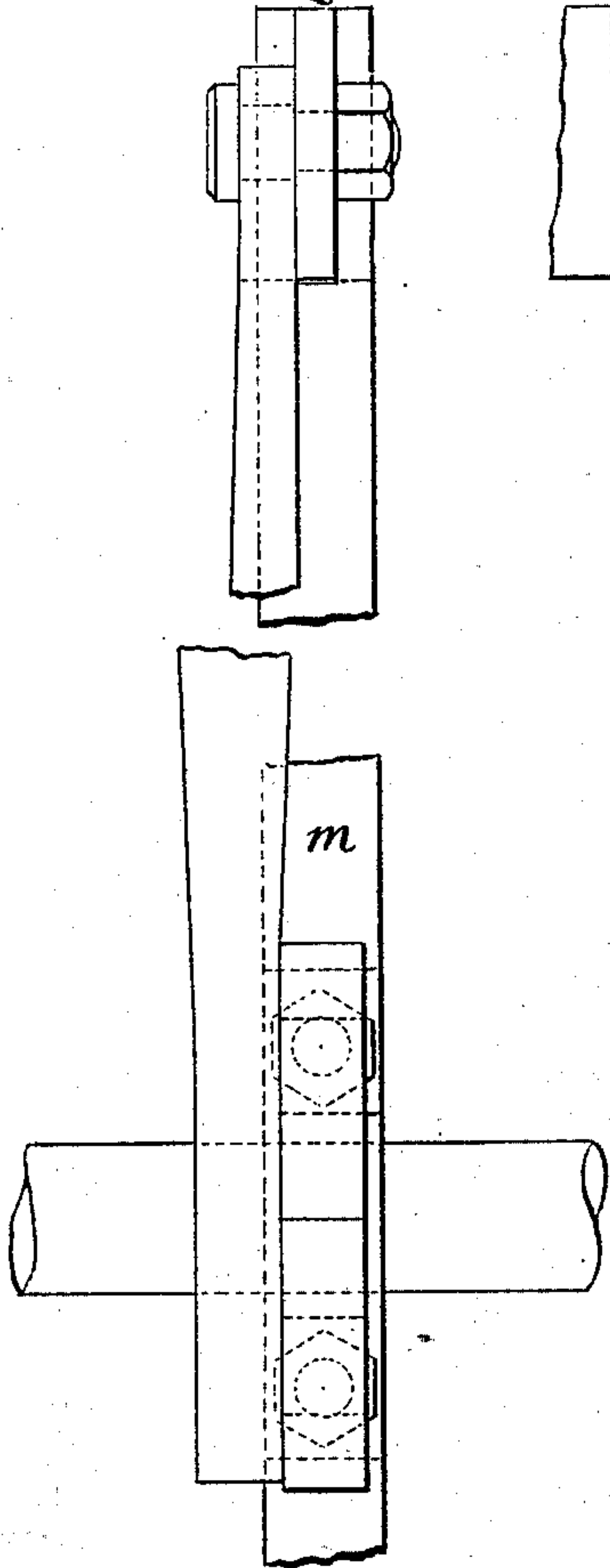


Fig:5.

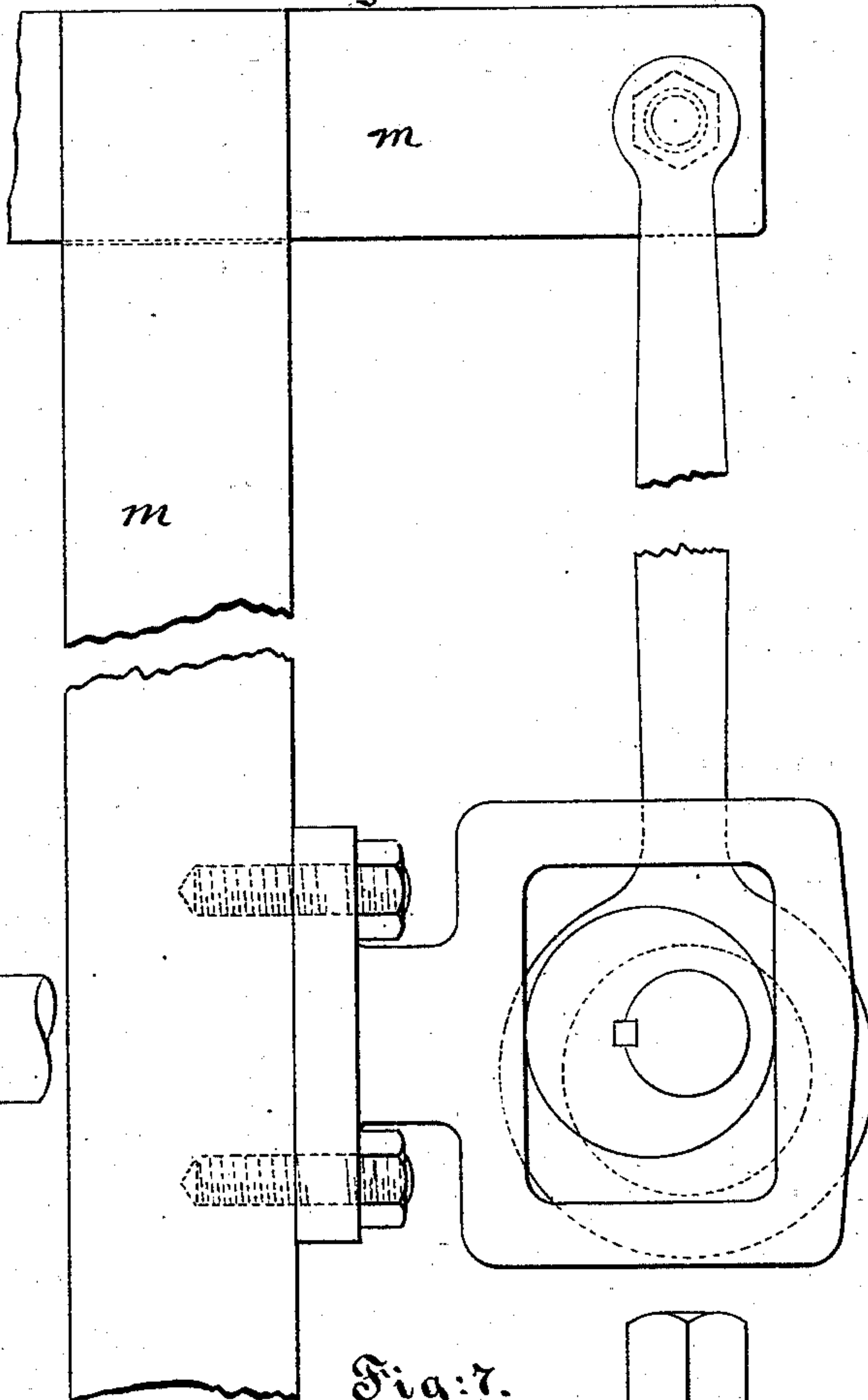
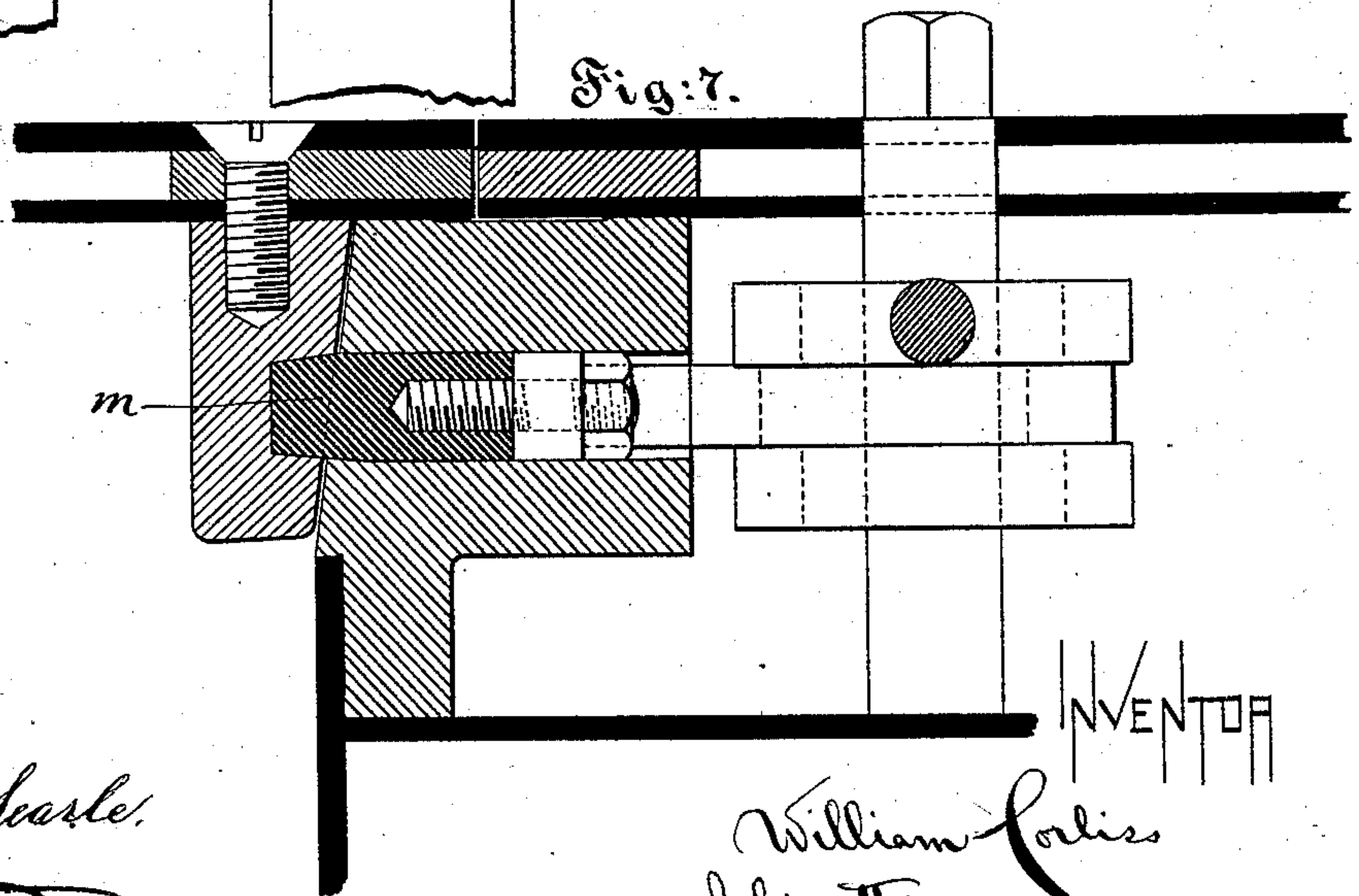


Fig:7.



WITNESSES

Charles R. Searle.
A. H. Gentner

INVENTOR

William Corliss
his attorney
James D. Stetson

UNITED STATES PATENT OFFICE.

WILLIAM CORLISS, OF PROVIDENCE, RHODE ISLAND.

FIRE-PROOF STRUCTURE.

SPECIFICATION forming part of Letters Patent No. 280,294, dated June 26, 1883.

Application filed June 28, 1882. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM CORLISS, of the city and county of Providence, and State of Rhode Island, have invented certain new and useful Improvements in Fire-Proof Structures, of which the following is a specification.

The invention relates more particularly to the doors and windows of fire-proof buildings, as well as of vaults, safes, and, in general, to all kinds of structures the contents of which it is desired to protect against all possible injury from fire.

In the following I will describe the invention as applied to vaults for banks, &c.

The improvements insure an absolutely-tight joint around the entire door, so constructed that no amount of heat, with its tendency to warp the metal, shall open any appreciable joint for the circulation of air to support combustion. The walls and doors may be constructed with any desired quantity of clay, alum, plaster, or other heat-resisting materials or combinations of materials. They may also be formed with any quantity of franklinite, chilled iron, hardened steel, or other material adapted to resist burglars' tools and impart great strength. I will represent the walls as simple masonry and the doors as hollow shells of iron, the air-space within being divided into two separate spaces by the interposition of a thin sheet of iron. I believe that air-spaces divided so as to prevent circulation of air form a very efficient heat-resisting wall or door. It will be understood that my invention may be applied to any ordinary or suitable construction in these respects.

I have devised and reduced to a practical form means for urging forward from all sides of the door sufficiently-stout strips of metal which form movable tongues or locking-plates. They severally extend continuously along the whole line of the joint—that is to say, up and down each side and across the top and bottom. These bolts or locking-plates may be carried in the door and thrust outward, so as to serve usefully; but I prefer, for obvious reasons, to hold the strips or locking-plates in the casing and to thrust them inward to effect the locking by engaging them in a suitable groove formed in the door. The groove and the locking metal being beveled insures that the door shall be drawn properly to its seat by the act

of locking; but I do not deem it practicable to make and maintain an absolutely-tight joint between the door and its casing. I rely for the perfect tightness desired on the joint between the locking-plates and the adjacent metal, which is effected by the fact that the locking-plates are beveled on both sides and enter into the correspondingly-beveled grooves of the door, making an absolutely-tight fit therewith. The corners of the locking-plates are tongued together, so as to allow the required movement for locking, and so as to insure tight joints at the corners, as well as at the other portions, when the plates are thrust inward. The tightness of the corners cannot be obtained in this way if the strips or locking-plates are carried in the door and operated outward.

I have devised means for operating the locking-plates with facility and with great force. In what I esteem the most complete form of the invention the four locking-plates for a door are operated from a single point. Provisions are made for adjusting the parts so that all shall be brought to a bearing at the same time. In cases of bank-vaults or other structures, where the utmost degree of security is desired, I prefer to employ two doors thus secured around the edges, mounted one within the other to secure the entrance to the vault or large safe. I provide a third door of open-work metal, mounted on the innermost of the two doors, arranged to serve as a day-door. This day-door secures the contents of the vault by a simple lock during the business hours, while the main doors stand open, and insure that the interior of the safe is dry and well ventilated. My day-door opens outward, like the others. The day-door lies, ordinarily, parallel to and close along the inner face of the inner main door. The opening of the latter brings the axis or line of center of the day-door into the position to allow it to serve.

The following is a description of what I consider the best means of carrying out the invention.

The accompanying drawings form a part of this specification.

Figure 1 is a horizontal section of the wall of a vault, with a doorway provided with my invention. Fig. 2 is a vertical section of the door-casing, showing the locking-plates and

the means for operating them. Fig. 3 is a horizontal section, showing the joint of the door, with the casing and the adjacent parts. Fig. 4 is a perspective view of a detail. Figs. 5 to 7 represent a modification. Fig. 5 is an elevation of certain parts. Fig. 6 is an edge view, and Fig. 7 a horizontal section.

Referring to Figs. 1 to 4, inclusive, similar letters of reference indicate corresponding parts in all these figures.

A A are walls of brick or other suitable fire-proof material.

B is a door-casing of cast metal, certain portions being designated, when necessary, by additional marks of reference, as B' B². The casing B, as also the masonry A, is constructed so as to allow room for the locking-plates, and for mechanism to operate them forcibly.

D is the outer door, certain portions being designated by additional marks of reference, as D', when necessary. E is the inner door. P is the day-door, turning on hinges formed on the inner face of the inner door, E. The outer door, D, is made with stout edge frames, D' D², and with three parallel plates, D³ D⁴ D⁵, extending over its whole surface, these parts being permanently secured together by screws or other suitable means. The portion D' of the door and the adjacent portion B' of the door-frame are beveled, as shown. Suitable hinges, D*, perform their ordinary functions. A deep recess is accurately formed in the door-frame B', and, being nicely finished of uniform width quite around the door, receives the four locking-plates *m*. The adjacent exterior of the door-frame D' is grooved. When the door is unlocked, the locking-plates *m* are drawn outward by the mechanism, so as to leave the door free to be opened. When the door is closed and it is desired to lock it, the several plates *m* are thrown simultaneously inward and forced home until their beveled surfaces, engaging with the corresponding surface of the grooves, draw the door inward and make a tight joint between it and the door-frame. As means for working these locking-plates, I employ toggle-joints with efficient connections for operating them. The toggles are distributed so that there shall be two for each locking-plate. They are connected by bars, which are thrown by a single crank, so as to operate the whole simultaneously. The fixed fulcrums of these toggles are formed on arms projecting from the door-frame. I prefer to cast these arms in one with the casting that constitutes the door-frame.

The several pairs of links, sometimes denominated "toggled levers," are marked G G. All may be exactly alike.

H is a lever provided with a convenient handle, and adapted to rotate or partially rotate a shaft, *h*, carrying a pinion, H'. This engages with rack-teeth I' on a sliding bar, I, which extends up and down in the casing, and is connected to the upper and lower toggles, respectively, for that edge of the door. The extreme upper and lower ends of the

bar I connect to the mechanisms for operating the locking-plates on the upper and lower edges and at the farther vertical edge. The bottom and top are counterparts of each other. A description of one will suffice for both. The upper end of I connects, through an adjustable link, I², with a bell-crank lever, J, turning on a fixed center, *j*, cast on the door-frame. The other arm of each of these levers J connects, by a link, K', to the nearest adjacent toggle for the upper part of the door. Another link, K², connects from this to the farthest toggle of the upper edge. Another link, K³, connects from this to a bell-crank, L, which in turn operates an adjustable link, L', connected to the nearest adjacent toggle on the opposite vertical side of the door. Each of the four plates *m* is provided with two or more guide-pins, *m'*, extending at right angles from its edge, and playing easily through guide-holes produced within the door-framing. The ends of the several locking-plates *m* are engaged together by tongues and grooves, as indicated at *m**, the parts being so finished and applied together that they form a tight contact when the several locking-plates are forced inward into the door to the fullest extent to strongly and tightly secure the door.

The casing B is extended to form a strong and close lining to the vestibule, and to unite the casing for both doors D and E in a single rigid structure. This portion is marked B². Another portion, B³, constitutes a chamber to accommodate the mechanism. I prefer to make those parts which serve as the frame for each door of cast-iron, and to use wrought-iron for the vestibule proper, or rectangular casing connecting such frames, and also for the casings which inclose the operating mechanism; but these materials may be varied according to the special requirements of each case, to their dimensions, &c. A movable panel, B⁴, secured by screws or otherwise, allows access from the vestibule to adjust the several adjustable parts, so as to insure that all the toggles work equally, and also to change the combination, or otherwise give attention to the lock.

The adjustment of the rods I² L' may be made by right and left hand screw-threads, or by any other ordinary or suitable means.

N is the casing of a combination-lock. It is operated by the knob O, through the shafts O' O⁴ and the bevel-gear wheels O² O³. The bolt *n* of the lock engages with the lever H², fixed on the shaft *h*, and prevents the working of the latter, and consequently the withdrawal of the locking-plates *m* from the door until the lock is properly opened.

There may be a similar locking mechanism and a similar train of connections for securing the inner door, E, except that the operating-shaft must of course open into the vestibule. I have shown a simple mechanism controlled by any lock. (Not shown.)

The shaft of the pinion H³ carries a bevel-wheel, H⁴, which meshes into a correspond-

ing wheel, H^5 , on the shaft H^6 . The latter extends outward into the vestibule, and carries on its overhanging end a hand-lever, H^7 . The turning of this lever in one direction or the other causes the rack-bar I^3 to move up and down, as will be easily understood, thus operating the toggles $G G$, that control the bars m^2 , in a manner exactly corresponding to the operation of the locking mechanism of the outer door.

The day-door P lies alongside of the inner door, E , when the latter is closed. It also lies in a precisely similar relative position when both are open; but ordinarily, when the inner door, E , is open, and the center of motion or line of the hinges P' of the day-door is brought well inward, as indicated in dotted lines in Fig. 1, the day-door will be turned on such hinges each time access to the safe is required during the day, being opened outward against E , to allow the proper parties to walk in and out, and at all other times during the day it will be extended across the passage and secured by any suitable lock. The arrangement of the hinges allows a narrower day-door to serve than would be otherwise practicable.

Q is a lock which secures the inner door, E , in the open position. I consider such lock an important feature in its combination with the peculiarly-hinged day-door, as it prevents the latter from being forced open, when in the locked position, by simply turning the carrying fire-proof door, and thus moving that edge of the day-door which is opposite its hinges away from the corresponding side of the casing or vestibule.

An air-space, a , in the wall A aids in retarding the transmission of heat through the masonry, and also retards the passage of dampness when, for any reason, there is a tendency to absorb moisture from surrounding earth.

Modifications may be made in the form and proportions without departing from the principle or sacrificing the advantages of the invention. Parts of the invention may be used without the whole.

Figs. 5 to 7 show an arrangement in which the toggles are dispensed with. The several locking-plates m may be operated independently of each other, instead of being all worked at once from a single point. In these figures the plates are worked from two points. There is a shaft on each side of the door, each capable of being turned about a half-revolution. One works the vertical locking-plate on one side and the adjacent ends of the top and bottom locking-plates. The other correspondingly works the other side. Each shaft carries three eccentrics. Various other modifications may be suggested by any good mechanic. I prefer the construction shown in Figs. 1 to 4.

I have, in a patent to me dated January 13, 1874, No. 146,382, shown a means of securing the joint around a circular door by a ring capable of expansion and contraction; but such

left a space between the ends which was not secured. My present invention differs by the use of rigid and straight plates, which may have any thickness and stiffness without interfering with the action, and by applying to rectangular doors meets a want which is felt in connection with a widely-different class of structures.

I claim as my invention—

1. A fire-proof structure having a rectangular door with beveled locking-plates m arranged on the several sides, engaging in grooves, so as to secure the door continuously to the framing, so that any contortion or warping shall cause both the framing and the door to yield alike and in the same direction, and thus maintain a close and tight joint all around the door, substantially as herein specified.

2. The continuous locking-plates m , adapted to be projected from the outside into the door, and extending quite around the door, substantially as herein specified.

3. The series of locking-plates m , tongued together, as indicated by m^* , in combination with each other, and with a vault or safe, A , containing the same, and with a door, D , as herein specified.

4. The double toggles G , locking-plates m , and operating means I , in combination with each other and with the door D and vault or safe A , as herein specified.

5. The bar $I I'$, links $P^2 K' K^2 K^3 L'$, and bell-crank levers $J L$, in combination with each other and the toggles $G G$ and locking strips or plates m , and with the vault or safe A and door D , as herein specified.

6. In a fire-proof structure having a thick wall, A , and door-frame B' , with locking mechanism for operating locking-plates m , the chambered or recessed casings B^3 , formed in the door-frame, and provided with hand-holes and easily-movable covers or panels B^4 , arranged to allow easy access to the mechanism for any purpose, as herein specified.

7. In a fire-proof structure having one or more tight doors, the movable axis P' , carried on the face of the innermost door and arranged as shown, so that the opening of the door moves said axis inward, in combination with a day-door, P , mounted on said axis P' , and arranged to serve as herein specified.

8. In a vault or safe having a tight door, E , a lock, Q , serving to hold said door locked in the open position, in combination with said door, and with a day-door turning on an axis which is movable with the tight door, and with means for locking the day-door when the tight door E is open, substantially as herein specified.

In testimony whereof I have hereunto set my hand, at Providence, Rhode Island, this 24th day of June, 1882, in the presence of two subscribing witnesses.

WILLIAM CORLISS.

Witnesses:

A. H. GENTNER,
SAML. T. DOUGLAS.