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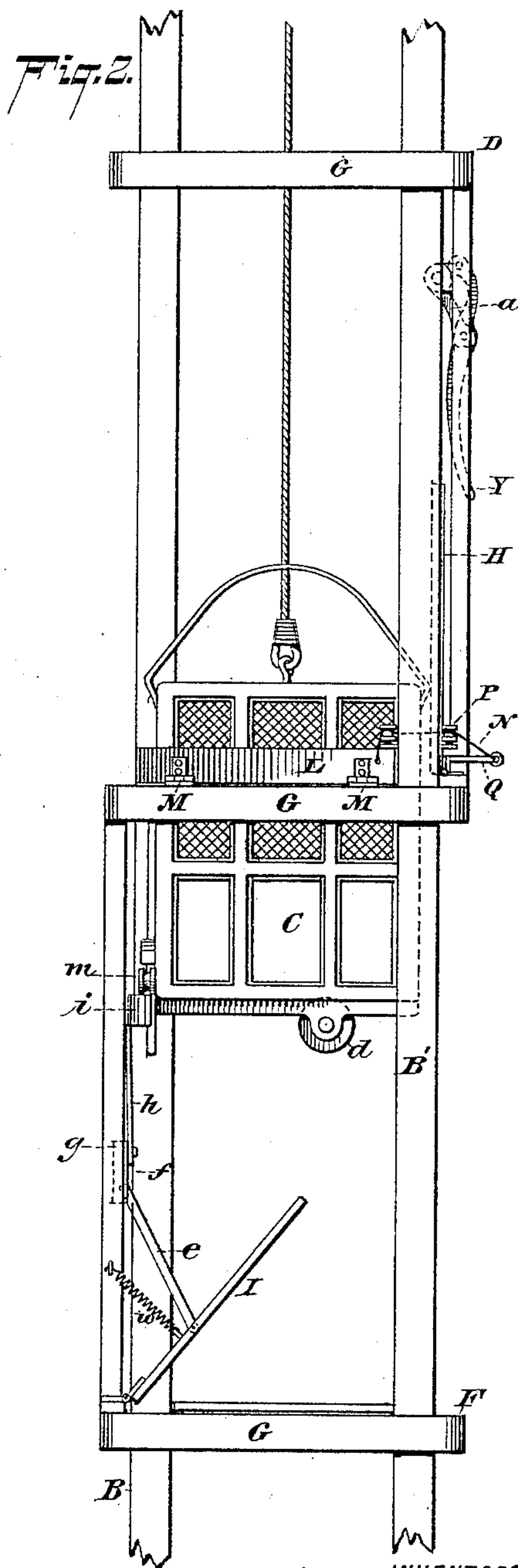
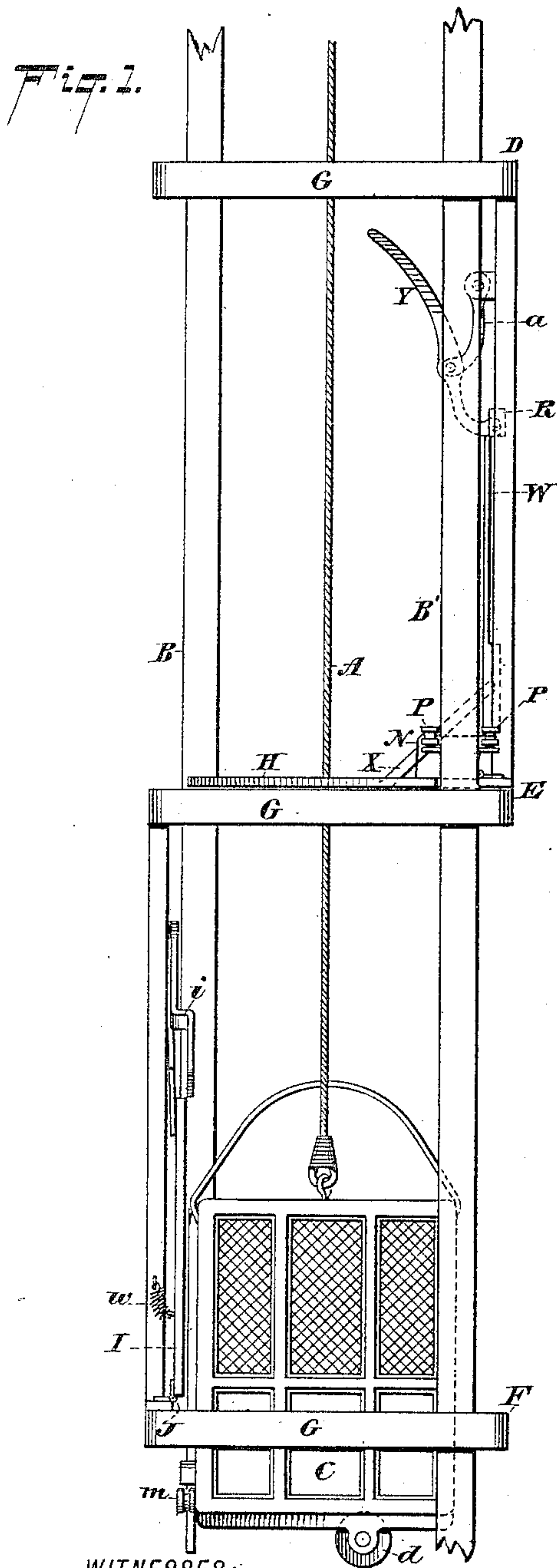
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W. BARDSLEY & W. K. CROFFORD.

HATCHWAY DOOR MECHANISM.

No. 442,279.

Patented Dec. 9, 1890.



WITNESSES:

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William Goebel.

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(No Model.)

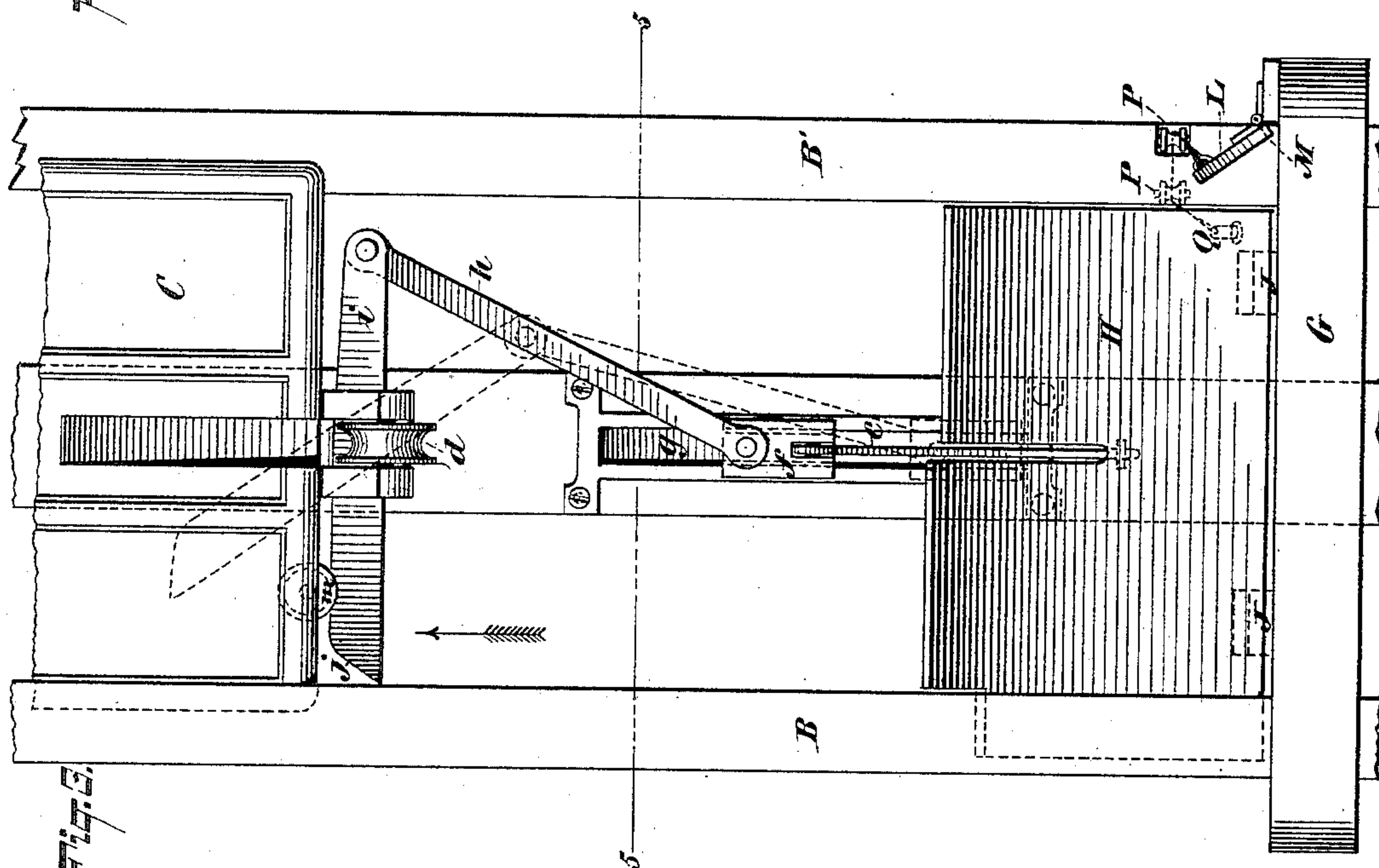
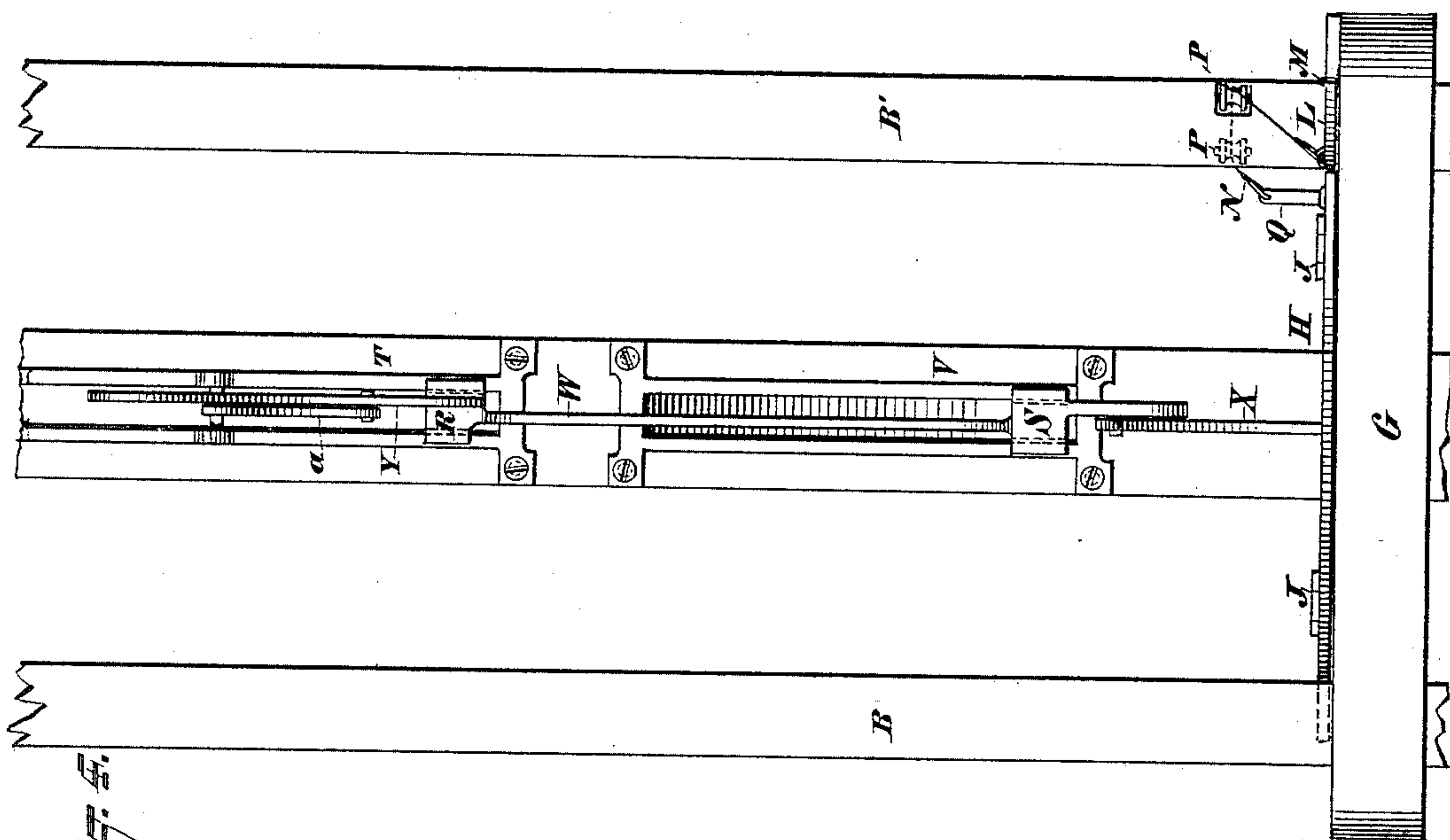
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Fig. 5.

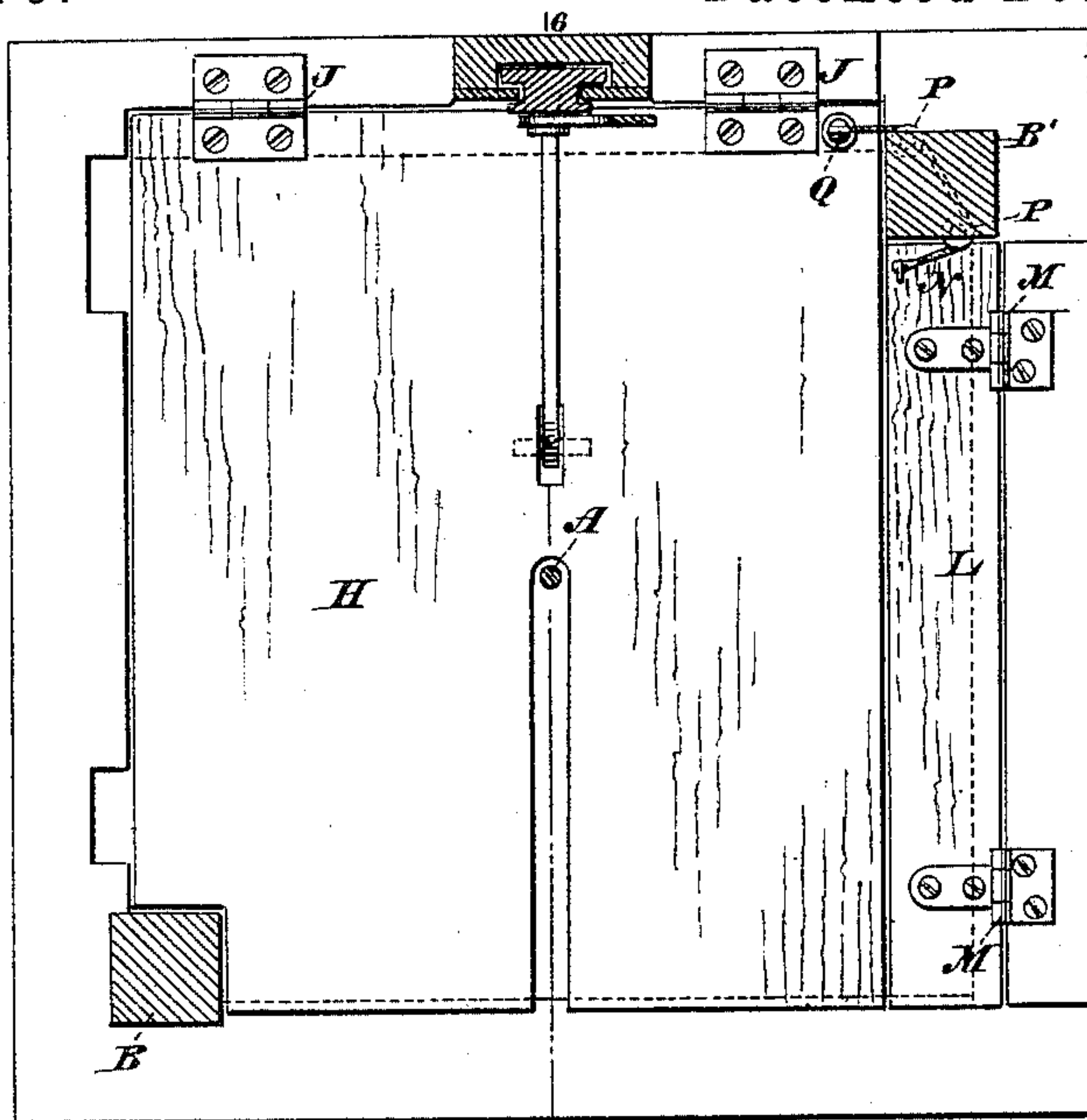


Fig. 7.

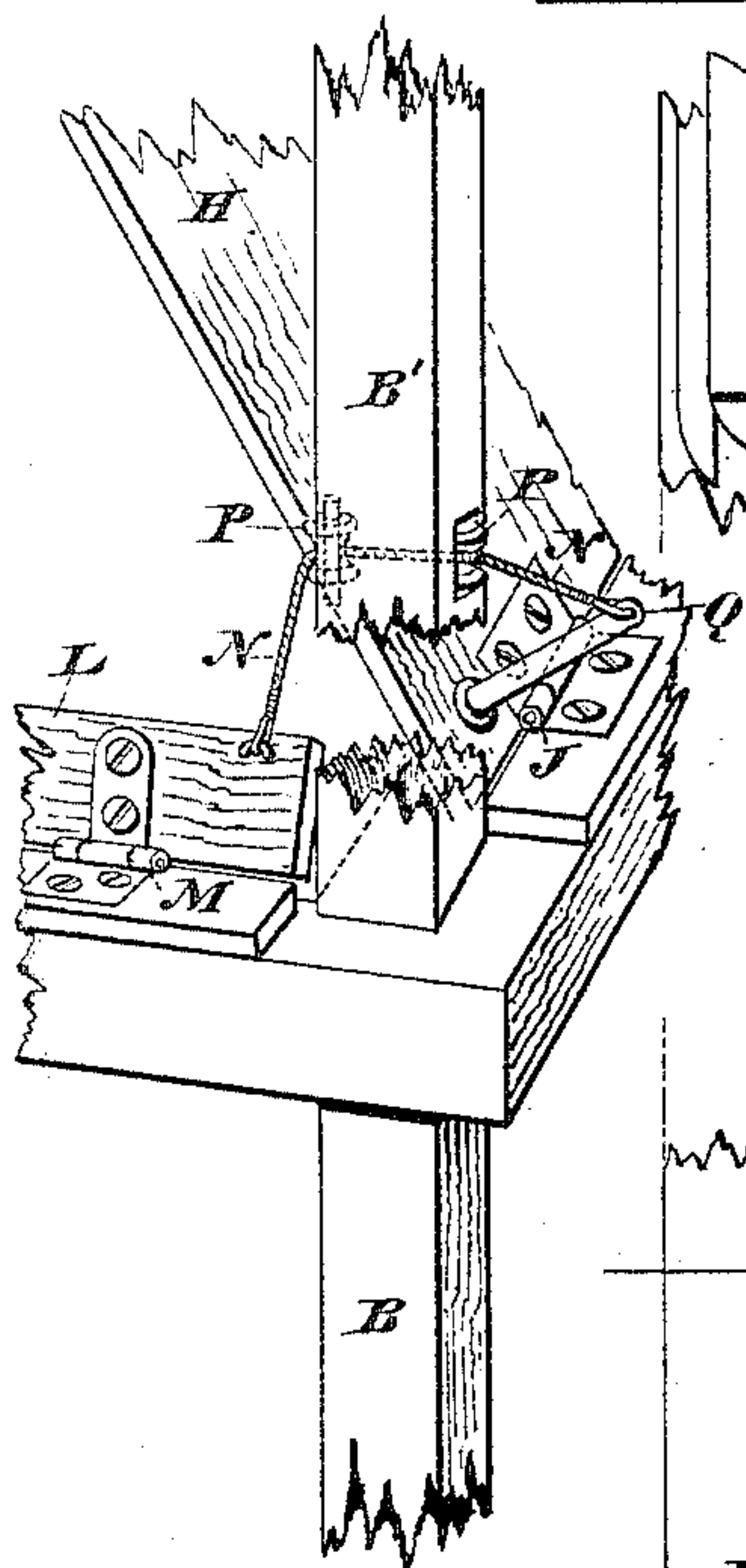
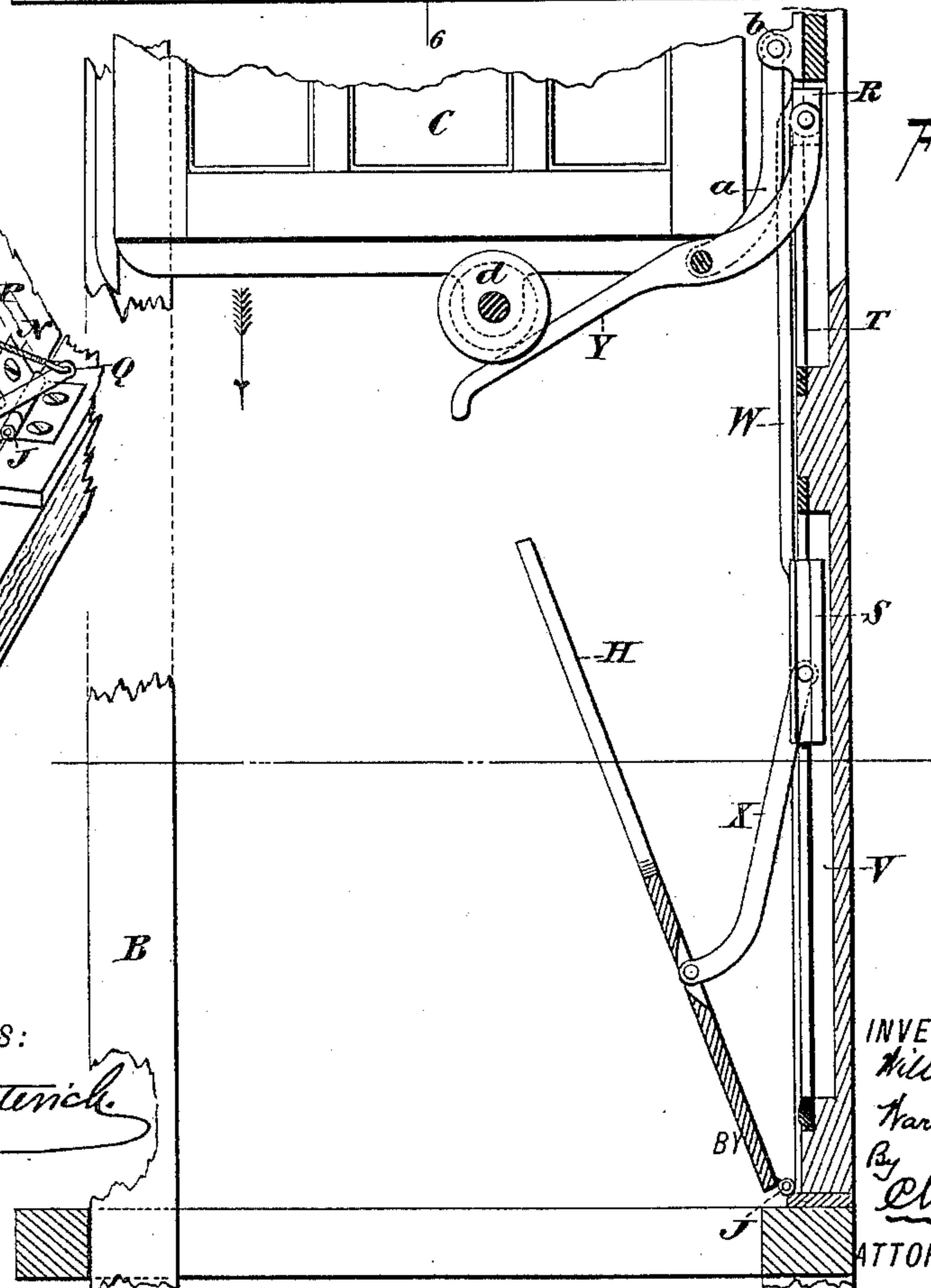


Fig. 8.



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UNITED STATES PATENT OFFICE.

WILLIAM BARDSLEY, OF KEARNEY, NEW JERSEY, AND WARREN K. CROFFORD, OF NEW YORK, N. Y.

HATCHWAY-DOOR MECHANISM.

SPECIFICATION forming part of Letters Patent No. 442,279, dated December 9, 1890.

Application filed January 30, 1890. Serial No. 338,649. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM BARDSLEY, a citizen of the United States, and a resident of Kearney township, New Jersey, and WARREN K. CROFFORD, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Hatchway-Door Mechanisms, of which the following is a specification.

The invention relates to improvements in hatchway-door mechanisms; and it consists in the elements hereinafter described and claimed, by which the doors at the various floors of the building may be automatically opened and closed during the ascent and descent of the elevator hoist or carriage, and when closed will effectually cover the space outlined by the hatchway-frames.

Referring to the accompanying drawings, forming a part of this specification, Figure 1 is a side view of an elevator-shaft, illustrating three floors of a building and the elevator hoist or carriage upon the ascent through the lower floor, the hatchway-door for the latter being illustrated in its open position; Fig. 2, a like view of same, the elevator-carriage being illustrated in the act of passing through the second floor of the building and permitting the hatchway-door at the lower floor thereof to close; Fig. 3, an enlarged face view of the mechanism for controlling the movement of the lower-hatchway door illustrated in Figs. 1 and 2; Fig. 4, a like view of the mechanism illustrated in Figs. 1 and 2 for controlling the movement of the upper-hatchway door, the door being shown in its closed position in Fig. 4 and partly open in Fig. 3; Fig. 5, a horizontal section on the dotted line 5 5 of Fig. 3, looking downward upon the face of the lower-hatchway door; Fig. 6, a central vertical section on the dotted line 6 6 of Fig. 5 and illustrating particularly the mechanism for controlling the movement of the upper-hatchway door; and Fig. 7 is a detached perspective view of one corner of the elevator-shaft and hatchway-door and designed to illustrate the devices for operating the supplemental hinged door or wing adapted to close the space be-

tween the main door and the framing of the elevator-shaft.

In the drawings, A designates the elevator-shaft, and B B' the vertical guides for the same, and between which the carriage C travels.

At the different floors D E F is provided the hatchway-framing G, surrounding the elevator-shaft A and forming supports for the hatchway-doors H I, said doors being hinged to the framing, as indicated at J, and being of suitable size to cover the space outlined by said framing G, with the exception of the portion of said space in line with the guide B', which is adapted to be closed by the supplemental door or wing L, hinged to the side framing G, as indicated at M in Fig. 5.

The supplemental door or wing L is provided with the cable N, which passes over the pulleys P, secured to the guide B', and is connected with the upper end of the post Q, which is secured to the upper surface of the hatchway-door, as illustrated more fully in Figs. 5 and 7, in position when the hatchway-door is open to draw on the cable N and open the supplemental wing or door L. The hatchway-door and the supplemental wing or door L have a simultaneous movement, the hatchway-door, when opened through the medium of the post Q and cable N, opening the supplemental wing or door L, and when closed permitting said supplemental wing or door to close of its own weight. The purpose of the hatchway-door and supplemental wing or door L is to effectually close the entire space outlined by the framing G, in order that no undue draft may be permitted through the elevator-shaft. Each of the doors H I will be provided with the supplemental wing or door L. The doors H I upon the ascent and descent of the elevator-carriage C are automatically opened and closed by the action of the carriage, and in the accompanying drawings we have illustrated mechanisms which during the ascent and descent of the carriage are actuated to open and close the doors.

The main embodiment of the invention, so far as the elevator mechanism is concerned, is illustrated as applied to the door H, and consists of the slides R S, adapted to move in

the guides T V and connected by the rod W, the lower slide S being connected by the rod X with the door H, and the upper slide R being pivotally secured to one end of the cam-shaped lever Y, which has pivotally secured at about its center the lower end of the link *a*, the upper end of which is pivoted to the wall of the elevator-shaft, as indicated at *b*. During the ascent of the elevator-carriage C its upper end comes into contact with the lower side of the closed hatchway-door H and turns the same upward upon its hinges J, the movement of the door having the effect of moving the slides R S upward in the guides T V, the rod X serving as the medium between the door and the slides, by which the action of the former is imparted to the latter. During the upward movement of the slide R the inner end of the cam-lever Y is carried upward and the lower end moved downward to the position illustrated in Fig. 2, in which condition the said cam-lever, with its connections, will be beyond the path of the carriage C and not obstruct the latter. During the ascent of the elevator-carriage C, and as soon as its lower end has passed the upper edge of the open door H the weight of the door will cause it to gradually close, and thereby effect a downward movement of the slides R S and an upward movement of the outer end of the cam-lever Y, the effect being that said outer end of the cam-lever Y will follow the lower surface of the elevator-carriage C and control the movement of the door H, the latter being prevented thereby from closing too rapidly and having its movement restrained and governed by the rapidity of the movement of the elevator-carriage. After the elevator-carriage C has passed upward through the third floor D of the building the outer end of the cam-lever Y will project outward into the elevator-shaft A in position to be brought into contact with the wheel or projection *d* on the lower end of the elevator-carriage upon the descent of the latter. During the downward movement of the elevator-carriage C the grooved wheel or projection *d* comes into contact with the outer end of the cam-lever Y and turns said lever downward on the pivot, securing it to the link *a*, as illustrated in Fig. 6, the effect being to move the inner end of said cam-lever Y, the slides R S, and arm X upward, thereby opening the door H and supplemental wing or door L and permitting the unobstructed descent of the elevator-carriage. As soon as the carriage has passed beyond the cam-lever Y the door H upon the continued descent of said carriage gradually closes upon it, and hence it will be observed that the door is opened by the elevator-carriage both on its ascent and descent, and is permitted to gradually close upon the elevator-carriage during the descent of the latter.

65 In the arrangement of the lever mechanism for the opening and closing of the door H it is important to note that said mechanism oc-

cupies the minimum amount of space and its employment does not require any enlargement of the elevator-shaft A, that when the hatchway-door H is opened said lever mechanism folds into a vertical line, as illustrated in Fig. 2, entirely clear of the path of the elevator-carriage, and that the door H is held open firmly and without danger of any loose movement in the same by the rigid connection of the upper end of the arm X with the slide S at a point adjacent to the upper end of said door, where the greatest strain is caused by the weight of the latter.

It is important in the construction of automatic mechanism for hatchway-doors that the upper end of the door when open shall be firmly held against the side wall of the elevator-shaft, in order that the carriage when descending may not strike the edge of said door, and this object we have successfully accomplished by means of the slide S and arm X with mechanism by which the slide may be elevated during the opening of the door to a point adjacent to that at which the upper edge of the door will stop when completely opened. We do not therefore limit the invention to the use of the special features of construction shown, since other forms of leverage may be employed for the purpose of effecting the movement of the slide S, and one such mechanism is illustrated in connection with the hatchway-door I and will presently be described. The cam-lever Y, with the upper slide R and connecting-rod W, we deem of great importance, however, in view of their efficacy when used in connection with the hatchway-door H, and do not wish to be understood as waiving whatever exclusive right we may have to them.

The door I is connected by the arm *e* with the slide *f*, which moves in the guides *g*, arranged against the wall of the elevator-shaft A, and said slide *f* is connected with the lower end of the rod *h*, whose upper end is pivotally secured to one end of the rocking lever *i*, the other end of said rocking lever being formed with the cam-edge *j*, which engages the grooved roller or projection *m*, secured to the lower end of the elevator-carriage C. The rod *e* and slide *f*, connected with the hatchway-door I, are the same in all essential respects as the rod X and slide S, connected with the hatchway-door H. Upon the ascent, the elevator-carriage will push the door I open in the manner above described with respect to the door H, the opening of the door I, through the rod *e*, moving the slide *f* and connecting-rod *h* upward and turning the rocking lever *i* upon the pivot, securing it in position. As soon as the lower end of the elevator-carriage has passed upward beyond the upper edge of the door I the grooved roller or projection *m* rides upon the cam-edge *j* of the rocking lever *i*, and operates during the ascent of the carriage to restrain and control the movement of said rocking lever, and through it and the rod *h* the clos-

ing of the door I. Upon the descent of the elevator-carriage the grooved roller or projection *m* comes into contact with the upper end of the rocking lever *i* and turns said end downward, as indicated by the two positions of the lever represented in Fig. 3, with the effect of drawing the rod *h*, slide *f*, and rod *e* upward and opening the door I. The lever *i*, being pivoted at about its center, turns freely under the action of the grooved roller *m*, and thereby controls the opening and closing of the door I. When the door I is open, its upper edge will be about on a line with the slide *f*, and will be firmly held, as in the case of the slide *S* and door H, illustrated in Fig. 6. We thus show two features of lever mechanism for operating the slide *f* and rod *e*, and hence the operation is not limited so far as the slide *f* and rod *e* are concerned to any special form of mechanism for effecting the opening and closing of the hatchway-door.

The door I is provided with the spring *w*, (shown in Figs. 1 and 2,) said spring being secured at its lower end to the upper surface of the door and at its upper end to the wall of the elevator-shaft, and being of such length that it will be extended when the door is closed and contracted when the door is open. The purpose of the spring *w* is to impart an upward tension to the hatchway-door, and in this manner to facilitate its being opened during the ascent of the elevator-carriage and to prevent its closing too suddenly after the carriage has passed upward beyond the door.

The application of the spring *w* to the doors facilitates their operation and permits the use of a durable substantial door without rendering the weight of the same objectionable, the said spring aiding in the opening of the

door and assuming part of the load during the closing of the door.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In hatchway-door mechanism, the cam-lever Y, pivotally secured at its lower end to the slide R, and having pivoted to it at about its center the lower end of the link *a*, combined with the rod W, slide S, and rod X, the latter connecting the hinged door with the slide S, and said slides being arranged in vertical guides, substantially as set forth.

2. In hatchway-door mechanism, the slide S, mounted in vertical guides, and the rod X, connecting said slide with the hinged door, combined with the rocking lever sustained on a pivot at about its center and connected at one end with said slide, while its opposite end constitutes a cam, substantially as and for the purposes set forth.

3. In hatchway-door mechanism, the cam-lever Y and the link *a*, secured on a fixed pivot at its upper end and at its lower end pivoted to about the center of said lever Y, in combination with the hatchway-door and mechanism, substantially as described, connecting said door with the lower end of said lever Y, the upper end of said lever Y serving as a cam and the lever having a rocking movement on the lower end of said link, substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 25th day of January, A. D. 1890.

WILLIAM BARDSLEY.
WARREN K. CROFFORD.

Witnesses:

CHAS. C. GILL,
E. D. MILLER.