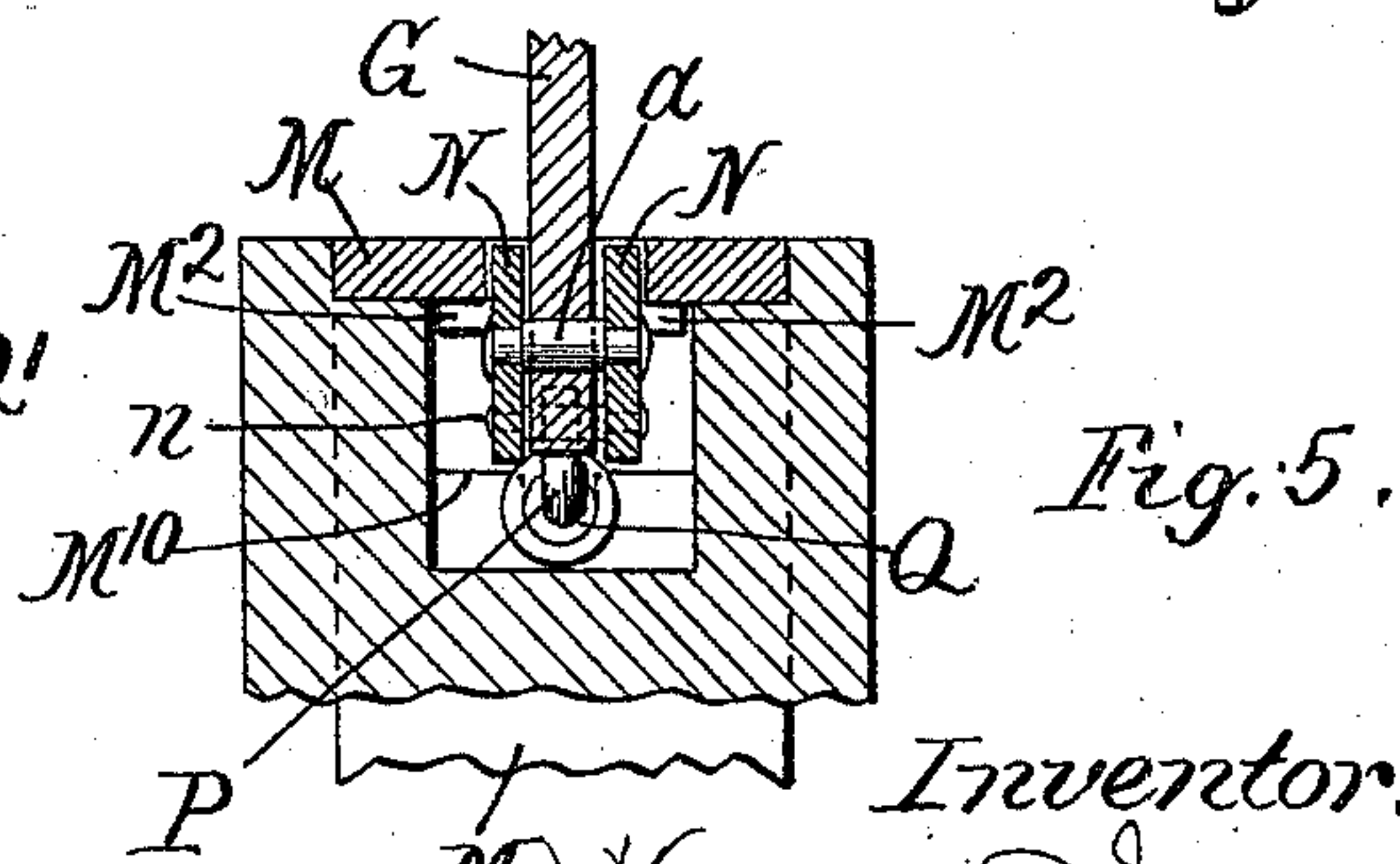
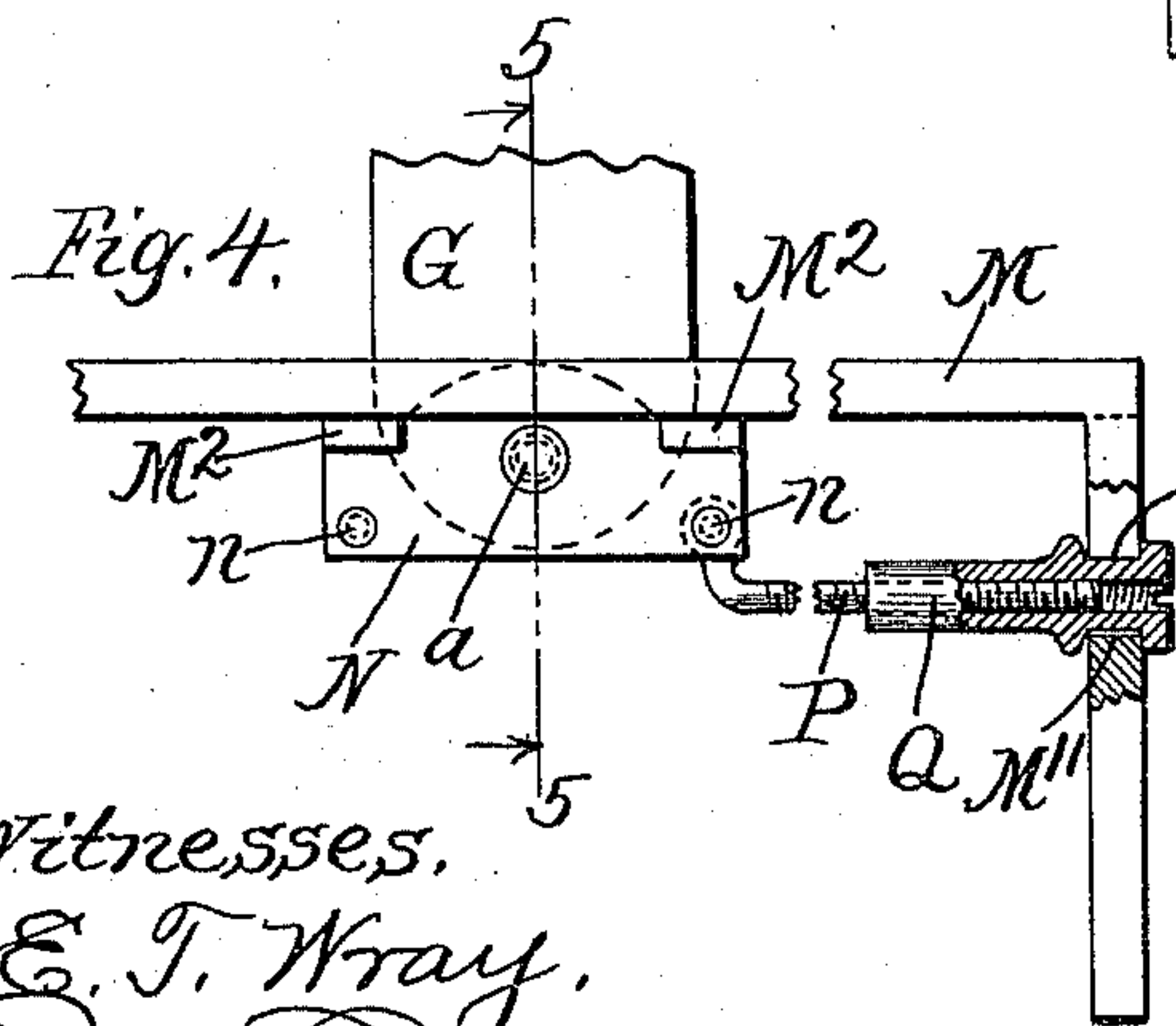
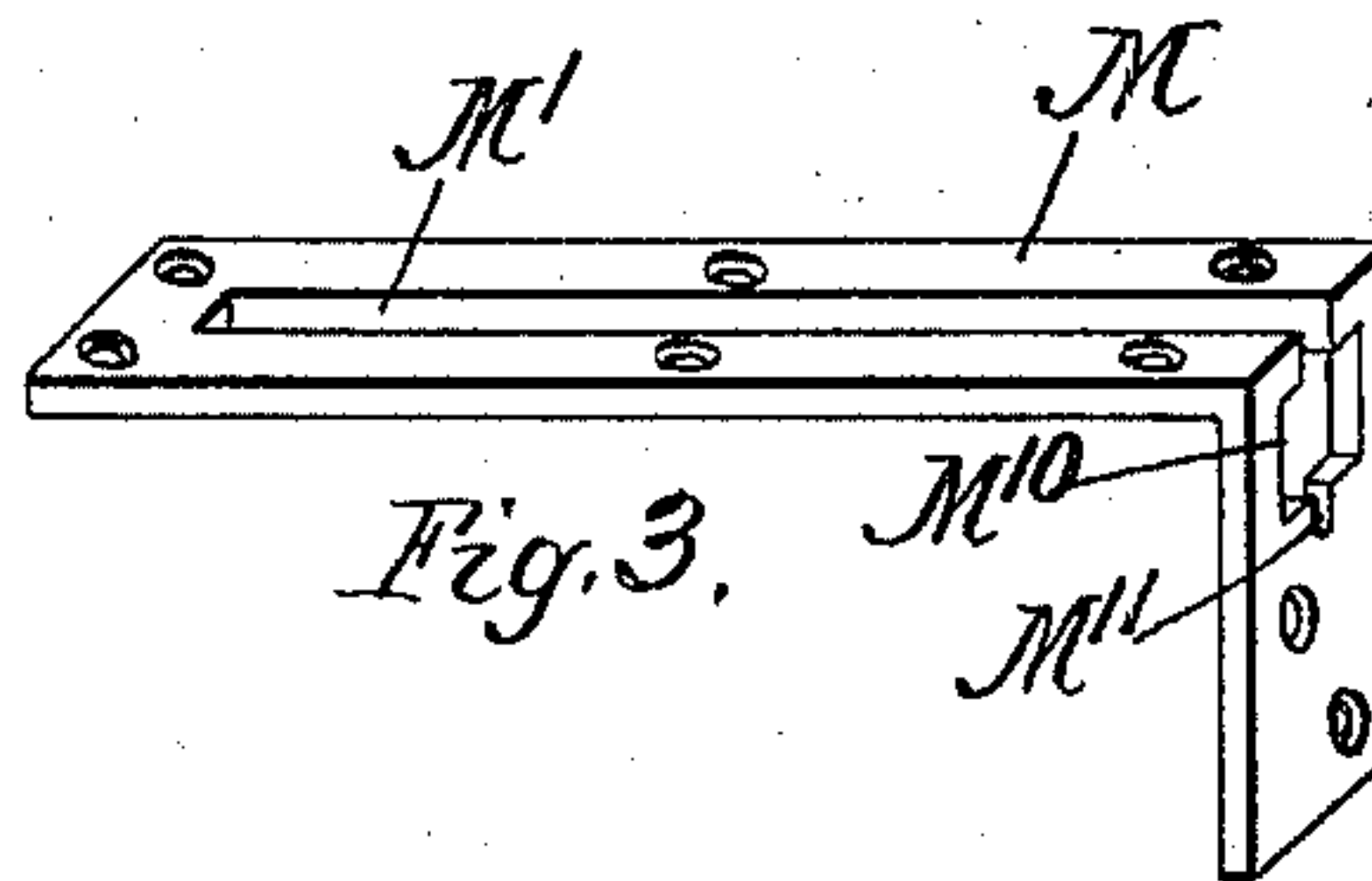
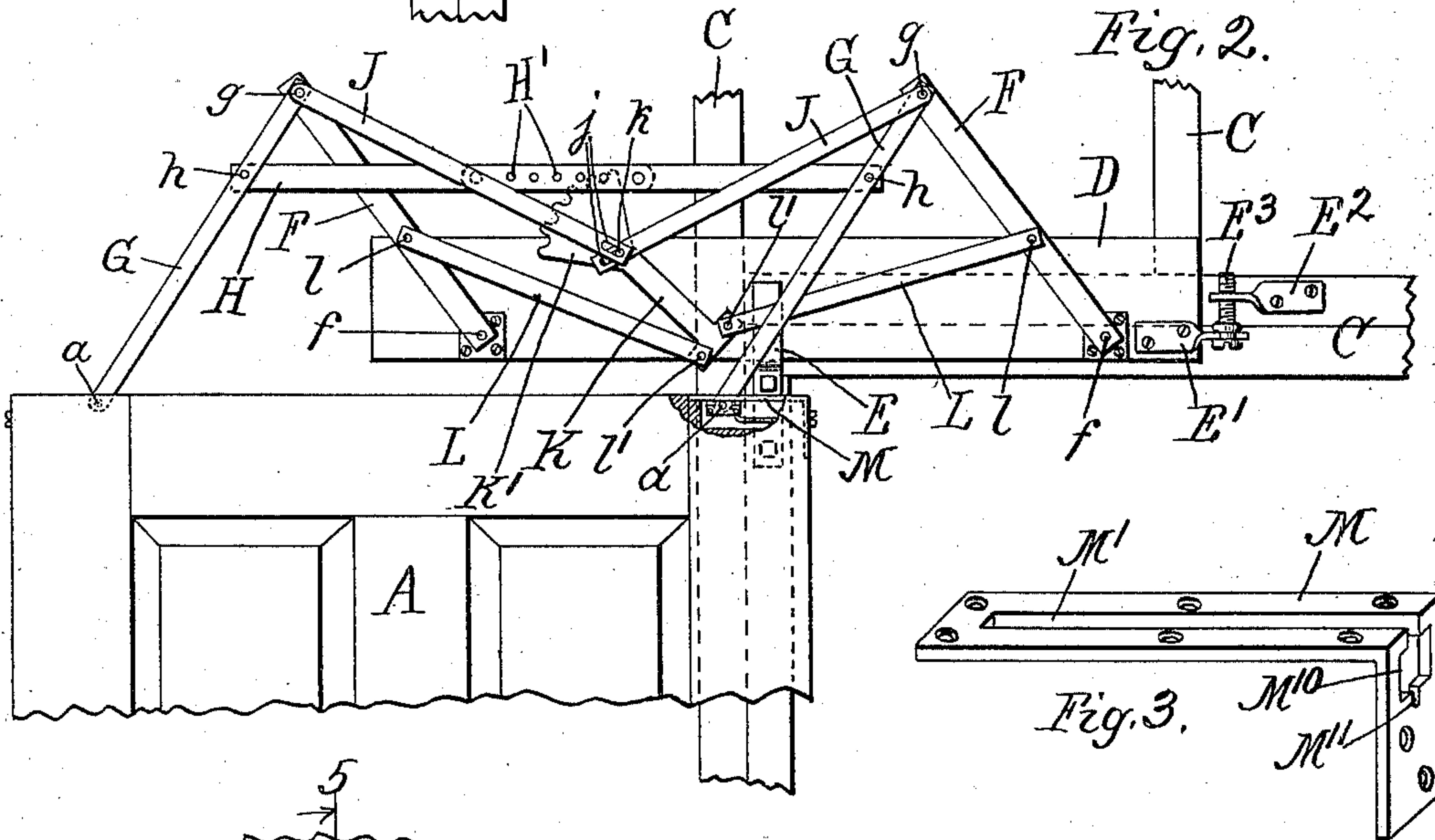
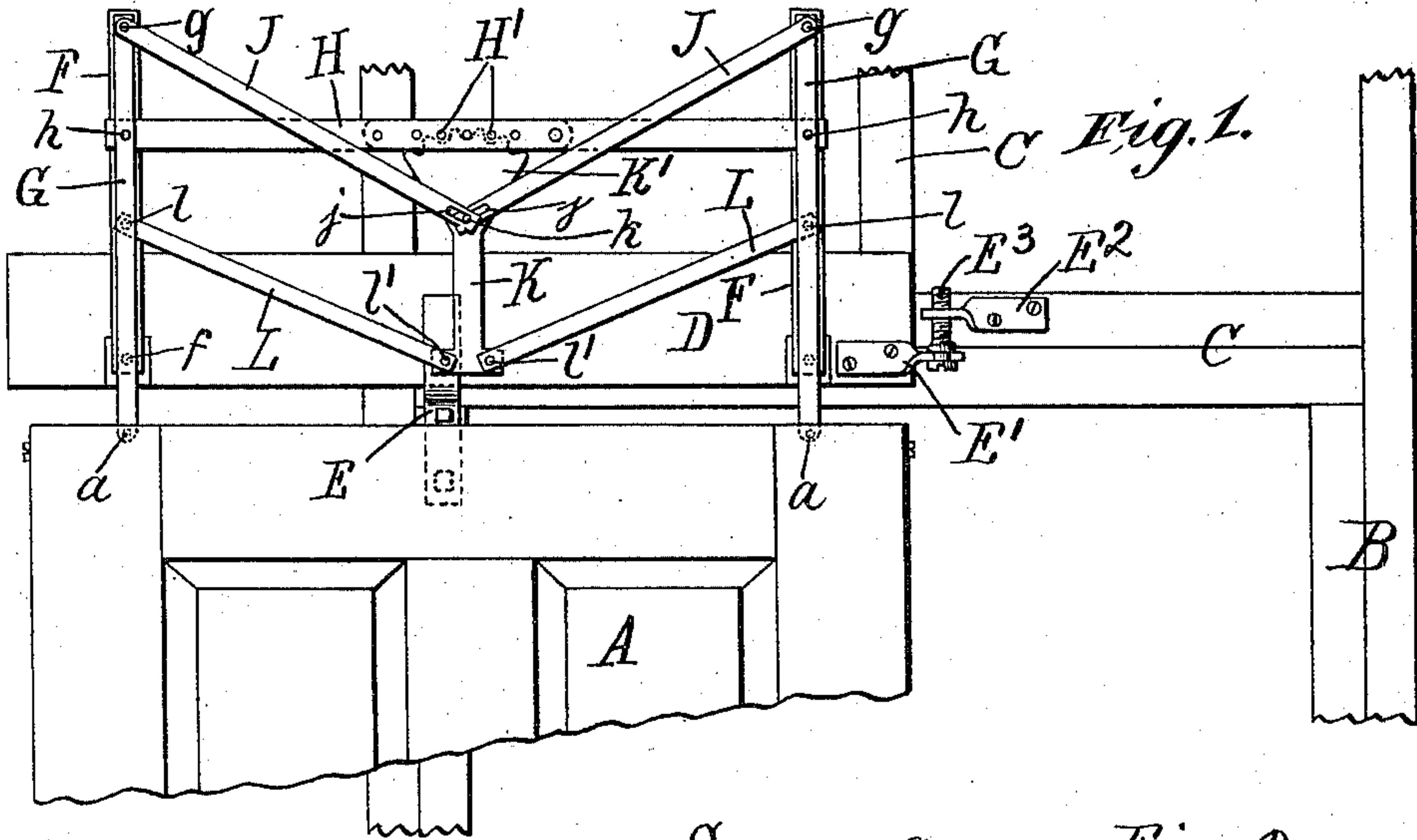


(No Model.)

W. R. STEUART.
DOOR HANGER.

No. 533,243.

Patented Jan. 29, 1895.



Witnesses,
E. T. Wray,
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UNITED STATES PATENT OFFICE.

WILLIAM R. STEUART, OF CHICAGO, ILLINOIS.

DOOR-HANGER.

SPECIFICATION forming part of Letters Patent No. 533,243, dated January 29, 1895.

Application filed April 2, 1894. Serial No. 506,047. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM R. STEUART, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Door-Hangers, which are fully set forth in the following specification, reference being had to the accompanying drawings, forming a part thereof.

The purpose of this invention is to provide a hanger for sliding doors, which will accomplish the usual purpose of such hangers in carrying the door truly,—that is, without raising or lowering or tilting it in its horizontal travel, and, at the same time, without the necessity for ways or tracks to guide its movement and without the use of rollers or shoes running on such tracks.

It consists in the construction and arrangement of levers and suspending links and bars and their connections as particularly set out in the claims.

In the drawings,—Figure 1 is an elevation of the door and the hanger which constitutes my invention, shown in connection with the frame-work of the casing of the doorway, the wall-covering being stripped off to disclose the mechanism which, in practice, is concealed within the wall above the doorway. In this figure, the position of the parts is that which corresponds to the half-open position of the door. Fig. 2 shows the same parts in the same manner, except that the door is at one limit of its travel. Fig. 3 is a perspective of a corner clip used on the door, and affording means for connecting the hangers thereto. Fig. 4 is a sectional detail of one corner of the door and the hanger connected thereto, the part shown in section by breaking away a portion being a nut or sleeve by which the hanger is adjusted on the door to bring the latter to exact position. Fig. 5 is a detail section at the line 5—5 on Fig. 4.

A is the door.

B represents the frame-work of the casing at one side of the doorway.

C C represent any convenient timbers in the wall to which the parts may be secured above the door.

D is a board or plate to which the mechanism is attached, in order that it may be bodily put into place in the wall and secured to any

timbers, as C C, therein. The board or plate D is secured in position by a bar or strap E secured to the frame-work of the doorway at the side to which the door slides to open, said strap or bar extending up through the slot left in the casing above the doorway, and having the bar or plate D supported on it. Another support for the plate or board D is provided at the end which overhangs the doorway, where a lug or strap E' is bolted to it, and projects horizontally beyond the end, a similar lug or strap E² being bolted to a timber C, and a screw E³ having its head adapted to engage the protruding end of the strap E', and the threaded end screwed into the end of the strap E², which overhangs the end of the strap E'. The most convenient method of effecting the engagement described for the purpose of adapting the screw to raise and lower the end of the board or plate D to level the door is to provide the head of the screw with an annular groove and to fork the end of the strap E', so that it may enter and be engaged in the groove. By this means, the entire mechanism which is sustained on the plate D may be taken out readily by merely withdrawing the screw E³, and the bolts which secure the strap E to the upright framework timbers B.

I will now describe the operation of the hanging mechanism.

F F are standards which are pivoted at their ends at *f f* on the plate or board D, and are designed to rock through an angle of about ninety degrees (90°) from forty-five degrees (45°) inclination in one direction to forty-five degrees (45°) inclination in the opposite direction.

G G are links pivoted to the upper ends of the standards F F, respectively, and depending therefrom through the top of the door-casing, and affording means for attaching the door A, which is hung to the lower ends of these links at *a a*. It will be observed that without other mechanism these guards and links tend to hold the door properly in one position only,—viz: that shown in Fig. 1, wherein all the pivots, *a*, *f* and *g*, are in line vertically, and that in order to carry the door truly without raising, lowering or tilting it, as it is suspended thus from the standards F F, and by the links G G, provision must be made,

first, for causing the links $G\ G$ to swing away from vertical position as the standards $F\ F$ rock from vertical position, and to proportion the swinging of the links $G\ G$ to the rocking of the standards $F\ F$, so that the pivots $a\ a$ at the lower ends of the links shall be lifted by the swinging of the latter as much as they are lowered by the rocking of the standards $F\ F$; and secondly, to equalize the rocking of the standards F , and to equalize the swinging of the links G , so that both ends of the door will be carried alike. To accomplish these two purposes, the remaining mechanism is provided as follows:—A bar H is pivotally connected at its ends to the links $G\ G$, respectively, the connections $h\ h$ being equally distant from the pivots $g\ g$ respectively. From the pivots $g\ g$, the links $J\ J$ are extended to a pivot k , which is located on the part K , which I term an "evener." This evener is connected by links $L\ L$, pivoted at one end to it at points separated from each other, but equally distant from the pivot k , and at the other end to the standards $F\ F$, at points equally distant from the pivots $g\ g$ respectively. The pivotal connections of the links $J\ J$ to the evener at k are made by means of slots $j\ j$ in the links J , allowing a slight range of sliding movement, the necessity for which will hereinafter appear.

Disregarding for the present the links $G\ G$ and the bar H , it may be understood that any force tending to tilt both standards F away from the vertical position, as, for example, toward the position shown in Fig. 2, tending therefore to depress the points $g\ g$, increases the distance from the left-hand point g to the pivot l of the link L to the right-hand standard F . These two points g and l are connected by three pieces,—viz: the left-hand link J , the evener K , and the right-hand link L ,—said three pieces being successively pivoted together at k and l' . The lengthening of the distance, therefore, between the extremities holds the pivot k at the outer end of its slotted connection to the link J , and tends to bring all the pivots into line. The pivot k must therefore be depressed to the left and the pivot l raised. This tilts the evener over to the left; but the same movement has caused the right-hand pivot g to approach the left-hand pivot l , and these two pivots are also connected by three parts—viz: the right-hand link J , the evener k , and the right-hand link L —and the shortening of the distance between the extremes first pushes the link J on the pivot k until that pivot is on the inner end of the slot j , and then folds the evener over toward the link L to dispose of the superfluous length of the jointed connection made by these three pieces between the extreme pivots g and l . The tendency of this action to tilt the evener K , it will be understood, is precisely equivalent to the like tendency of the lengthening of the distance from right-hand l to left-hand g ; and thereby the evener K is definitely tilted and held in an inclined position deter-

mined absolutely by the amount of tilting of the standards $F\ F$. The force which will tend to tilt or rock the standards $F\ F$ from vertical position may be the weight of the door suspended from the point g . If now, the links $G\ G$ constituted the only connection of the door with the mechanism whose movements have been above analyzed, the door would descend as the links $F\ F$ tilted over to either side; but the evener K affords a means for swinging the links G from a position which they would otherwise assume,—depending vertically from the pivot g ,—sufficiently to compensate for the lowering of the pivots g . The bar which connects these two links $G\ G$ is provided with a rack H' , and the evener K is extended beyond the pivot k , and terminates in a segment gear adapted to engage the rack. As the evener, therefore, tilts, it carries the bar H farther than the pivot k moves, and the bar H thereby swings the links G away from vertical position in the same direction in which they are carried by the movement of the pivot g . By properly proportioning the distance from the pivot k to the pitch line of the segment to the other dimensions of the mechanism, the swinging movement thus communicated to the links G , tending to lift the pivot a , may be made to precisely compensate the lowering of the pivot g , due to the rocking or tilting of the standards F , so that the pivots a shall travel horizontally and the door be thereby carried as desired. Theoretically, there is one point at which the door does not make an absolutely horizontal movement, and that is at the instant that the standards F and links G separate from vertical position when one or the other of the links J moves at the pivot K , so that that pivot passes from one end to the other of the slot j , but this movement occurs while the point g is passing over the center f , so that the lowering of the door is not perceptible, though it is sufficient to shift the bearing of the pivot k from one end to the other of the slot. At all other positions, the bracing is positive. Thus, in the left-hand position shown in Fig. 2, the strains compel the pivot K to be at the inner end of one slot, and at the outer end of the other, in the links $J\ J$, respectively, and the same will be true at any position after the links depart to the left from the vertical position of Fig. 1; and likewise at all positions of the links to the right of the vertical, the strains will compel the pivot k to be at the opposite ends of the slots respectively. The proportionating of the distances of the several pivots and of the pivot k from the pitch line of the segment K' , will be determined by the mechanic, in view of the range of movement desired, the space above the door in which the mechanism may operate, or which may be limited by the length of the standard F , and the distance from the pivot f to the line of travel of the pivot a , which will be determined somewhat by the style of finish of the casing of the door and other details.

In order to level the door easily and connect and disconnect it readily, I provide, as a means of attaching the links G G, an angle-plate M, adapted to be secured to the corner of the door, having in its horizontal branch a slot M', which extends to the corner and merges in an enlargement M¹⁰ below the corner in the vertical branch, a notch M¹¹ being lodged in the lower end of this enlargement for a purpose hereinafter indicated. The two plates N N, secured together by shouldered rivets n, have the lower end of the link G pivoted between them, and are provided with lugs M² M², which project outwardly and bear under the horizontal branch of the angle-plate at both sides of the slot, and are adapted to pass in and out through the enlargement M¹⁰. A threaded stem P is attached to one of the rivets n, and an interiorly threaded sleeve or nut Q is provided, adapted to screw into the stem, having an annular groove Q', adapting it to be lodged in the notch M¹¹. The outer end of this sleeve or nut is slotted to adapt it to be rotated by a screw-driver, and by this means the plates N N may be caused to slide to any proper position and may be withdrawn entirely from the angle-plate, thereby detaching the door from the links G.

I claim—

1. In combination, the standards F F, pivoted at their lower ends; the links G G, suspended from the upper ends of the standards, and the door hung upon the lower ends of said links; the evener K, and connections by which its longitudinal movement swings the links G G; and two pairs of links which connect said evener to the standards respectively: substantially as set forth.

2. In combination, the standards F F pivoted at their lower ends; the links G G pivoted to the upper ends of the standards, and the door hung upon the lower ends of said links; the evener K and two pairs of links by which it is connected to the standards respectively; the bar H connected to both the links at points similarly situated with respect to the pivots of the links G to the standards, the evener K being engaged with the

bar: substantially as and for the purpose set forth.

3. In combination, the standards F F pivoted at their lower ends; the links G G pivoted to the upper ends of the standards, and the door hung upon the lower ends of said links; the evener K and two pairs of links by which it is connected to the standards respectively; the bar H connected to both the links G G, and provided with the rack H', the evener K having a gear segment adapted to engage the rack to move the bar longitudinally as the evener tilts: substantially as set forth.

4. In combination, substantially as set forth, the pivoted standards F F; the links G G pivoted to the upper end of the standards and having the door suspended from their lower ends; the bar H connecting said links; the evener K suspended between the standards by two pairs of links and having a gear segment to engage the bar; the upper pair of links having sliding pivotal connection with the evener, and the lower pair being connected to the evener at different points similarly situated with respect to the pivot of the upper links: substantially as set forth.

5. In combination with the door, the corner iron M, having its horizontal branch slotted; the plates, and having lugs, adapted to engage under the horizontal branch of the corner iron, and the threaded stem connected to said plates, and the sleeve, adapted to be screwed onto said threaded stem and journaled in the vertical branch of the corner iron, and provided with a head adapted to be operated by a tool outside the same to adjust the plates; and the links for supporting the door pivoted between the plates and extending out through the slot in the corner iron: substantially as set forth.

In testimony whereof I have hereunto set my hand, in the presence of two witnesses, at Chicago, Illinois, this 26th day of March, 1894.

WILLIAM R. STEUART.

Witnesses:

WALTER J. GUNTHERP,
JEAN ELLIOTT.