

No. 842,895.

PATENTED FEB. 5, 1907.

A. K. LOVELL.  
SHUTTER OPERATING DEVICE.

APPLICATION FILED AUG. 11, 1902.

2 SHEETS—SHEET 1.

Fig. 1.

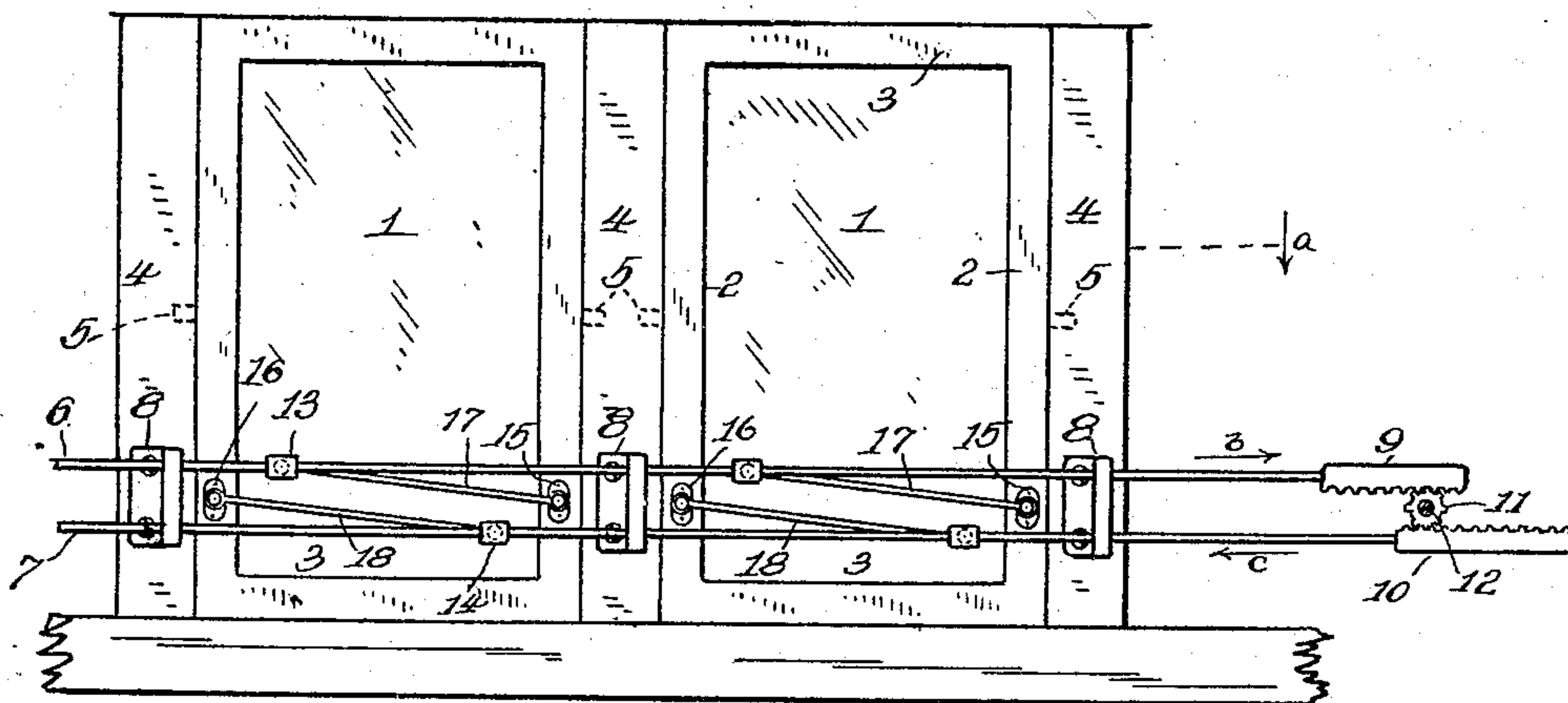
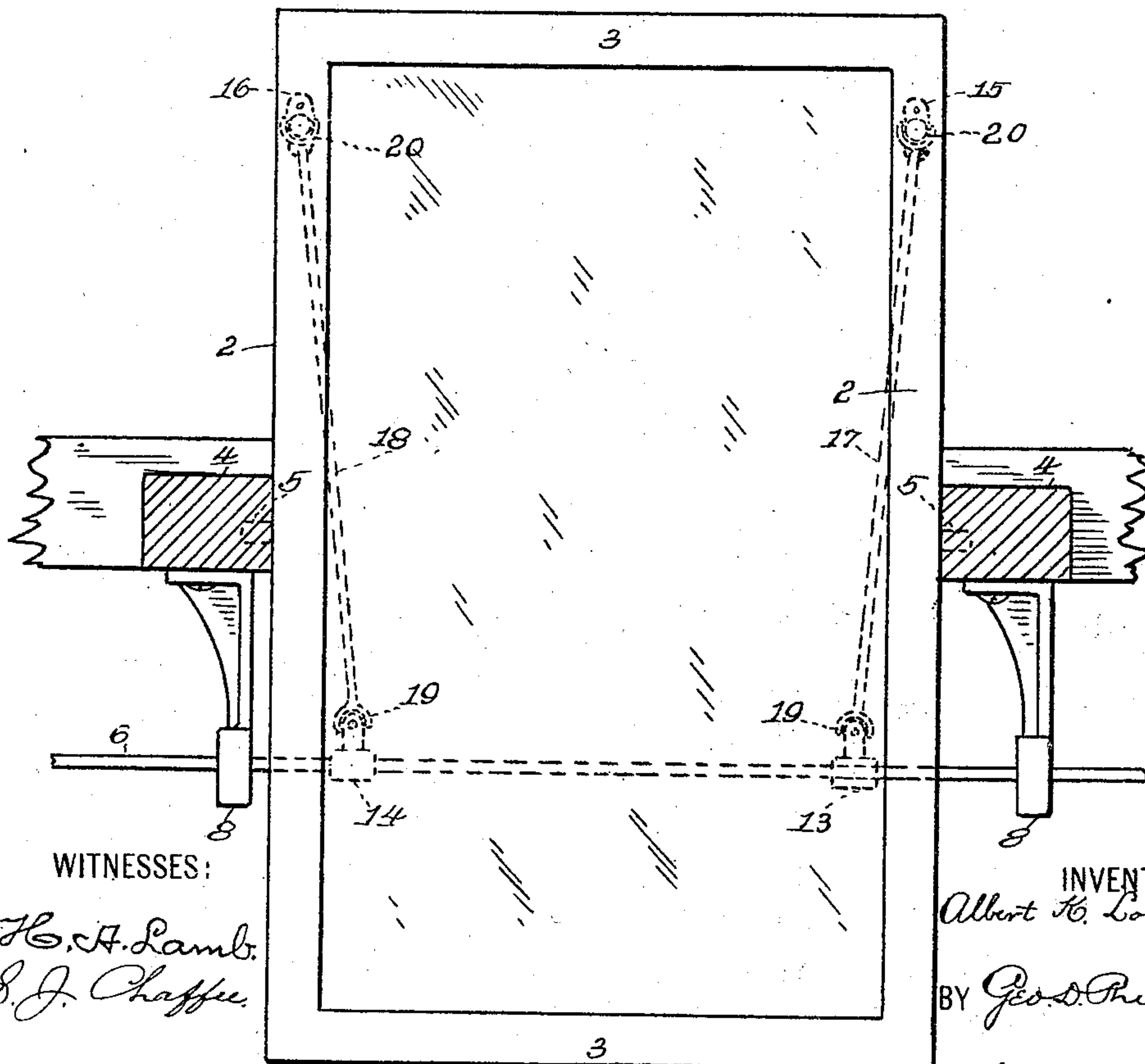


Fig. 2.



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his ATTORNEY

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2 SHEETS—SHEET 2.

Fig. 3.

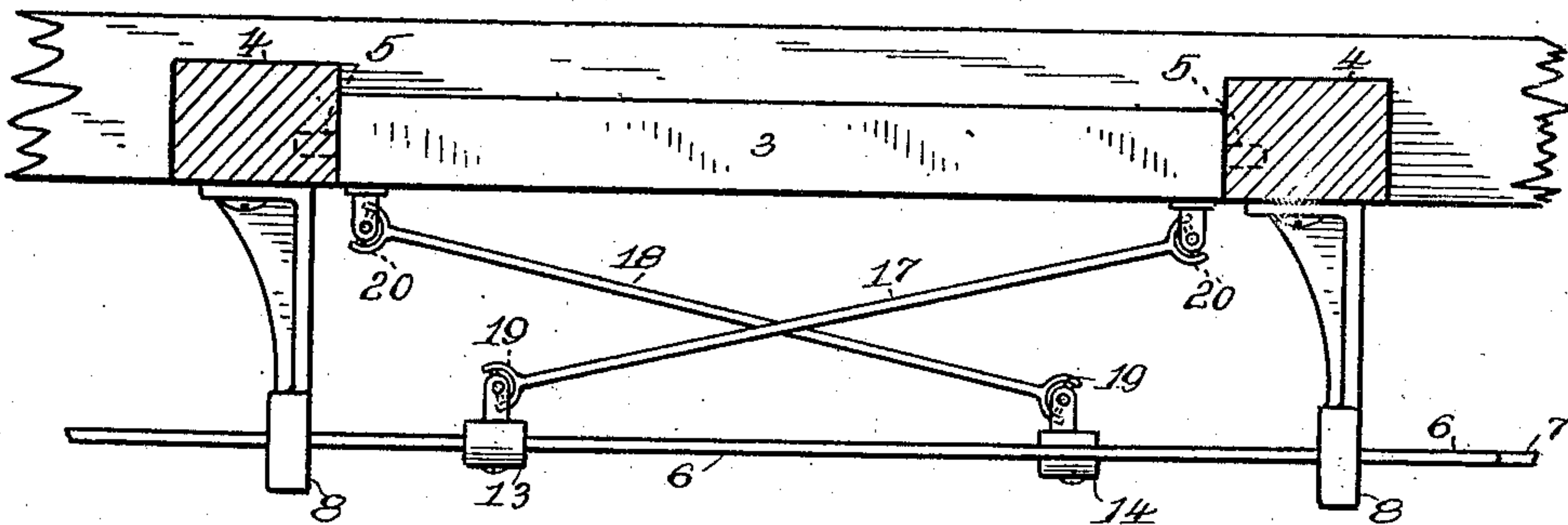


Fig. 4.

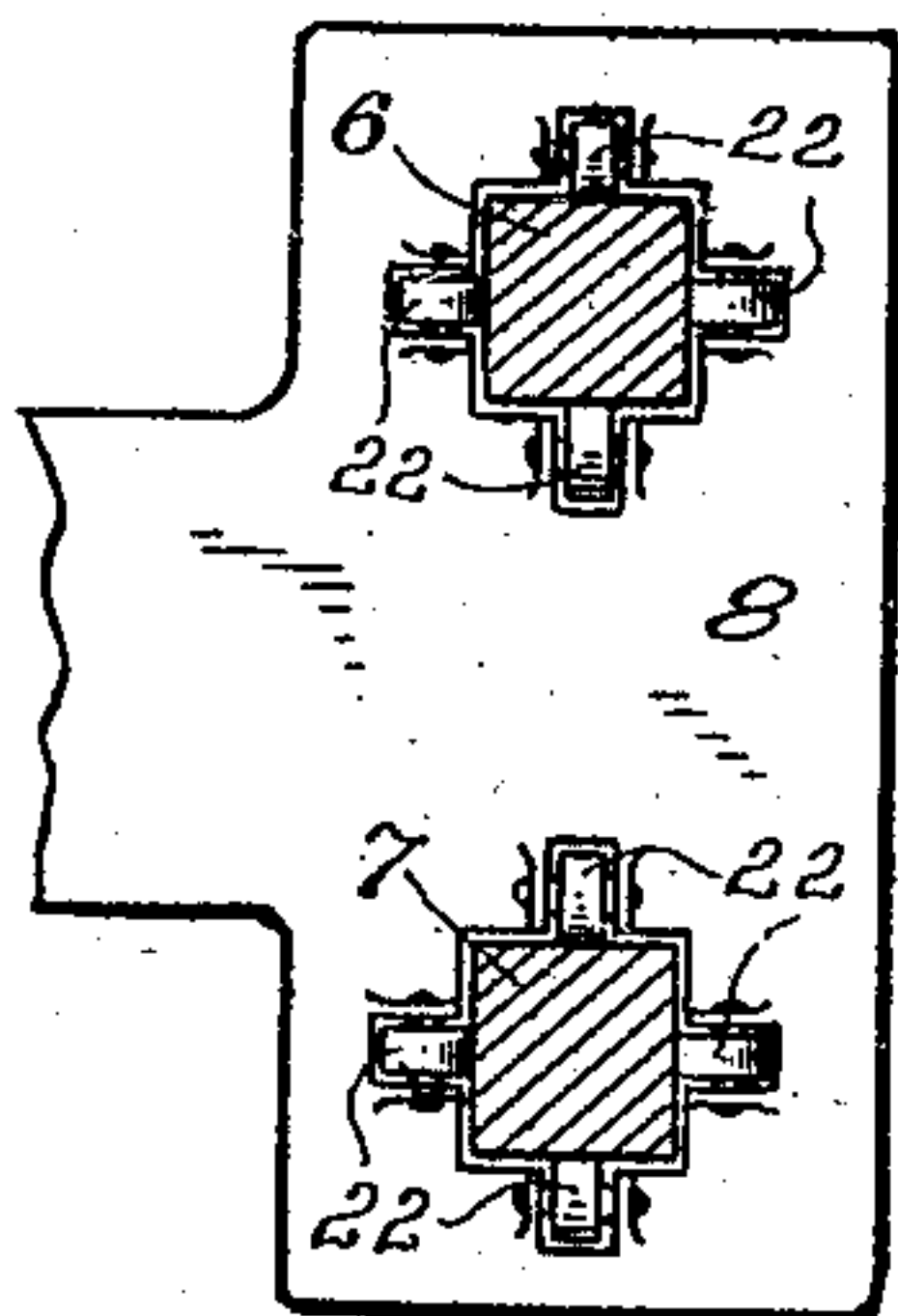


Fig. 5.

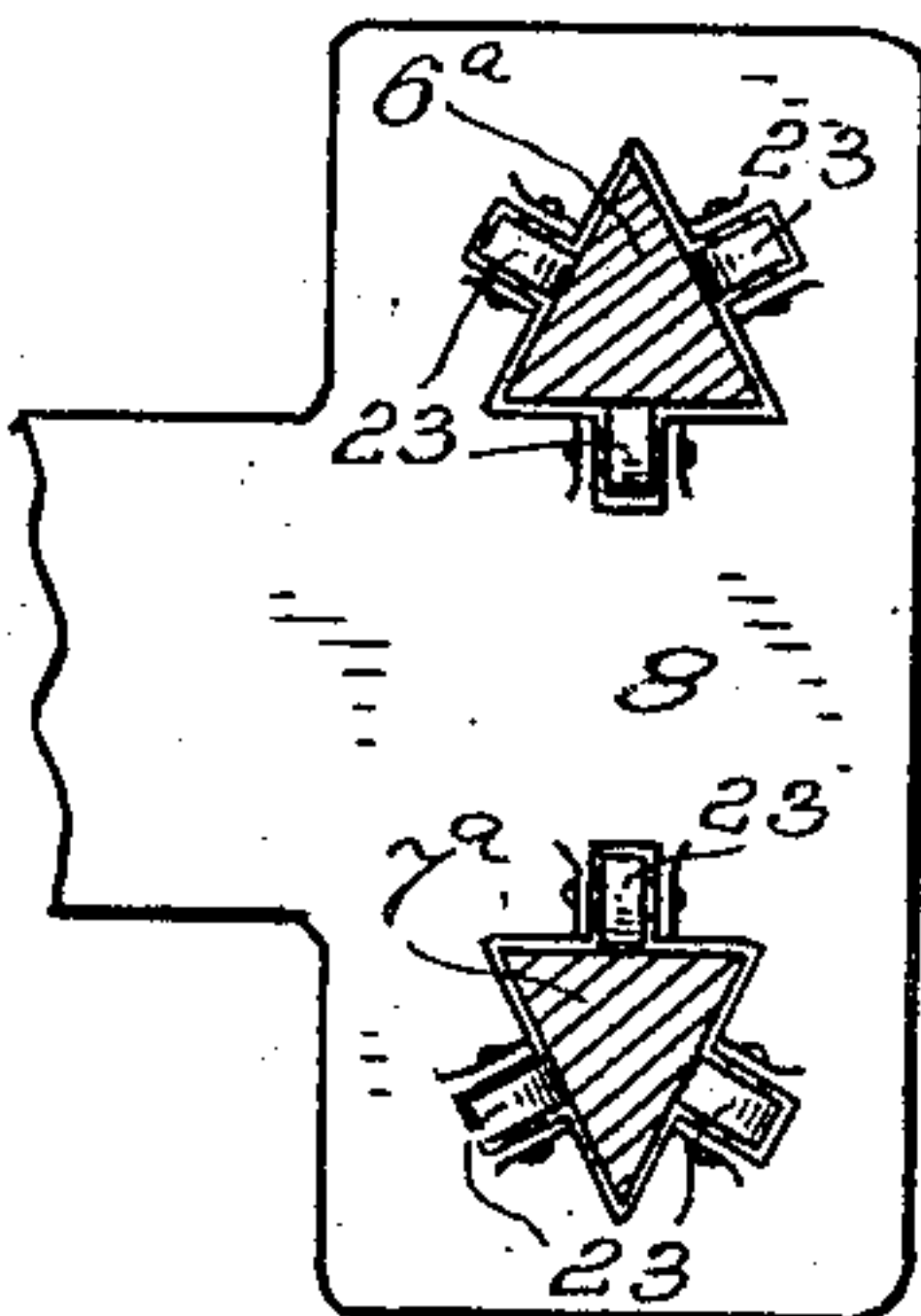


Fig. 6.

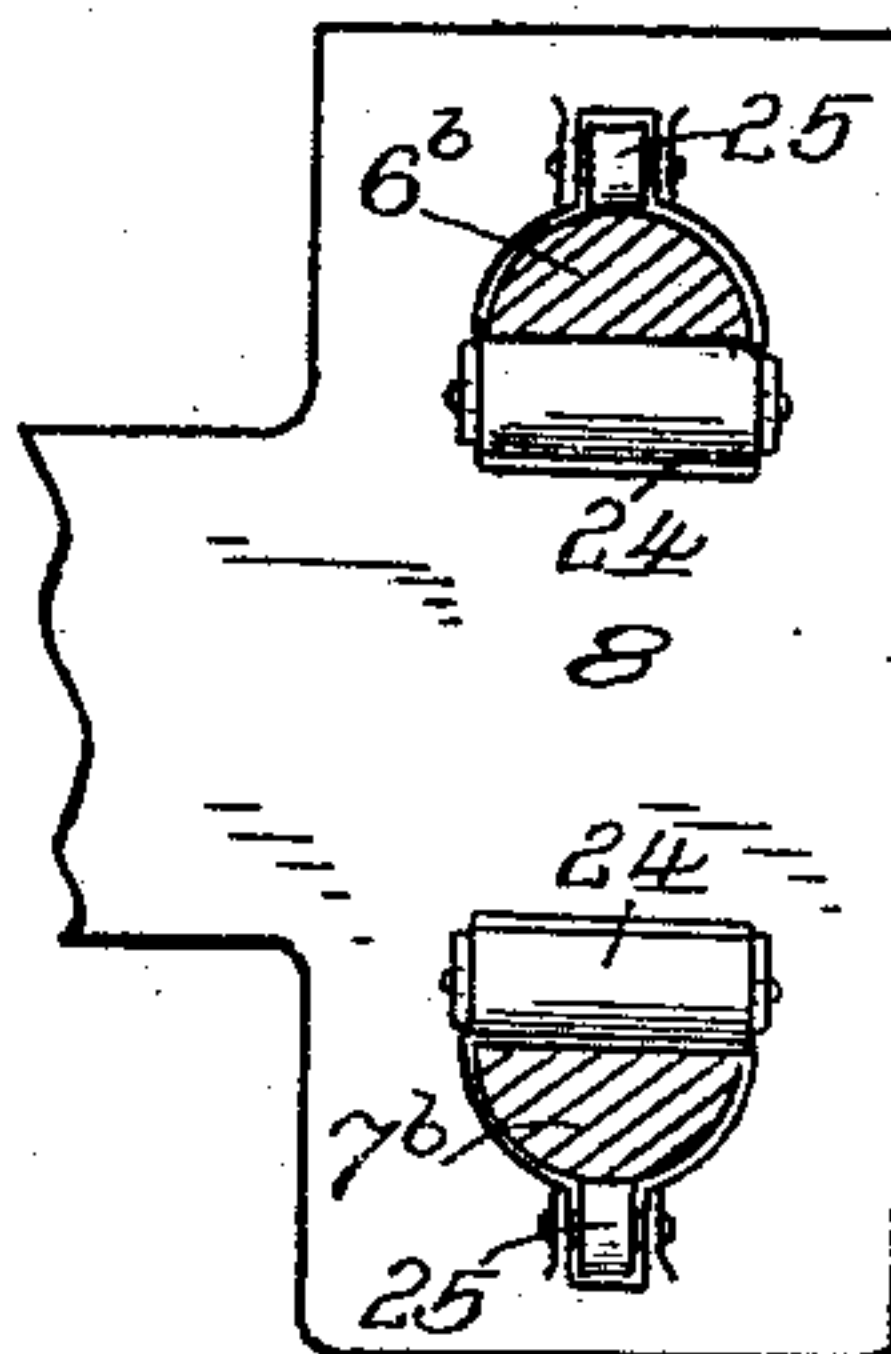


Fig. 7.

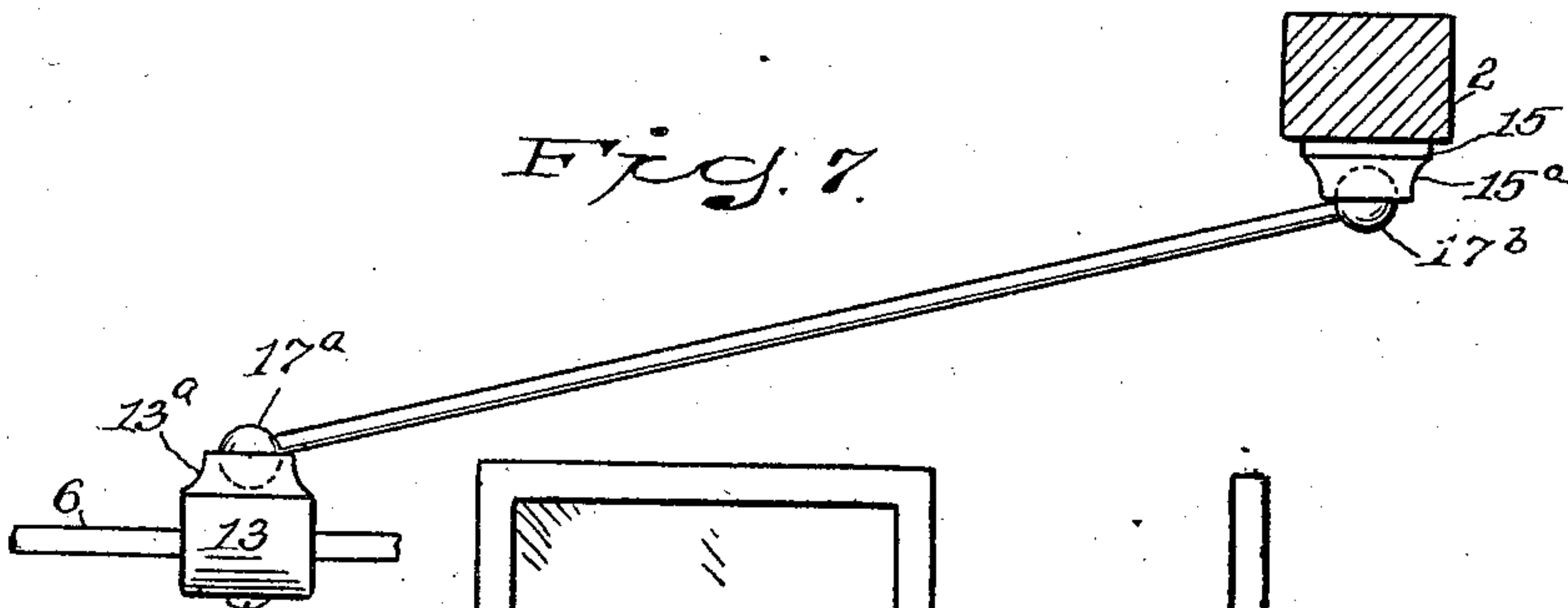
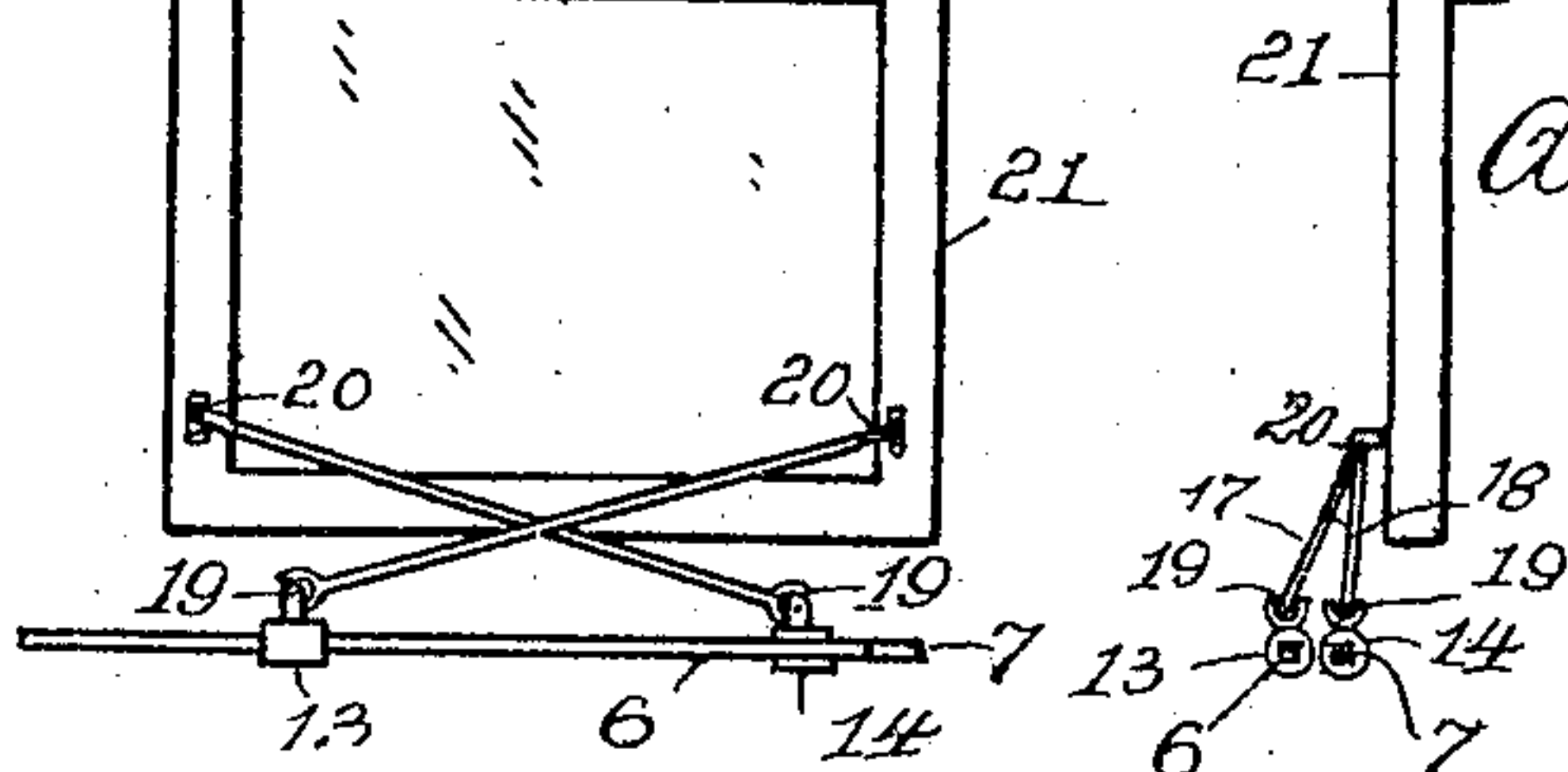


Fig. 8.

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Fig. 9.



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# UNITED STATES PATENT OFFICE.

ALBERT K. LOVELL, OF NEW YORK, N. Y., ASSIGNOR TO GERHARD F. DROUVÉ, OF BRIDGEPORT, CONNECTICUT.

## SHUTTER-OPERATING DEVICE.

No. 842,895.

Specification of Letters Patent.

Patented Feb. 5, 1907.

Application filed August 11, 1902. Serial No. 119,304.

*To all whom it may concern:*

Be it known that I, ALBERT K. LOVELL, 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 a certain new and useful Improved Shutter-Operating Device, of which the following is a specification.

My invention relates to window-operating devices, whereby a long line of windows are automatically operated so as to open and close simultaneously.

The object of my invention is to control the movement of a long line of windows by mechanism of simple and cheap construction and requiring but a slight expenditure of power to operate it. Heretofore devices of this character have failed to give satisfaction for the reason that they were hard to operate and slow-moving and for the further reason that a long line of windows could not be operated from a single station located at the end of the line.

To enable others to understand my invention, reference is had to the accompanying drawings, in which—

Figure 1 represents the front elevation of two windows of a series closed, broken view of two parallel operating-rods, ball-and-socket-jointed links connecting said rods and the window-sashes. Fig. 2 is an upper plan view of one of the windows opened, sectional view of the uprights between the windows through line *a* of Fig. 1. Fig. 3 is a view similar to Fig. 2, showing the window closed. Fig. 4 is an enlarged broken side elevation of one of the operating-rod hangers, sectional view of the operating-rods and antifriction-rollers therefor. Fig. 5 is also an enlarged broken side elevation of one hanger, showing sectional view of three-sided rods with antifriction-rolls. Fig. 6 is another enlarged broken side elevation of the hanger, showing sectional view of half-round rods and antifriction-rolls. Fig. 7 is an enlarged detail view of one of the operating-links fitted at each end with a ball-and-socket joint, also section of one of the operating-rods, and section view of one sash of the window. Fig. 8 is a reduced front elevation of vertically-operating windows, broken view of the operating-rods arranged in the same relative position with respect to the movement of the windows as shown in the other views, show-

ing also the operating-links connecting the rods with the window-sash. Fig. 9 is a side elevation of the construction shown at Fig. 8.

Its construction and operation are as follows:

1 represents the window-pane, 2 the vertical sash-rails, and 3 the upper and lower horizontal sash-rails.

4 are the uprights or frames for the windows. 5 are short journals projecting from the vertical sash-rails and adapted to have a bearing in the said uprights.

6 and 7 are the operating-rods, adapted to extend throughout the entire series of windows to be operated. 8 are brackets or hangers for these rods, which hangers are secured to the uprights 4.

9 and 10 are racks on the outer ends of the operating-rods, the location of which racks represents the station from where all the windows are operated. 11 is a pinion mounted on the shaft 12, whereby said racks are operated to move the rods 6 and 7 simultaneously in opposite directions, as shown by arrows *b* and *c*. The wheel for operating the pinion 11 and which is supposed to be mounted on the shaft 12, together with the means for supporting the racks, is not shown.

In front of each window and on each rod is mounted the adjustable collars 13 and 14.

15 and 16 are brackets secured to the vertical sash-rails 2.

17 and 18 are the operating-links. In Fig. 1, as before mentioned, these links are connected between the rods and said sash-brackets by a ball-and-socket joint, an enlarged view of which is shown at Fig. 7, wherein the balls 17<sup>a</sup> and 17<sup>b</sup> in the end of link 17 are operatively fitted in the socket 13<sup>a</sup> of the collar 13 and in the socket 15<sup>a</sup> of the sash-bracket 15. At Figs. 2, 3, 7, and 8 the links are shown connected to the collars on the operating-rods and to the sash-brackets by the ordinary universal joints 19 and 20.

I am aware that operating-rods moving in opposite directions and running along a series of windows arranged in a line, with simple links pivoted to the rods and to shutters adapted to swing on a vertical axis—like, for instance, a door—have been used; but with windows hung as I show them or pivotally hung at the top this mode of linking could not possibly work, for the reason that, as the



windows move through the arc of a circle, while the operating-rods move at right angles to such arc, it is quite evident that these ordinary links, which in this case move in a horizontal plane, could not follow the circular movement of the windows. In order to transmit a circular movement from operating-rods moving at right angles to such circular movement, it is absolutely necessary that the connecting-links should move at a tangent to such circular movement in order that they may readily conform to the various positions that the windows are obliged to assume. To accomplish this, I have equipped the connecting-links with universal joints or ball-socket joints, or any suitable means of like character could be used that will enable the links to follow the window throughout all of its varying positions with respect to the movement of the operating-rods, and to do this without the slightest tendency to cramp or bind, for the slightest tendency of any one of the links to cramp or bind would check the movement of the whole line of windows. With this construction of link I am able to operate a long line of windows moving in any direction, whereby the links are capable of conforming to the changing positions of the windows. At Figs. 8 and 9 the links are connected to the vertical sash-rails of the vertically-operating window 21. Therefore, whatever direction that the windows move in I prefer that the connecting-rods maintain the same relative position with respect to the movement of the windows. Therefore in these vertically-operating windows the connecting-rods are arranged in a horizontal plane.

The torsional strain on the operating-rods is conveniently counteracted by making the rods angular in cross-section. At Fig. 4 the rods are shown square with the anti-friction-rolls 22 bearing against the four sides of the rods. At Fig. 5 the rods 6<sup>a</sup> and 7<sup>a</sup> are three-sided, with the rolls 23 bearing against the angular sides. At Fig. 6 the rods 6<sup>b</sup> and 7<sup>b</sup> are half-round, with the wide rolls 24 bearing against the flat face of the rods and the grooved rolls 25 bearing against the curved surface of the rods. In place of making the rods angular in cross-section throughout their entire length the rods may be made angular only where they engage with the hangers. Counteracting the torsional strain of the rods is very essential in operating a large number of windows. If not neutralized in some manner, the rods are liable to twist off.

The gist of my invention lies in so constructing the intermediate connecting-links between the windows and connecting-rods that they will readily conform to the varying

positions of the windows, and also with respect to the movement of the operating-rods, without lost motion or impeding the movements of either, and it is immaterial just how these links are swiveled. I have shown the well-known ball-and-socket joint and the well-known universal joint, either of which will operate to produce the desired result, as no other form of link, so far as known, will.

Two operating-rods and two links for each window are generally needed for heavy windows; but for light windows a single operating-rod and a single link pivotally supported to operate as described may be used.

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

1. The combination, in a device for operating a plurality of windows, comprising, operating-rods extending throughout the entire series of windows to be operated, and adapted to move in opposite directions, said rods positioned with respect to the movement of the windows, adjustable collars mounted on said rods, links connecting said collars with said windows, the pivotal connections of said links being such that each end of said links will readily conform to the varying operative positions of the windows and also with respect to the movement of said rods, for the purpose set forth.

2. The combination, in a device for operating a plurality of windows, comprising, operating-rods angular in cross-section combined with anti-friction-rolls to compensate for the torsional strain, said rods extending throughout the entire series of windows to be operated and adapted to move in opposite directions, said rods positioned with respect to the movements of the windows, adjustable collars mounted on said rods, links connecting said collars with said windows, the pivotal connections of said links being such that said links will readily conform to the varying operative positions of the windows and also with respect to the movement of the rods, for the purpose set forth.

3. The combination, in a device for operating a plurality of windows, of operating-rods, adjustable collars mounted on said rods; links interposed between said collars and windows and pivotally supported to each and adapted, when the windows are closed, to cross or overlap each other, for the purpose set forth.

Signed at Bridgeport, in the county of Fairfield and State of Connecticut, this 9th day of August, A. D. 1902.

ALBERT K. LOVELL.

Witnesses:

CLARENCE STERLING,  
 S. J. CHAFFEE.