

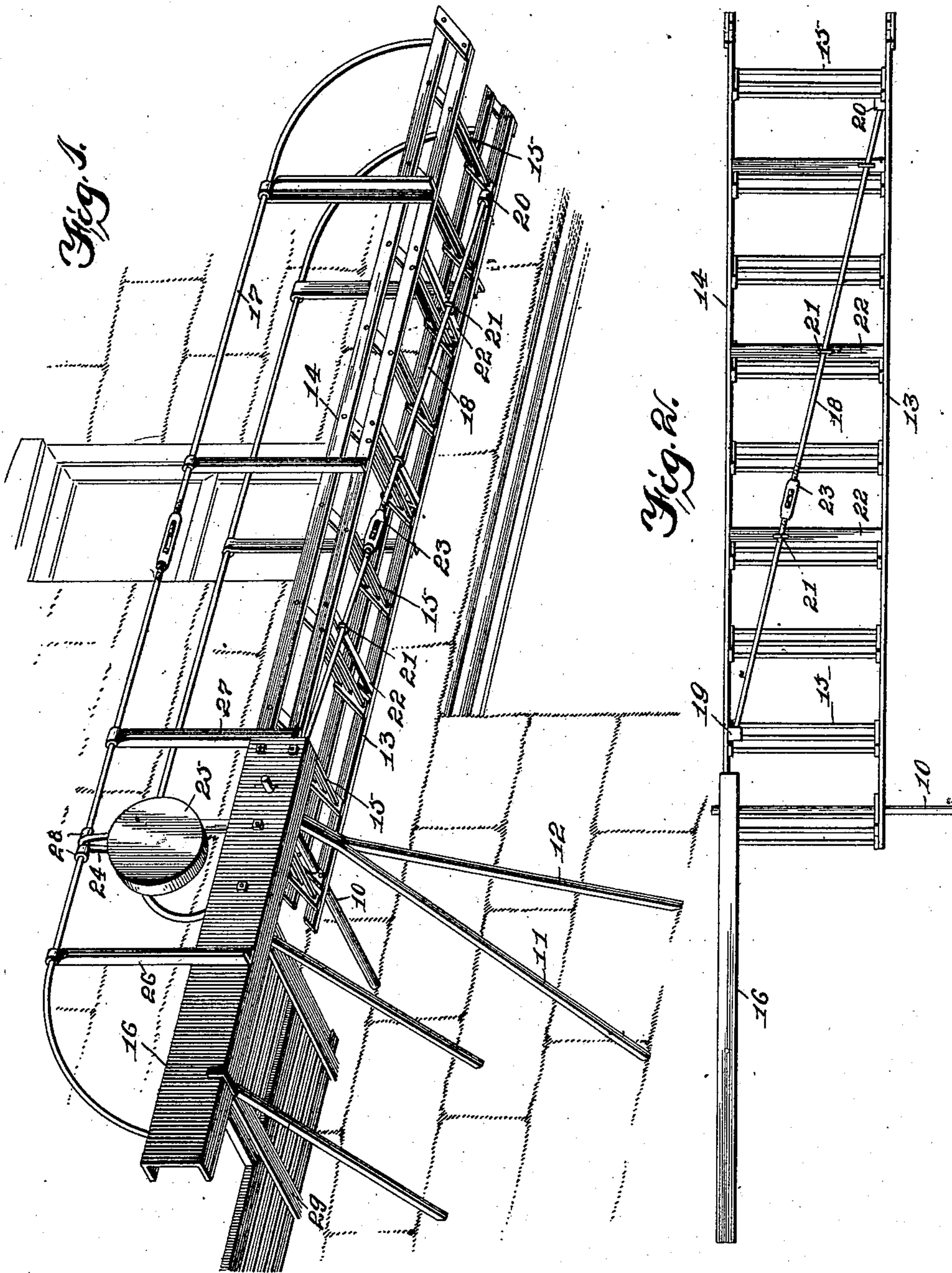
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P. L. LARSON.  
COUNTERBALANCING STAIR.

APPLICATION FILED DEC. 3, 1902.

NO MODEL.



Attest:  
J. S. Craig  
W. E. Allen

Inventor  
Peter L. Larson  
By J. S. Craig Atty



# UNITED STATES PATENT OFFICE.

PETER L. LARSON, OF DES MOINES, IOWA.

## COUNTERBALANCING STAIR.

SPECIFICATION forming part of Letters Patent No. 722,859, dated March 17, 1903.

Application filed December 3, 1902. Serial No. 133,723. (No model.)

*To all whom it may concern:*

Be it known that I, PETER L. LARSON, a citizen of the United States of America, and a resident of Des Moines, Polk county, Iowa, have  
5 invented a new and useful Counterbalancing Stair or Ladder for Fire-Escapes, of which the following is a specification.

The object of this invention is to provide improved means of construction for a counterbalanced stair or ladder for fire-escapes in  
10 which the inner or uncounterbalanced portion of the stair or ladder may be connected with and held up by the counterbalanced side thereof.

15 My invention consists in the construction, arrangement, and combination of elements hereinafter set forth, pointed out in my claims, and illustrated by the accompanying drawings, in which—

20 Figure 1 is a perspective illustrating my improved device in position for practical use. Fig. 2 is a bottom plan of a portion of the device, illustrating the improved means of sustaining the uncounterbalanced side of the  
25 stair or ladder.

In the construction of the device as shown the numeral 10 designates a pivot-rod arranged for mounting with one end in the wall of a building and the opposite end braced by  
30 brackets 11 12 to said wall. A ladder or stair is provided and composed of side bars 13 14, connected by steps or rungs 15 in any ordinary and desirable manner. The side bars 13 14 of the stair or ladder are pivotally connected  
35 at one end to the pivot-rod 10, and an extension-arm 16 is fixed to the pivot end of the side bar 14 and extends therefrom in an opposite direction from the pivot-rod. The extension-arm 16 preferably is in longitudinal  
40 alinement with the side bar 14. The weight of the extension-arm 16 approximates closely to the weight of the ladder or stair, and a truss-rod 17 is fixed at its ends to the opposite ends, respectively, of the side bar 14 and  
45 the extension-arm. The application or connection of the extension-arm 16 to one only of the side bars of the ladder or stair has the effect of permitting a twist or wind of said stair in respect of a drooping of the free end  
50 of the side bar 13. To overcome such drooping of the free end of the side bar 13, I mount

a truss-rod 18 of two sections diagonally or obliquely across the stair or ladder and beneath the steps or rungs thereof. The extremities of the rod 18 are mounted in sockets  
55 19 20, fixed, respectively, to the inner end portion of the bar 14 and the outer end portion of the bar 13 of the stair or ladder. The rod 18 intermediate of its ends extends through  
60 U-bolts 21, mounted in and depending from cross-bars 22, fixed to the side bars 13 14 of the stair or ladder adjacent the steps or rungs thereof. The adjacent end portions of the sections of the rod 18 are oppositely screw-threaded, and a turnbuckle 23 is screwed  
65 thereon and arranged for revolution relative thereto. The normal length of the rod 18 is equal to the distance between the seats of the sockets 19 20, and through the rotation of the turnbuckle 23 in one direction said length of  
70 the rod may be increased by the separation of its sections to the end of applying an expanding strain between the sockets. Inasmuch as the socket 19 is located adjacent the pivot-rod 10 and has a relatively permanent  
75 location, and the socket 20 is carried by the free end of the unbalanced bar of the ladder, it follows that any expansion of the rod or expanding strain between the sockets will tend  
80 to elevate the said free end portion of the unbalanced bar. Flexure or buckling of the rod 18 or either section thereof is prevented by the limiting effect of the U-bolts 21 on the cross-bars 22. Thus in the rod 18, formed in sections  
85 connected by a turnbuckle arranged to expand the length of the rod by separation of the sections, provision is made to neutralize, overcome, and compensate for the normal tendency of the free end portion of the bar 13 of  
90 the ladder to droop and twist or form a wind in the ladder. A hanger 24 is mounted on and embraces the truss-rod 17, and a disk weight 25 is mounted on and supported by said hanger and depends between the truss-rod and the inner end portion of the extension-  
95 arm 16. The hanger 24 is adjustable longitudinally of the truss-rod 17 within the limits of the space between the struts 26 27, supporting said truss-rod, and said hanger may be locked in any position by means of keys  
100 28, wedges, or other desired fastenings, whereby it is connected to the truss-rod. When



the stair is in a horizontal position, as shown in Fig. 1, the hanger is attached to the truss-rod 17 at a point in the rear of and above the pivot-rod 10, and the weight of the disk 25 is such that it effectually holds the ladder or stair in a horizontal position. The length of the struts 26 27 is such that when the free end of the ladder or stair is drawn downward the weight-disk may swing forward across the axis of the pivot-rod 10 and overcome the equilibrium of the stair to the end of holding said stair in an inclined position. By reason of the change of positions of the weight-disk 25 said disk will hold the ladder or stair in either a horizontal or inclined position. Normally the ladder or stair would be horizontal at an altitude out of the reach of a person on the ground. A person could approach the upper end of the ladder or stair from a window or other opening in the wall of the building and tilt said ladder or stair by an application of manual force to the truss-rod 17, which also serves as a hand-rail, or the ladder may be tilted by a person stepping on the rungs or steps thereof. The ladder also may be tilted downward by a fireman applying a fireman's hook to the free end thereof. The weight-disk ordinarily is so adjusted relative to the pivot of the stair or ladder that a very slight force is required to initiate an upward movement of the stair from the inclined position toward the horizontal. Such arrangement is made in order that the counterbalancing-weight may neutralize the effect of accumulations of ice or snow which may adhere to the ladder or stair on one side of the pivot in excess of the amount adhering to the extension-arm and truss-rod on the opposite side of the pivot. A stop-rod 29 is mounted in and projects horizontally from the wall of the building and serves as a rest to limit the downward movement of the extension-arm 16 and maintain the horizontal positioning of the ladder or stair and extension-arm against the gravity of the disk 25 at the rear of the pivot-rod. The disk 25 and hanger 24 may be adjusted along the truss-rod 17 for the purpose of determining the amount of force necessary to oscillate the ladder or stair and to regulate the stability with which said weight will maintain either positioning of the stair or ladder at the extremities of its movement.

I claim as my invention—

1. A movable step or ladder having a pivotal support, means for holding up the free end of said movable step applied at one side thereof, and an expanding truss-rod mounted diagonally of the movable step for aiding in the support of the other side thereof, where-

by the inner free corner of the step or ladder is carried from the fixed outer corner thereof.

2. A movable step or ladder having a pivotal support, means, comprising an adjustable counterbalance, for holding up the free end of the movable ladder applied at one side only thereof, a supporting device for the other side thereof secured to said counterbalanced side and comprising an expanding truss-rod mounted diagonally of the lower portion of said step or ladder and seated at its ends in sockets and in its intermediate portions extending through loops depending from the step or ladder, whereby the side opposite the counterbalanced side may be brought up, when the ladder extends in a horizontal position, to the proper level.

3. A movable step or ladder carried by a pivotal support, a counterweight applied at one side only of said step, and means for supporting the other side thereof comprising an expanding truss-rod subject to longitudinal expansion and arranged to extend diagonally beneath the step or ladder.

4. The combination of a stair, the expanding truss-rod diagonally of and below said stair and fixed at its ends to the end portions of the side bars of the stair, the extension-arm on the stair, the truss-rod connecting the extremities of the stair and extension-arm, the pivot-rod on which the stair is pivotally mounted and the counterbalancing-weight suspended on said truss-rod and arranged to swing across the axis of the pivot-rod in an angular adjustment of said stair.

5. In a device of the class described, the combination of the pivot-rod, the stair or ladder pivoted near one end on said rod, the extension-arm mounted on and extending longitudinally from the outermost bar of said stair or ladder, the stop arranged for engagement of said extension-arm to limit the movement thereof in one direction, the cross-bars on the stair or ladder, the loops depending from said cross-bars, the socket on the inner end portion of the outermost bar of the ladder, the socket on the outer end portion of the innermost bar of the ladder, the truss-rod having its extremities seated in said sockets and extending diagonally across the lower face of the ladder through said loops, and the turnbuckle in said truss-rod whereby the rod may be expanded and exert a lifting strain on the free end of said innermost bar.

Signed by me at Des Moines, Iowa, this 20th day of November, 1902.

PETER L. LARSON.

Witnesses:

S. C. SWEET,  
E. E. SEWELL.