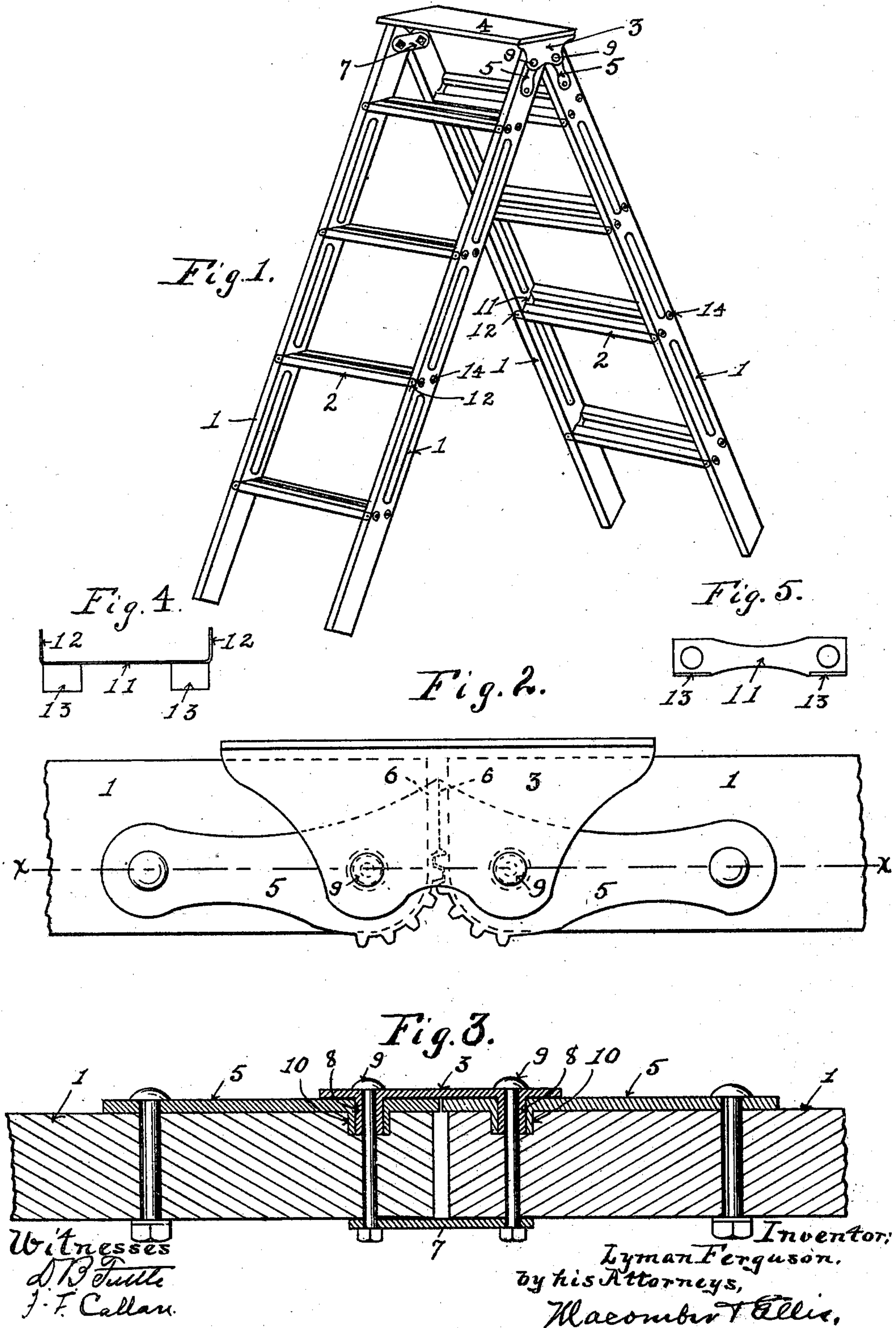


No. 719,450.

PATENTED FEB. 3, 1903.

L. FERGUSON.  
EXTENSION STEP LADDER.  
APPLICATION FILED MAY 8, 1902..

NO MODEL.





# UNITED STATES PATENT OFFICE.

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## EXTENSION STEP-LADDER.

SPECIFICATION forming part of Letters Patent No. 719,450, dated February 3, 1903.

Application filed May 8, 1902. Serial No. 106,378. (No model.)

*To all whom it may concern:*

Be it known that I, LYMAN FERGUSON, a citizen of the United States, residing at Ithaca, New York, have invented certain new and  
5 useful Improvements in Extension Step-Ladders, of which the following is a full, clear, and exact description.

My invention relates to improvements in extension step-ladders, and more particularly to improvements upon my former invention shown and described in my Letters Patent No. 579,263, dated March 23, 1897.

The object of my invention is to strengthen the parts of the ladder; and to that end it consists of, first, reinforcing the plates, having  
15 segmental gears to prevent them from shearing off the pivot-bolts, and, second, to reinforce the rungs and prevent them from turning and pulling from the side rails of the  
20 ladder.

Referring to the drawings herewith, Figure 1 is a perspective of a step-ladder provided with my improvements, which is in general construction the same as that shown  
25 in my said former patent. Fig. 2 is a segmental side elevation of the pivotal portions of the ladder. Fig. 3 is a section on the line *xx* of Fig. 2. Fig. 4 is an edge view of my plate for reinforcing the rungs and side pieces.  
30 Fig. 5 is a face view of the same.

The general construction will be understood from the following brief description.

The two sections of the ladder are made up of side pieces 1 and rungs 2. The rungs are  
35 in pairs, rectangular in form, and each pair constitutes a step. The ends of the rungs are round and fit into holes in the side pieces and have heretofore been secured against turning only by a screw or nail passing into the side  
40 piece and through the round part of the rung. The two sections are pivoted to brackets 3, which brackets are secured to the platform 4 and are retained in their proper relative positions by the plates 5, having seg-  
45 mental gears. These plates have stops 6, which limit the pivotal action to a parallel position, so that the ladder may be used as an ordinary straight ladder. Now the weight, strain, and wear are upon the pivots or bolts  
50 9, which pass through the brackets 3, the plates 5, the side pieces 1, and the straps 7,

and the tendency is for the plates 5 to shear off these bolts or pivots 9, and the first object of my invention is to overcome that defect, which I accomplish as follows: Referring  
55 especially to Fig. 3, I provide the brackets 3 with cylindrical studs 8, through which the bolts 9 pass, and I also provide the plates 5 with cylindrical extensions or sleeves 10, which take over the studs 8. By this construction I more than double the pivot bearing-surface and take the load entirely from the bolts 9 and put it upon the studs 8 on the plates 3, wholly removing all danger of shearing and reducing the wear. The bolts 9  
60 serve chiefly to hold the parts together. By this change I secure great strength without materially increasing the cost of casting, forging, or stamping the plates or brackets.

Referring to the second part of my improvement, in Fig. 4 and Fig. 5 I have shown my reinforcing-plate. This consists of a flat strip of metal 11, bored to receive the rungs, having ears 12 at right angles to the body of the  
75 plate and distant from each other the width of the side pieces 1. This reinforcing-plate also prevents the side rails from splitting when driving the rungs to place. This plate goes on over the round end of the rungs and extends transversely across the inside of the  
80 side pieces. The ears 12 engage over the edges of the side pieces and are secured thereto by means of screws or nails, as shown in my said former patent; but while this plate strengthens the side pieces it neither prevents  
85 the rung from turning nor reinforces it. To accomplish this, I provide the plates 11 with plates 13 at right angles to the body of the plate 11 and so positioned as to form rests for the under sides of the rungs 2.  
90

To prevent the ends of the rungs from drawing out from the side rails of the ladder, I cover them with metal caps or disks 14, secured by a screw or nail screwed or driven  
95 into the end of the rung. These disks so fixed also strengthen the ladder. The diameter of the disks should be in excess of the diameter of the end of the rung, or the disk may be attached to and made a part of the  
100 reinforcement-plate to extend around the edge of the side rail of the ladder to cover the end of the rung.



Having thus described my invention, what I claim is—

1. In combination with the side pieces and platform of an extension-ladder, brackets having cylindrical studs, and plates having cylindrical extensions taking over said studs, and means for securing the same together, substantially as and for the purposes set forth.
2. In combination with the side pieces and platform of an extension-ladder, brackets having two cylindrical studs, plates, having segmental gears, taking over said cylindrical studs, stops on said plates having segmental gears, and means for securing the same together, whereby the thrust of said plates when said stops are in contact is taken from the means for securing the plates and brackets

together and borne by said cylindrical studs, substantially as and for the purposes set forth.

3. In combination with the side pieces and platform of an extension step-ladder, brackets secured to said platform, plates secured to said side pieces, cylindrical studs on said brackets, and cylindrical extensions on said plates taking over said studs, whereby said plates are pivoted to said brackets, and means for holding the plates in place, substantially as and for the purposes set forth.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

LYMAN FERGUSON.

Witnesses:

J. A. BANKS,

E. E. HOLLENBECK.