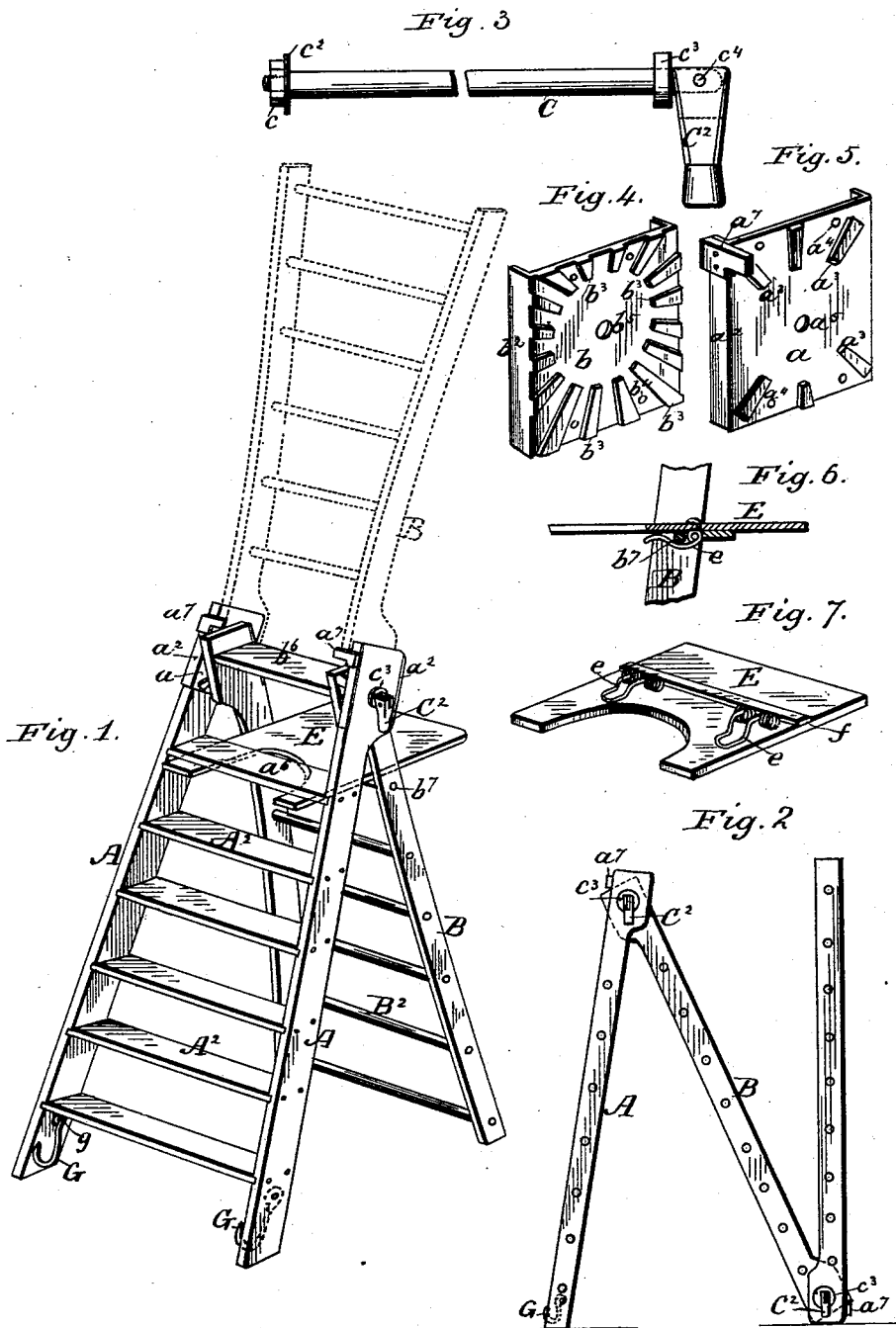


(No Model.)

W. B. CANTRELL.
STEP OR EXTENSION LADDER.

No. 570,661.

Patented Nov. 3, 1896.



WITNESSES

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STEP OR EXTENSION LADDER.

SPECIFICATION forming part of Letters Patent No. 570,661, dated November 3, 1896.

Application filed August 11, 1893. Serial No. 482,887. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM B. CANTRELL, a citizen of the United States, residing at Seattle, in the county of King, State of Washington, have invented certain new and useful Improvements in Step or Extension Ladders, of which the following is a specification, reference being had therein to the accompanying drawings.

The objects of this invention are to furnish an improved step-ladder which shall be so constructed that it may be readily arranged for use as a step-ladder, or as an ordinary ladder, or an extension-ladder, and may be folded together for storage and transportation, and when adjusted for either purpose the parts thereof will be held securely in place, and said ladder shall be simple in construction, convenient, strong, and reliable in use. I attain these objects by the construction illustrated in the accompanying drawings, in which—

Figure 1 is a perspective view of a step-ladder constructed in accordance with my invention, one member of said ladder being also shown in dotted lines in a turned-up position to constitute with the other member an ordinary ladder. Fig. 2 represents in side view an extension-ladder consisting of three members united together by hinge-bolts, eccentric-levers, and cogged plates constructed in accordance with my invention. Fig. 3 represents on a larger scale in side view the bolt used to unite the rear member to the front member of the step-ladder and the eccentrically-pivoted lever or handle on one end of said bolt. Fig. 4 is a perspective view of one of the cogged plates that are secured to the outer faces of the rear member of the ladder adjacent to its upper end. Fig. 5 is a perspective of one of the cogged plates that are secured to the inner faces of the front member of the ladder. Fig. 6 is a transverse vertical section through the removable shelf mounted upon one of the rounds of the rear member of the step-ladder. Fig. 7 is a perspective view of the under side of said removable shelf.

In said drawings, A represents the sides of the front member of the step-ladder, and A² the steps thereof. B represents the sides of the rear member of the ladder, and B² the

rounds thereof. Said members have their upper ends adjustably united together by means of a bolt C passing through them. To strengthen the upper portion of the sides A and B, and to permit the rear member of the ladder to be retained at any desired angle with the front member, there is secured to the inner face of each side A, adjacent to its upper end, a plate *a*, provided with flanges *a*², that embrace the edges of the sides A. Said plate has projecting from its face a series of long radial teeth *a*³, that have substantially rectangular edges and arranged to be received between inversely long flat teeth *b*³, projecting from the face of plates *b*, that are secured to the outer face of each side B of the rear member of the ladder adjacent to its upper end. Said plates *b* are also provided with flanges *b*² to embrace the edges of the sides B. The plates *a* and *b* have also eccentrically therein small perforations *a*⁴ *b*⁴ to receive small screws or nails, by which they are retained permanently to the sides A and B of the ladder, and with a larger perforation *a*⁵ and *b*⁵ nearly centrally therethrough for the passage of the bolt C. Said bolt is also made to pass through corresponding perforations in the sides A and B. The bolt C passes close against the under side of the top step *b*⁶ of the rear member of the ladder, and said step *b*⁶ prevents the sides B from being forced toward each other by the side pressure obtained by the cam-lever C², pivoted to one end of the bolt C. The top step *a*⁶ of the front member of the ladder is about eight or nine inches under the bolt C, and said length of the sides A can be sprung toward each other by the bolt C and its cam-lever C² sufficiently for the teeth *a*³ of the plates *a* to be strongly interlocked with the teeth *b*³ of the plates *b*.

To easily adjust the length of the bolt C and to permit its removal, for example, to facilitate the disconnection of the third ladder member, (shown in Fig. 2,) said bolt is screw-threaded at one end and carries a nut *c* and a washer *c*² to bear against one of the sides A, while a washer *c*³ rests against the other side A, said washer constituting a bearing-surface for the cam-lever C² to operate against. The distance between the pivot *c*⁴ of said lever and the upper end thereof is less than half the width of said lever at its upper

end. Consequently when its lower end or handle is at right angle to the axis of the bolt, as shown in Figs. 1, 2, and 3, it acts against the resilience of the sides A with greatest power; but when it is held in a horizontal position, or on the axis of the bolt C, the teeth of the plates *a* become disconnected from the teeth of the plates *b*, and the member B of the ladder can be rotated and secured at any angle with the member A by re-engagement of said teeth under the pressure of the bolt C and its cam-lever C², or even in line therewith, as shown by dotted lines in Fig. 1, although the ladder thus extended will bear the weight of one or more persons thereon without danger on account of the comparatively large length and width given to the plates *a* and *b* and the large number of radial teeth formed thereon. The plates *a* have secured to the upper portion of their flanges or made integral therewith rectangular lugs *a*⁷, that project toward each other and in the path of the flanges of the plates *b* of the second member of the ladder.

The step-ladder is provided near its top with a shelf E, for example, to support a bucket, if desired. Said shelf is resting upon and is pivoted to the upper round *b*⁷ of the rear member of the ladder, and its front portion abuts when in use against the under side of the step *a*⁶; but to have the ladder unencumbered with the shelf when its rear member is straightened out, as shown by dotted lines in Fig. 1, said shelf is easily removable from the round *b*⁷, the means to have it connected thereto consisting of two wire springs *e*. Each spring is made of a piece of spring-wire bent double in the middle of its length. Each half has a few coils formed thereon to add to its resilience, and its ends after being passed through small holes in the shelf are clenched thereto against its upper sides. The portion

of the wire in front of the coils is suitably bent or arched to firmly embrace the round *b*⁷. A cleat *f* is secured to the under side of the shelf E transversely thereof to strengthen the shelf and form an abutment for the coils of the spring-clamps *e*.

To permit the ladder to be easily secured to an elevated object, for example, to the ridge of the roof of a house, or to a window-sill after turning its lower end upward, the lower portion of the sides A of its front member are provided with hooks G, pivoted at *g* to the inner face of said sides A. The point of each hook is facing the front of the ladder, and being located under the lower step are out of the way of the operator when the device is used as a step-ladder.

Having now fully described my invention, I claim—

1. In a hinged extension or step ladder the combination of two members each provided with metal plates having flanges embracing the side and edges of each member and radial teeth on the face of each plate, with a bolt passing through the sides of the two members and through their toothed plates, and a cam-lever pivoted on one end of said bolt substantially as described.

2. The combination of the sides and rounds of a ladder with a shelf securely mounted upon said rounds and removable therefrom, the fastening for said shelf consisting of wire springs having their ends secured to said shelf, and coils of said wire adjacent to said shelf substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM B. CANTRELL.

Witnesses:

E. C. BAIRD,

R. J. CANTRELL.