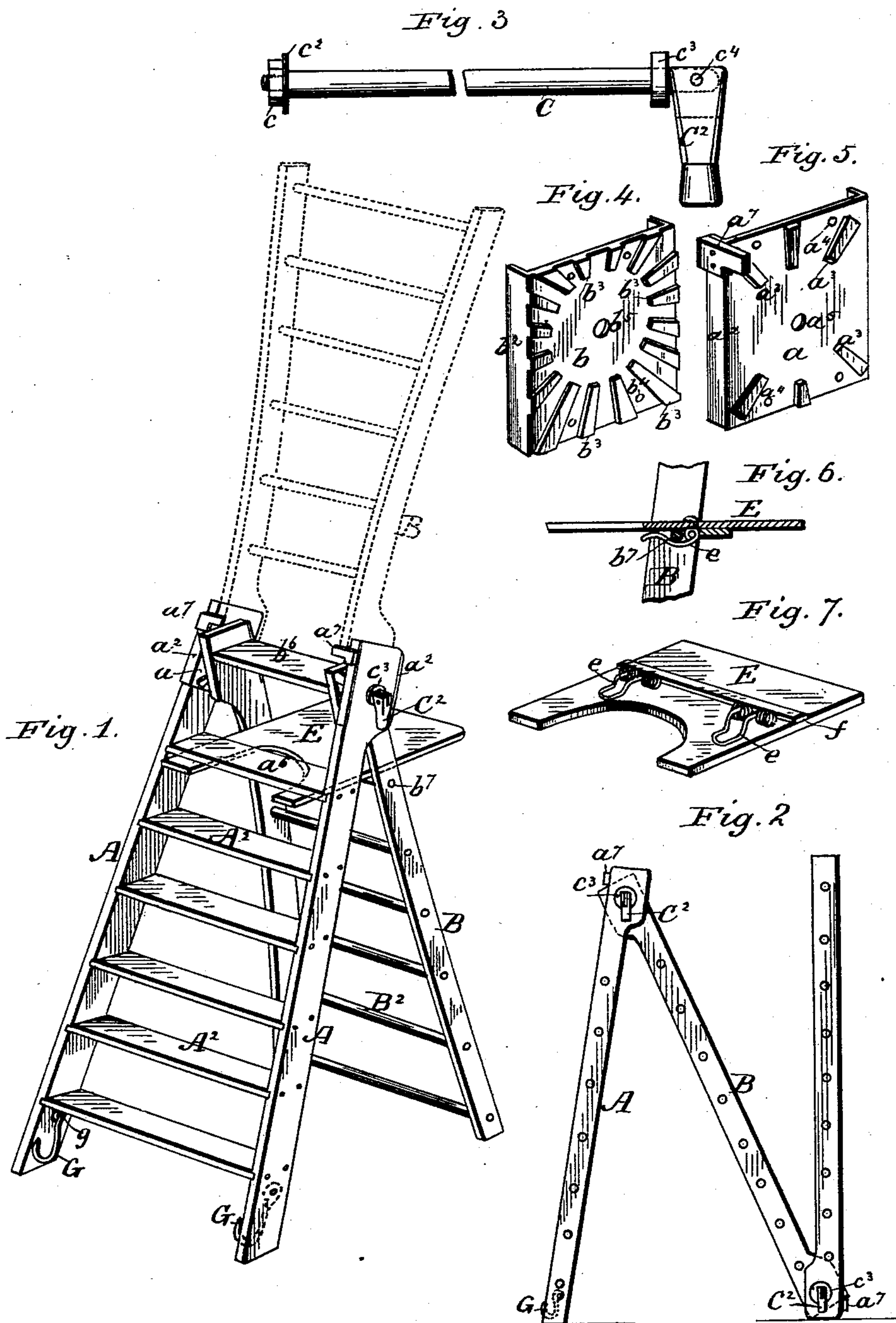


(No Model.)

W. B. CANTRELL.
STEP OR EXTENSION LADDER.

No. 570,661.

Patented Nov. 3, 1896.



WITNESSES

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UNITED STATES PATENT OFFICE.

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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 Wash-
ington, have invented certain new and use-
ful Improvements in Step or Extension Lad-
ders, of which the following is a specification,
reference being had therein to the accompa-
nying 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 transporta-
tion, and when adjusted for either purpose
the parts thereof will be held securely in
place, and said ladder shall be simple in con-
struction, convenient, strong, and reliable in
use. I attain these objects by the construc-
tion illustrated in the accompanying draw-
ings, in which—

Figure 1 is a perspective view of a step-
ladder constructed in accordance with my in-
vention, one member of said ladder being also
shown in dotted lines in a turned-up posi-
tion 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, ec-
centric-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 ec-
centrically-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 per-
spective view of the under side of said re-
movable 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 se-
ries of long radial teeth *a*³, that have sub-
stantially 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 eccen-
trically therein small perforations *a*⁴ *b*⁴ to re-
ceive 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 perfora-
tions 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 ob-
tained 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 lad-
der 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 bear-
ing-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.