No. 623,540.

Patented Apr. 25, 1899.

L. C. HALL.

COMBINATION LADDER.

(Application filed Apr. 18, 1898.)

(No Model.)

2 Sheets—Sheet 1.

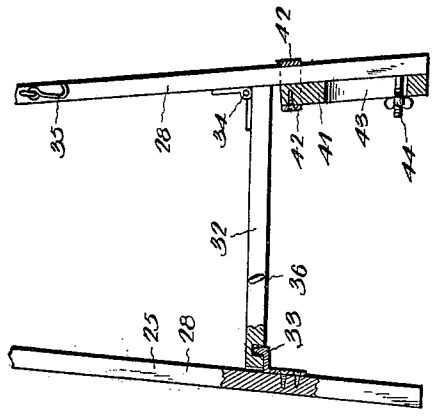


Fig. 4.

Fig. 1.

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Fig. 3.

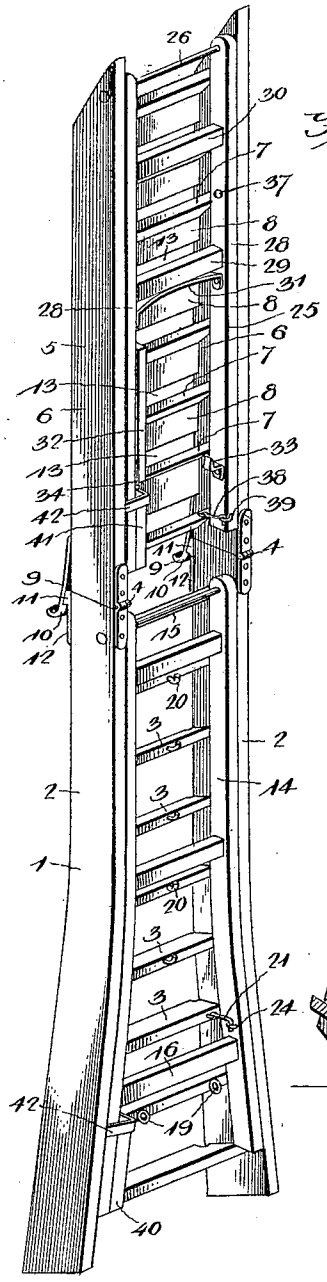
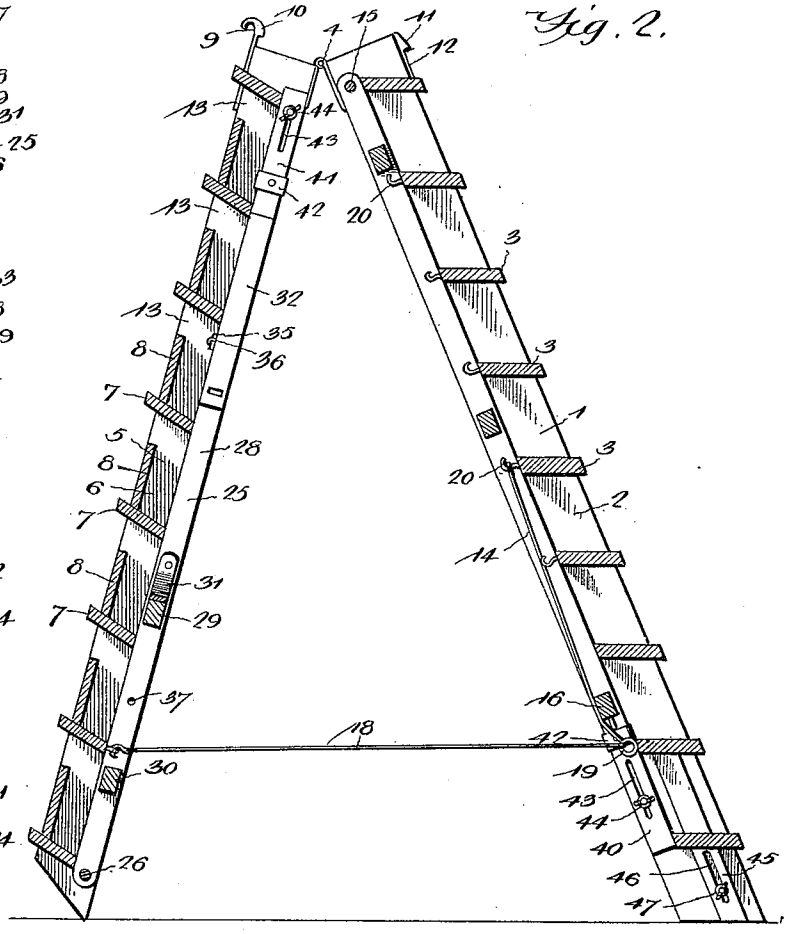


Fig. 2.



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UNITED STATES PATENT OFFICE.

LINCOLN C. HALL, OF BURLINGTON, IOWA.

COMBINATION-LADDER.

SPECIFICATION forming part of Letters Patent No. 623,540, dated April 25, 1899.

Application filed April 18, 1898. Serial No. 678,050. (No model.)

To all whom it may concern:

Be it known that I, LINCOLN C. HALL, a citizen of the United States, residing at Burlington, in the county of Des Moines and State of Iowa, have invented a new and useful Combination-Ladder, of which the following is a specification.

The invention relates to improvements in combination-ladders.

The object of the present invention is to improve the construction of ladders and to provide a simple and comparatively inexpensive one adapted to be arranged as a step-ladder, an extension-ladder, and a scaffold and capable of being compactly folded when not in use.

Another object of the invention is to enable the scaffold to be readily adjusted for raising and lowering its platform and to provide means for supporting the ladder perfectly steady on uneven ground.

The invention consists in the construction and novel combination and arrangement of parts, as hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the claims hereto appended.

In the drawings, Figure 1 is a perspective view of a ladder constructed in accordance with this invention and arranged to form a scaffold. Fig. 2 is a longitudinal sectional view, the parts being arranged to form a step-ladder. Fig. 3 is a perspective view, the parts being arranged to form an extension-ladder. Fig. 4 is a detail view of the lower portion of the folding support of the platform-section, showing the spreading-bar or cross-piece interposed between the sides of the brace and in engagement with the catch.

Like numerals of reference designate corresponding parts in all the figures of the drawings.

1 designates a main ladder-section composed of sides 2 and connecting-steps 3, interposed between the sides and preferably composed of flat boards, as shown; but rungs or any other suitable form of steps may be employed, if desired. The lower portions of the sides 2 of the main section 1 are preferably spread, as shown, to increase the width of the base of the ladder, and the upper ends of the sides are connected by hinges 4 with a platform-section 5, composed of sides 6, connecting-steps 7, and foot-boards 8, arranged substantially at right angles to the plane of the steps 7 and forming a supporting-surface when the section 5 is arranged in a horizontal position for forming a scaffold, as illustrated in Fig. 1 of the accompanying drawings.

The hinges 4 are arranged at the rear edges of the sides 2 and 6 of the sections 1 and 5, and the said sections are adapted, as illustrated in Fig. 3 of the drawings, to be arranged in alinement for forming an extension-ladder, and they are locked in such position by resilient catches 9, consisting of strips of resilient material secured at one end to the front edges of the sides of the section 5 and provided at their free ends with lugs 10, forming shoulders on the inner faces of the strips and adapted to engage beveled lugs 11 of plates 12. The plates 12 are secured to the front edges of the sides 2 of the section 1, and the beveled lugs, which are located at the upper ends of the plates 12, are disposed adjacent to the upper edges of the sides 2. The spring-catches are adapted to engage the beveled lugs automatically when the ladder-sections 1 and 5 are brought in alinement.

The foot-boards 8, which have their outer faces flush with the adjacent edges of the sides 6 of the section 5, are arranged adjacent to the steps next above them and terminate short of the steps next below them in order to provide a space or opening 13 at each step for the foot.

The main section 1 of the ladder carries a folding front brace 14, pivoted by a transverse rod 15 to the upper end of the section 1 and arranged to fold between the sides thereof when the parts are arranged to form a step-ladder or an extension-ladder or when the device is completely folded, and sufficient space is left between the rear edges of the steps and the rear edges of the sides 2 to receive the brace 14. The brace 14 is composed of sides and connecting-bars arranged at the top, bottom, and center of the brace, and the lower connecting-bar 16 is slightly longer than the other connecting-bars and serves to spread the lower portions of the sides of the brace. The lower cross-piece 16 of the brace 14 is provided at its lower edge with eyes, into which are linked hooks 17 of a cord 18, which connects the brace with the front section and prevents the parts from spreading under the

weight of a load when the scaffold is in use. The cord 18 is doubled, the sides being passed through eyes 19 of the main section 1, and the loop formed by doubling the cord is adapted to engage hooks 20, mounted on the rear edges of the steps 3 and adapted to enable the connecting portion of the cord to be varied in length for the purpose of raising and lowering the platform-section of the scaffold. Any number of the hooks 20 may be employed, and when the front brace 14 is folded within the sides of the section 1 it is secured in such position by a hook 21, mounted on one of the steps 3 at the rear edge thereof and engaging an eye 24, located at the inner face of one of the sides of the brace 14. The transverse rod 15, which pivots the upper end of the brace to the section 1, is threaded at one end and provided with a nut, so that the parts may be readily tightened should they become loose.

The rear ends of the sides of the platform-section 5 are pointed for engaging the ground when the parts are arranged to form a step-ladder, as shown in Fig. 2 of the drawings, and they have pivoted between them a rear brace or support 25, connected with the sides 6 by a transverse rod 26 and adapted to fold between the sides when it is not in use. The rod 26 has one end threaded, and it is provided with a nut 27, similar to the rod of the front brace.

The rear brace is composed of side bars 28 and connecting cross-pieces 29 and 30, arranged above the center of the brace, and the cross piece or bar 29 is supported by a metal bracing-bar 31, connected with the center of the bar 29 and secured at its terminals to the inner faces of the sides of the brace. The sides of the section 5 are parallel, and the sides of the brace are also parallel when they are folded. The lower halves of the sides of the rear brace are free, as shown, and are adapted when the scaffold is in use to be spread, as clearly shown in Fig. 1, for increasing the base of the scaffold.

The lower portions of the sides of the rear brace are spread by means of a folding bar 32, which is hinged at one end to the inner face of one of the sides of the rear brace, and the other end of the bar 32 is adapted to abut against the other side of the rear brace, and it is supported and retained in such engagement by a catch 33. The catch 33 is mounted on the inner face of the adjacent side of the rear brace, and it consists of a plate provided at its top with an L-shaped portion, which has an upwardly-extending arm tapering slightly and engaging a recess or socket in the lower face of the folding spreading-bar 32. The hinge 34, which is arranged at the upper face of the spreading-bar 32, permits the latter to fold upward, and it is retained in such position by a hook 35 and an eye 36, mounted, respectively, on the brace and the spreading-bar.

As before explained, the front end of the platform-section of the ladder may be raised and lowered by changing the position of the front brace 14 and varying the angle formed by it and the main section 1, and in order to accommodate the rear end of the platform-section to this adjustment the rear brace is provided with a series of perforations 37, adapted to receive the transverse rod 26, which connects the upper end of the brace to the rear end of the platform-section 5. The rear brace when it is folded between the sides 6 of the section 5 by means of a hook 38 and eye 39 is mounted, respectively, on one of the steps 7 and on one of the sides of the rear brace.

In order to enable the ladder to stand perfectly steady on uneven ground, the main section 1 and the front and rear braces are each provided at one side with an extensible section or bar adapted to increase the length of such side. The sections or bars 40 and 41 of the front and rear braces are provided at their upper ends with cuffs or bands 42 to receive the adjacent sides of the braces, and they have longitudinal slots 43 for the reception of a clamping-screw or other suitable fastening device 44, whereby the sections or bars are retained at the desired adjustment. The extensible section or bar 45 of the main ladder-section 1 is guided in an opening of the bottom step and is provided with a slot 46 for the reception of a fastening device 47. The extensible bars or leg-sections are arranged at one side of the ladder; but the latter is adapted to be reversed or turned end for end to bring the extensible bars or sections at the opposite side should the character of the ground necessitate it.

The invention has the following advantages: The ladder, which is simple and comparatively inexpensive in construction, is adapted to be arranged, as shown in Fig. 2 of the drawings, with the sections 1 and 5 at an angle to each other to form a step-ladder, and as the cord is provided at its ends with hooks to render it detachable is adapted to be arranged for connecting the sections 1 and 5. When the sections 1 and 5 are straightened out or arranged in alinement, they form an extension-ladder, and the device is also adapted to be arranged to form a scaffold and is capable of adjustment to bring the platform portion or section at the desired elevation. When the parts are arranged as shown in Fig. 2, the sections 1 and 5 may be brought together and the ladder will be compactly folded.

Changes in the form, proportion, and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of this invention.

What I claim is—

1. A device of the class described comprising the horizontal platform-section, the front ladder-section 1 hinged to the front end of the platform-section, the front brace hinged to the upper end of the section 1, arranged at

the back thereof and being of a size to fold within the same, the rear brace hinged to the rear end of the platform-section and being of a size to fold within the same, said braces being permanently secured to their respective sections and carried by the same when they are arranged to form a step-ladder or an extension-ladder, and means for locking the front and rear braces in their folded positions, substantially as and for the purpose described.

2. In a device of the class described the combination of the platform-section, and the rear brace hinged to the platform-section and composed of side bars connected at their upper portions and adapted to have their lower portions spread apart to increase the base, and the folding spreading-bar mounted on one of the sides of the rear brace and arranged to abut against the other side of the rear brace, whereby the latter is maintained in its spread position, substantially as described.

3. In a device of the class described, the combination with the platform-section having parallel sides, of the rear brace hinged to the platform-section, adapted to fold within the same and provided with sides connected at their upper portions and having their lower portions free, a spreading-bar hinged to one of the sides of the brace and provided at its free end with a recess or socket, and a catch mounted on the brace at the inner face of one of its sides and arranged to support the spreading-bar and engage the recess or socket thereof, substantially as described.

4. A device of the class described comprising a front section, a horizontal platform-section hinged to the upper end of the front section, the front brace hinged to the front section and arranged at an angle to the same, and the rear brace pivoted to the rear end of the platform-section and having an expansible lower portion adapted to be spread to provide a wide base and capable of being contracted to fold within the platform-section, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

LINCOLN C. HALL.

Witnesses:
JESSE B. HUNT,
D. L. TUBBS.