

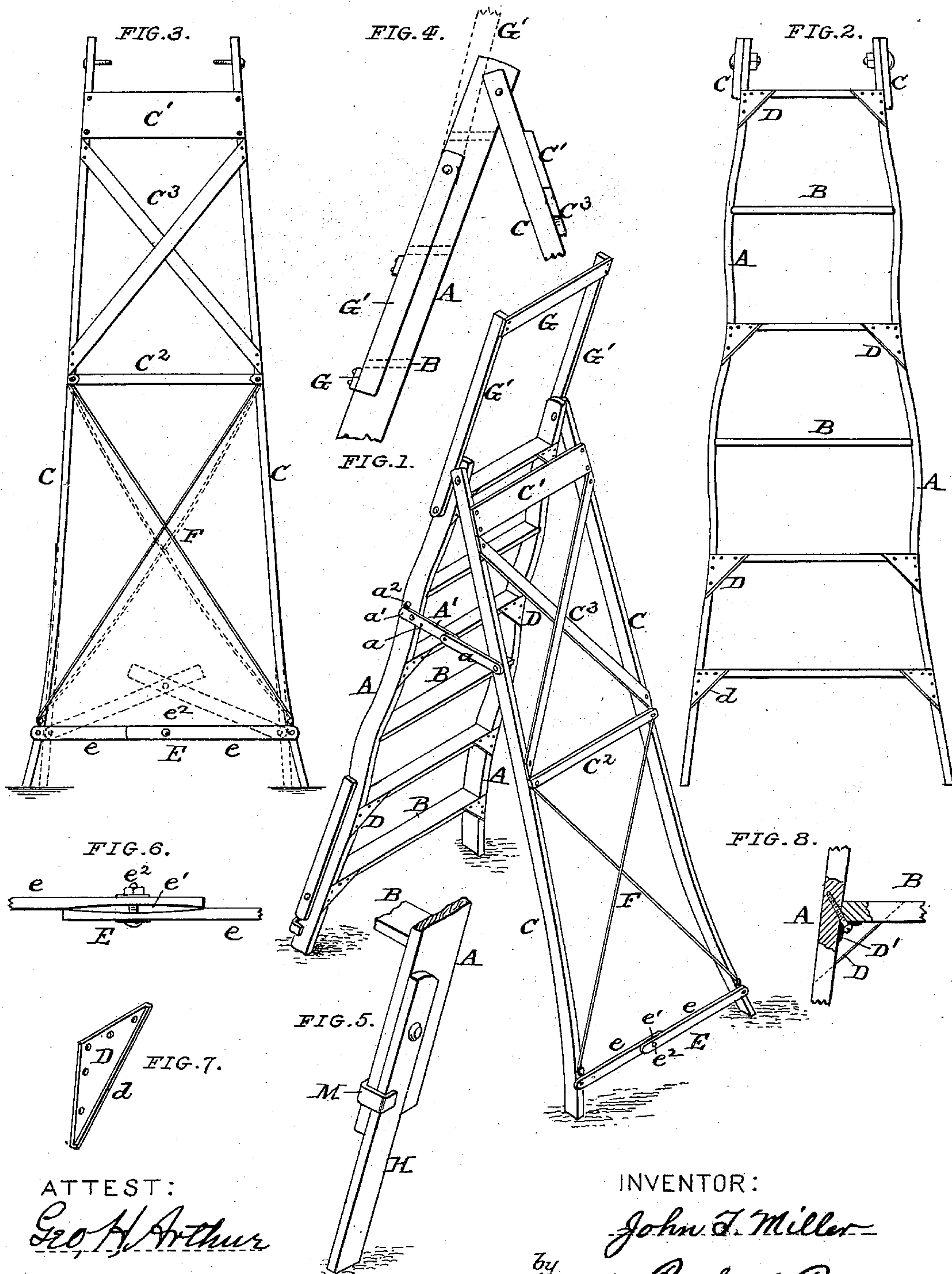
(No Model.)

J. T. MILLER.

STEP LADDER.

No. 376,102.

Patented Jan. 10, 1888.



ATTEST:

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STEP-LADDER.

SPECIFICATION forming part of Letters Patent No. 376,102, dated January 10, 1888.

Application filed February 9, 1887. Serial No. 227,078. (No model.)

To all whom it may concern:

Be it known that I, JOHN T. MILLER, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Step-Ladders; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a perspective view of a step-ladder embodying my present improvements; Fig. 2, a rear elevation of the step-ladder portion proper; Fig. 3, a rear elevation of the rear support or legs, showing the same spread laterally in full lines and closed in dotted lines; Fig. 4, a detail side view of the upper portion of the step-ladder, showing the support or guide at top; Fig. 5, a detail perspective view of the lower side of a step-ladder, illustrating the supplementary pivoted foot or rest; Fig. 6, a detail plan view of the jointed stretcher-bar of the rear support or legs of a step-ladder; Fig. 7, a detail perspective view of the brace or tie plate for bracing and connecting the step-ladder side bars and steps; Fig. 8, an enlarged detail front view, partly sectionized, showing the angle-piece attached to the side bar of a step-ladder for supporting the lower step.

Similar letters of reference indicate like parts in the several views.

My invention relates to improvements in step-ladders for climbing purposes, the several objects being to obtain extra strength and rigidity; to have less strain on the means and devices used to keep the front and rear sections from spreading too far apart when in use; a broad and safe footing on top, so that when weight is put thereon the foot of the front section will not jerk farther away from the foot of the rear section; to provide a bucket or other support above the top; to provide adjustable feet for the bottom of front section for use on stairs, roofs, or other inclined or uneven surfaces; to give a broader footing to the rear section.

The objects above stated I attain by the construction as shown in the accompanying drawings and by the means hereinafter more fully described.

In the drawings, A represents the side bars of the front section of a step-ladder, B the steps, and C the rear section or legs pivoted near their top to the upper portion of the side bars, as shown. The side bars, A, and rear section or legs, C, are connected or tied together by means of a folding tie or toggle member, A', consisting of two bars, *a a*, pivoted at their outer ends to the side bar, A, and legs C, respectively, with their inner ends hinged together, as shown. One of these bars has an extended outer end, *a'*, adapted to engage a lug or stop, *a''*, on the side bar, A, to keep them in an outstretched position when in use and to keep the front and rear sections at their proper spread, for which purpose they are designed.

The side bars, A, are sinuous or serpentine in form, with the steps B arranged between the greatest convexities and concavities of the bends or sinuations, as shown. By this construction the side bars, A, are strained from and against the ends of the steps B, holding the proportional longest ones in place without other fastening, if desired, and making the respective bearings and fastenings between the steps and side bars rigid and strong, thereby decreasing the tendency of the front section to a side-swaying motion when in use.

Tie-plates D are fastened to the edges of the steps B and side bars, A, to hold them together and brace them against the side-swaying motion mentioned above. They may be arranged on front or rear edge of any or all of the steps, as desired, and are preferably of a triangular form, as shown, having their exposed edges formed with a bead or flange, *d*, for the purpose of strength and to avoid injury to a person when handling or carrying a step-ladder. They are preferably arranged so that no portion will project above the top of the steps to which they are attached to offer an obstacle to the feet or a board placed thereon; yet they may be otherwise arranged, if so desired.

To groove the side bars of a step-ladder to receive the ends of the lower step weakens it where it is most liable to break. To avoid said grooving at this point I fasten angle pieces or plates D' to the side bars, A, for the lower step to rest upon, as shown in Fig. 8.

The rear section or legs, C, are pivoted to the front section of the step-ladder at a point above the top step. The side bars, A, being extended above such step for this purpose, as indicated in Figs. 1, 2, and 4, the objects for this are to utilize the rear section on which to attach the cross-piece, tie, or brace for hanging or fastening a pail or other articles, and this cross-piece, in connection with the top step, is to form a broad footing for standing upon and other purposes, and that the legs of this rear section will receive the weight directly endwise that they have to carry, thereby causing no strain on the devices or means employed to keep the sections of a step-ladder from spreading beyond a required stretch. Again, a step-ladder having its front and rear sections hinged or pivoted together at a point below the top step converts the front section into a lever of the first order, the short arm of the lever being that part above and to the rear of the point where the sections are hinged or pivoted together, and when more than a counterbalancing-weight is placed upon said short arm it tends to bear the long arm of the lever outward, thereby causing excessive strain on the means employed to prevent the sections of a step-ladder from spreading beyond a required stretch, frequently breaking such devices or the rear section, letting the person or weight fall to the ground, generally with serious results. A possibility of such accident is entirely avoided by my improved mode of construction in this respect.

The upper parts of the rear section or legs C are braced together in any practical manner, while the lower parts are adapted to be spread apart to form a broader footing on the ground. For this purpose I employ the toggle-spreader E, arranged near the lower ends of the legs C. F are flexible diagonal braces with their ends attached below to the legs C or toggle-spreader E and above to the same legs or to stationary bracing C² C³, and when drawn taut by spreading the legs form braces to the same. The toggle-spreader E consists of two bars, e, pivoted to the legs C at their outer ends and hinged together at their inner ends and overlapping each other to produce friction for keeping them in an extended position when required. These overlapping parts are concaved at e' on their inner sides around the hinge-bolt e² to produce an elastic bearing, whereby the friction can be regulated by loosening or tightening the bolt, as shown in Fig. 6.

G is a support on which, when turned upward, to hang or support a bucket, pail, shelf, and other articles used with a step-ladder, and is a steady guide or brace for a person. Such support is pivoted to the side bars or legs of a step-ladder and adapted to fold down either on its front or rear section, but preferably on the front, as shown.

I do not wish to confine myself to any particular construction of this support, the one

shown being preferable on account of its simplicity and cheapness, and is constructed with a horizontal rail attached to the vertical bars G', that are pivoted to the side bars, as shown. More rails may be added to the side bars, if desired.

H is an adjustable foot pivoted to the side bar, A, of the front section and adapted to be turned up alongside the side bar, and when turned down for use engages in the stop-stirrup M upon the ladder side bar to be firmly held in its proper position. This adjustable foot is duplicated on the opposite side of the section, so as to effect an adjustment at either or both sides, as required, for a vertical adjustment of the step-ladder when used on a flight of stairs or other incline surfaces.

I make no claim in the present application for the constructive feature of pivoting the ladder-legs or rear support to the main ladder at a point above the top step, as I intend to embody the same in a separate application for Letters Patent.

Having thus fully described my said invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The front section of a step-ladder, having its side bars, A, extended above the top step, in combination with the rear section or legs, C, pivoted to such extension above the top step and provided with a cross-piece, C', essentially as and for the purpose set forth.
2. A step-ladder having its side bars made of a sinuous form, in the manner and for the purpose set forth.
3. A step-ladder having its side bars made sinuous or serpentine in shape and secured to the steps with bracing-plates, in the manner and for the purpose essentially as set forth.
4. The combination of the front section, A, B, of a step-ladder with the rear section or legs, C, adapted to spread laterally, and provided with flexible braces F and a spreader-toggle, E, essentially as and for the purpose set forth.
5. The combination of the front section, A, B, of a step-ladder with the rear section or legs, C, having their upper portion rigidly braced together and their lower portion adapted to spread laterally, and provided with flexible braces F, and a spreader-toggle, essentially as and for the purpose set forth.
6. The spreader-toggle E of the rear section of a step-ladder, having the inner sides of its overlapping bars formed with a concave, e', in combination with the hinge-bolt e², essentially as and for the purpose set forth.
7. In a step-ladder, the combination, with the side bars and steps, of a tie or brace plate, D, for securing the parts together and bracing the same against lateral swaying in use, in the manner substantially as described.
8. The tie or brace plate for a step-ladder, having its exposed edge formed with a bead or flange, d, for the purpose set forth.
9. The combination, with a step-ladder, of a support, G, pivoted thereto, and adapted to

fold down out of the way when not in use, essentially as set forth.

10. The combination, with a step-ladder, of the folding foot H, pivoted to the front-section
5 side bars and adapted to engage a stirrup or lug, M, on said side bars when turned down for use, essentially as described, and for the purpose set forth.

11. The combination of the front section, A,
10 of a step-ladder with the rear section or legs, C, the folding tie or toggle A', having an extension, a' , and lug or stop a^2 on the ladder

side bar, as described, and for the purpose set forth.

12. In combination with the side bars and 15 lower step of a step-ladder, an angle-piece, D', attached to the side bars, for the purpose set forth.

In testimony whereof witness my hand this 1st day of February, 1887.

JOHN T. MILLER.

In presence of—

ROBERT BURNS,

GEO. H. ARTHUR.