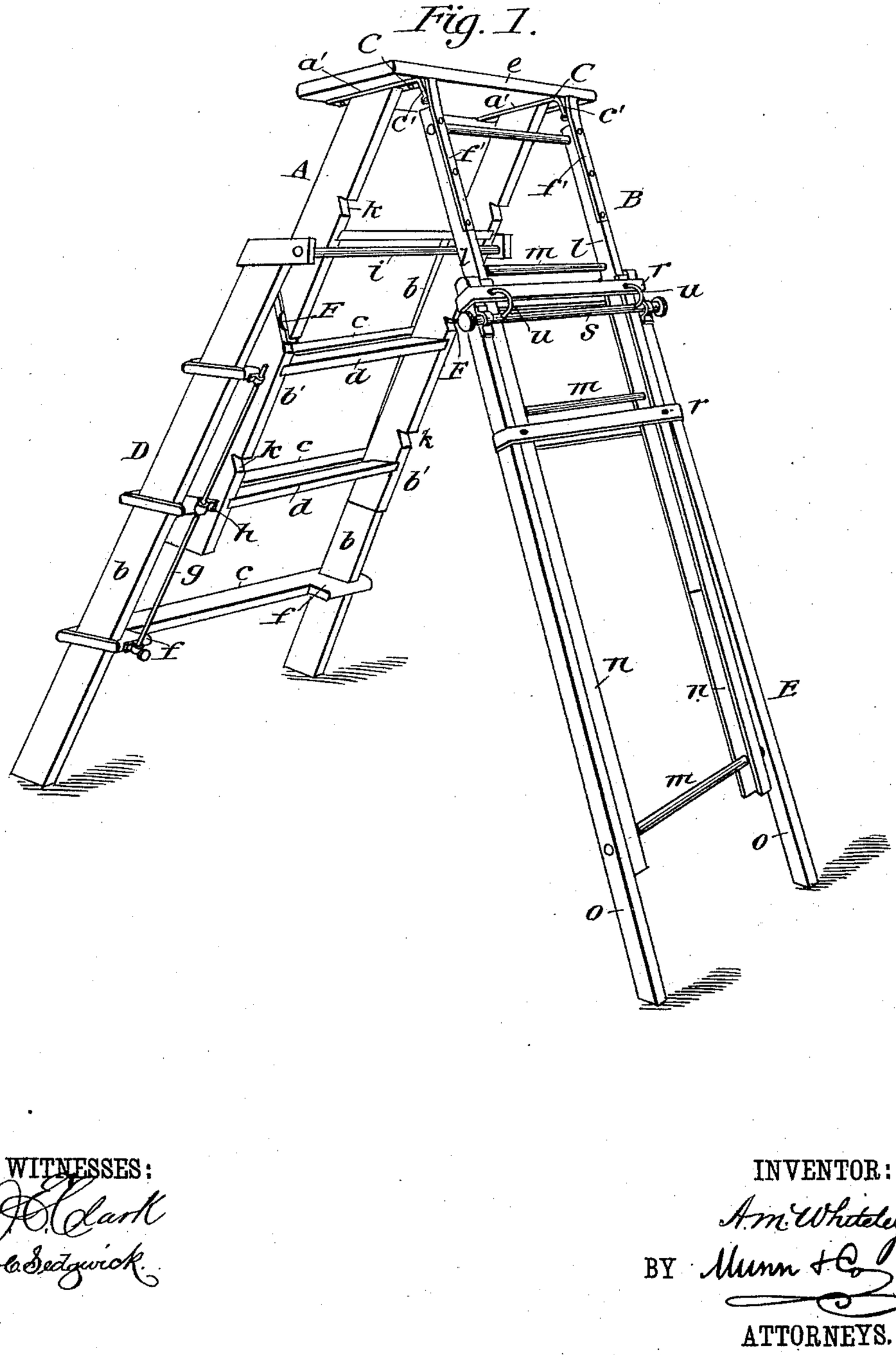
(No Model.) 2 Sheets—Sheet 1.

A. M. WHITELEY.

STEP LADDER.

No. 378,638. Patented Feb. 28, 1888.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

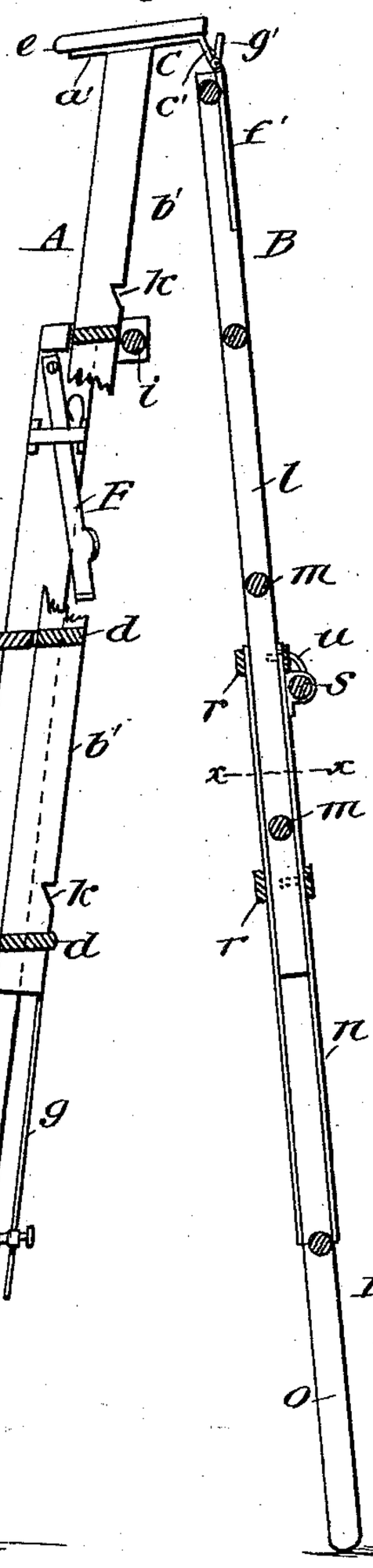


Fig. 3.

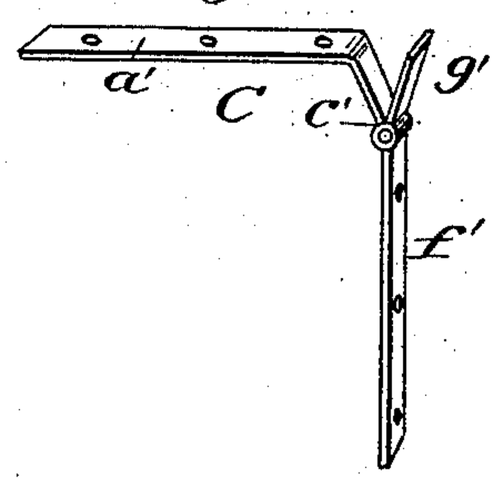
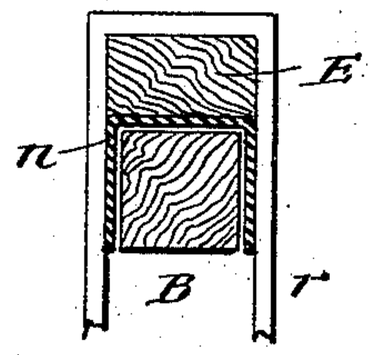


Fig. 4.



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UNITED STATES PATENT OFFICE.

ALFRED MILNE WHITELEY, OF BROOKLYN, NEW YORK.

STEP-LADDER.

SPECIFICATION forming part of Letters Patent No. 378,638, dated February 28, 1888.

Application filed September 29, 1887. Serial No. 251,036. (No model.)

To all whom it may concern:

Be it known that I, ALFRED MILNE WHITELEY, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Improvement in Step-Ladders, of which the following is a full, clear, and exact description.

This invention mainly consists in a step-ladder, in which the two hinged angling main limbs are made capable of simultaneous extension and contraction at pleasure in an upward or downward direction to vary the height of the ladder, and in certain constructions and combinations of parts in a ladder of this description, whereby great stability and facility of raising or lowering the ladder and of locking or holding it at different heights in the extension of it are secured, substantially as hereinafter described, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 represents a view in elevation of an extension step-ladder embodying my invention, showing the ladder as partly extended. Fig. 2 is a vertical section of the same in a plane which is transverse to the steps of the ladder. Fig. 3 is a side view, upon an enlarged scale, of one of the hinges by which the two extension-limbs of the ladder are connected at their upper ends; and Fig. 4 is a horizontal section in part, also upon a larger scale than Figs. 1 and 2, upon the line *x x* in Fig. 2.

A and B indicate the two extension-limbs or step and leg portions or frames of the ladder, connected together on opposite sides by hinges C C, to provide for angling or opening and closing the ladder. Both the step portion or frame A and the leg portion or frame B, instead of resting, when the ladder is in use, at their lower ends upon the ground, are fitted so as to be capable of sliding up and down within outer separate frame portions, D and E, which rest upon the ground and provide for the simultaneous extension or contraction in an up or down direction of the hinged and connected step and leg portions A and B. This provides for the bodily extension of the ladder at its front and back, and virtually constitutes a step-ladder bodily adjustable up or down within or along independent legs or supports. The outer frame portion, D, consists of side uprights, *b b*, connected by fixed narrow steps *c*, which register, when the ladder is shut down, with the steps *d* of the extension A, and also register, when the ladder is extended, with certain of said steps *d*. This provides for climbing the ladder when extended and gives a broad bearing for the feet when the two sets of steps *c* and *d* are in line or register.

The extensible step portion A also consists of side uprights *b' b'*, connected by the steps *d* and by the usual platform, *e*, at top. Said extensible step portion may be fitted to slide up and down within the supporting outer frame portion, D, in any suitable manner—as, for instance, by arranging the uprights *b' b'* to work within broadened end portions, *f*, of the fixed steps *c*, and by providing each side upright *b* with a guide-rod, *g*, up and down which a guide eye-piece, *h*, attached to the adjacent upright *b'* of the extension portion A, is free to slide. There may also be one or more cross-braces, *i*, connecting the side uprights *b b* of the frame D on the inside of the extension portion A to support said back surfaces of the uprights *b' b'* of the extension portion A.

Attached to the upper portion of each upright *b* of the frame D is a catch, F, preferably an automatically-engaging spring-catch or pivoted catch controlled by a spring, which catch engages with any one of a series of notches, *k*, in either upright *b'*, arranged one above the other, so as to tally or register with the steps *c d* when in line, or register with each other. These catches F, when engaged with their respective notches *k*, serve to lock or hold the extensible portion A in the position in which it may have been adjusted up or down, and when said catches are drawn out by the hand of the person using the ladder from such engagement then the extensible portion A is free to be raised or lowered, as required. The extensible leg portion or frame B is similarly adjustable up or down, and, by the hinged connections C, simultaneously with the extensible step portion or frame A. Thus said leg portion B, which is composed of opposite side uprights, *l l*, connected by rounds *m*, is free to slide up or down within or through upright

metallic guides *n*, attached to the uprights O O of the outer frame or portion, E, and through strap-like braces *r r* connecting said uprights O O. When said leg portion B is raised or lowered in connection with the connected extension portion A, it is held or locked at its adjustment by suitably turning a cross bar or shaft, *s*, having its bearings in or on the uprights O O, and provided with curved teeth *u u*, which engage with holes in the uprights *n* of the extension portion B, or through the straps *r r* and corresponding apertures in the uprights *l l*. This shaft *s* may be thus turned in the one direction to engage the portions B and E, and in the opposite direction to disengage said parts, when it is required to extend or contract the ladder, by means of buttons on the ends of said shaft. The engaging apertures for the teeth *u u* correspond in distances apart with the notches *k* in the uprights *b'* of the extension portion A, so that both extension portions A and B correspondingly engage and disengage with their respective stationary supporting frames or portions D and E, and when the ladder is extended it is stably held in position both front and back—that is, at both its step and leg portion.

Any other suitable means than those here described might be used for fastening or holding the sliding portions or sections of the ladder at different altitudes to the supporting legs or frames, up and down which said sections are fitted to slide.

The hinges C C, which connect the upper portions of the extensible frame A and B, are of peculiar construction. Thus they each consist of a strap, *a'*, secured to the platform *e* and having a downwardly and outer angular bent extension, *c'*, and of a second strap, *f'*, secured to the uprights *l l* of the extension leg, frame, or portion B, and pivoted or jointed to the lower ends of the bent extensions *c'*, also provided with an upper extension or leaf, *g'*, which, when the front and back portions of the ladder are spread apart to their proper standing angle, shuts down upon or against the bent extension *c'*, and thus holds the ladder at the proper or extreme lateral stretch of its step and leg sections without the aid of cords or jointed brace-rods.

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

1. An extension step-ladder consisting of an extensible step portion or section and an extensible leg portion or section hinged or jointed together above, and independent supporting-frames, up and down which said portions or sections are fitted to bodily and jointly slide, which step portion or section has a sliding rod-and-eye connection with one independent supporting-frame, while the leg portion or section has a sliding strap-like brace connection with the other independent supporting-frame, substantially as specified.

2. In an extension step-ladder, substantially as described, the combination, with the extensible leg portion or section and independent supporting leg or frame, up and down which said extensible leg portion is free to slide, of the turning cross bar or shaft *s*, provided with teeth *u*, adapted to engage said extensible and supporting leg portions or sections at different heights in the movement of the sliding leg-section, essentially as shown and described.

3. In combination with the step portion or section A of a step-ladder and the leg portion or section B thereof, the hinges C, constructed of a strap portion, *a'*, having a bent extension, *c'*, and of a second strap portion, *f'*, provided with an extension or leaf, *g'*, said strap portions being separately connected with said ladder-sections A B and pivoted or jointed together, with their extensions *c' g'* arranged to hold the ladder at its extreme lateral stretch, substantially as specified.

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Witnesses:
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ELLA G. MORRIS.