No. 611,643. Patented Oct. 4, 1898.

C. NAPIER.

EXTENSION LADDER.

(Application filed Jan. 31, 1898.)

(No Model.)

Fig. 1.

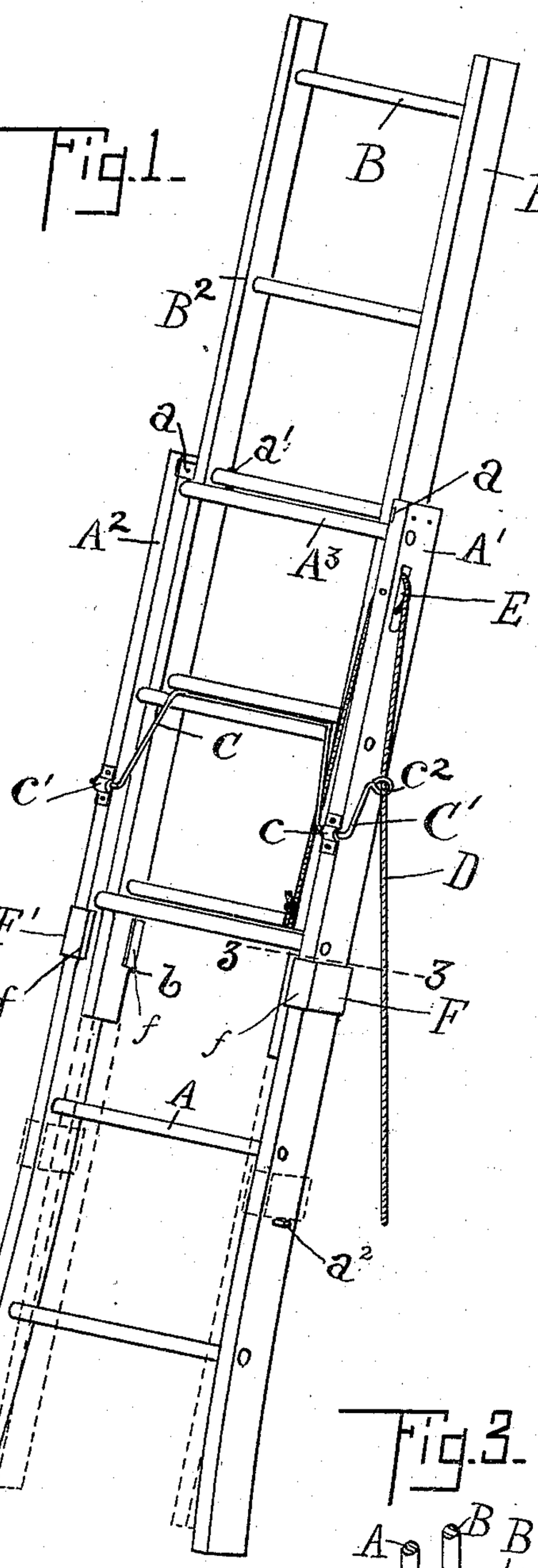


Fig. 2.

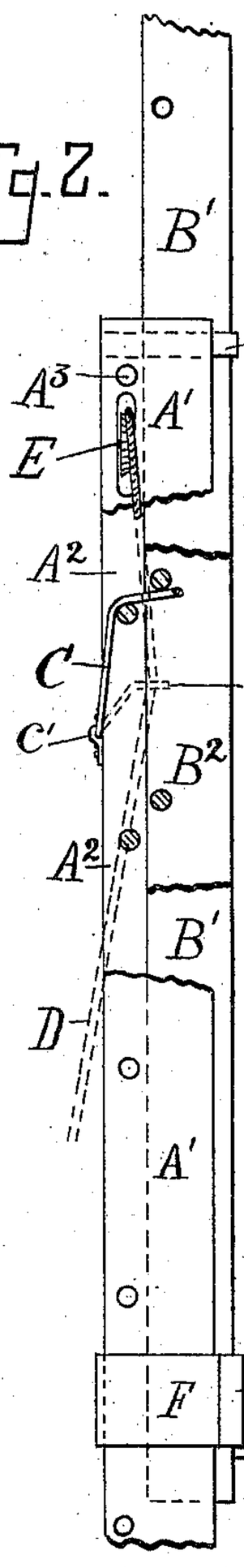


Fig. 4.

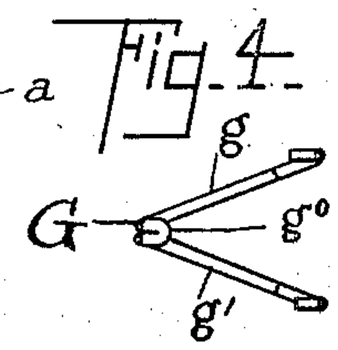


Fig. 5.

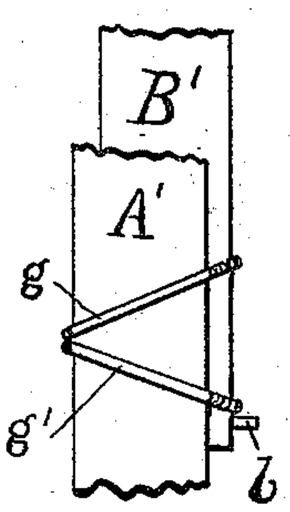
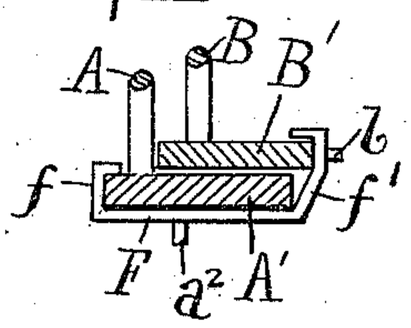


Fig. 3.



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UNITED STATES PATENT OFFICE.

CHARLES NAPIER, OF ROCHESTER, NEW YORK, ASSIGNOR TO ISAAC H. DEWEY, OF SAME PLACE.

EXTENSION-LADDER.

SPECIFICATION forming part of Letters Patent No. 611,643, dated October 4, 1898.

Application filed January 31, 1898. Serial No. 668,659. (No model.)

To all whom it may concern:

Be it known that I, CHARLES NAPIER, a citizen of the United States, and a resident of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Extension-Ladders, of which the following is a specification.

My invention relates to extension-ladders, and has for its object to provide simple adjustable means for preventing the angular separation of the sections.

In the accompanying drawings, Figure 1 is a perspective view of an extension-ladder, the full lines showing the upper section partially elevated and the dotted lines showing it in its lowered position. Fig. 2 is a partial side elevation of the same. Fig. 3 is a cross-section on the line 3 3 of Fig. 1. Fig. 4 shows the form and construction of one of the parts, and Fig. 5 shows the same part in its position.

A represents the lower, and B the upper, section of an extension-ladder, both sections being composed of side bars connected by rounds in the usual manner and the upper section being adapted to fit within the side bars of the lower section. The side bars of the lower section in the form shown spread outwardly somewhat at its foot.

Attached to the inner sides of the side bars A′ A^2, respectively, of the lower section A are angle-irons *a*, having flanges *a′*, which project behind the side bars B′ B^2 of the upper section B. These angle-irons, in combination with the upper round A^3 of section A, constitute a retaining-guide for section B. My improvement is adapted for use in combination with many of the different devices employed in extension-ladders to support the upper section in the extended position as to the lower one; but I have shown it in the drawings in combination with a particular device which consists of a support C, consisting of a rod pivoted in plates *c c′*, secured to the front of the side bars A′ A^2 at corresponding points, said rod being bent upwardly on each side from said plates and then backwardly at right angles over that round in said section A which is next above said plates and extended into the path of the rounds of the upper section. One end of the support C is extended in the arm C′, which is in the plane of the said upwardly-extending portions, and terminates in the loop c^2. A rope or wire D, attached to the lower round of the upper section, is passed up over a pulley E, set in the side bar A′, and then down through the loop c^2 in the arm of the support. To lower the upper section when held in an elevated position by the support, it is necessary, first, to raise it somewhat by pulling down upon the rope, in order to take its weight off from the support, and next to carry the rope forward, thereby rocking the support and withdrawing its arms from beneath the rounds of the upper section.

The retaining-slides F F′ are bent, as at *f*, (see Figs. 1 and 3,) to fit around the front edge and extend along the outside surface of the side bars A′ A^2, respectively, and are also bent, as at *f′* to inclose the back edges of both the side bars A′ B′ and A^2 B^2, respectively, and to lap over upon the inside surfaces of the side bars B′ B^2, respectively, thus clasping the adjacent side bars of both sections. These slides are free to move upon said side bars; but pins a^2, inserted in the outer surfaces of the side bars A′ A^2, respectively, at corresponding points, limit their downward movement. From the rear surface of each of the side bars B′ B^2, at corresponding points near its foot and below the slides F F′, respectively, two other pins *b* project. When the upper section B is down, as shown by the dotted lines in Fig. 1, the slides F F′ rest upon the pins a^2, as is also shown by dotted lines in said figures. When, however, the upper section B is elevated, so as to carry the pins *b* above the pins a^2, said pins *b* come in contact with the slides F F′, respectively, and carry them up with them.

The slides, whose purpose is to prevent the angular separation of the two ladder-sections, are always at or near the foot of the upper section and are therefore in the best position to take the strains produced by leverage of the upper section against its fulcrum, (the upper round of the lower section.) This result is produced by making the slides movable and causing them to follow the foot of the upper section as it is extended. This result could not be accomplished in cases where the side bars are spread outwardly, as shown

in the drawings, and which for purposes of strength and stability is the approved construction, if the said slides were rigidly secured to the side bars B′ B², for the reason that, if so secured, they would have to be at points on said side bars which would, when said upper section was lowered, be above the points at which the said side bars of the lower section begin to spread apart. The weight of the slides F F′ is sufficient to cause them to drop down to the pins a^5 on the side bars A′ A² when the upper section is lowered.

In Figs. 4 and 5 I show a modified form of the slide G which I consider the most desirable. Each consists, as readily appears from the drawings, of two members $g\ g'$, connected at one end, as at g^0, (see Fig. 4,) and set at an angle to each other in the same plane and having their ends bent so as to inclose the side bars A′ B′ and A² B², respectively, in such manner as do the slides F F′, hereinbefore described. The advantage of this peculiar form of slide over the other form lies in this—that it cannot easily become wedged against the side bars of the sections in its position against the pin a^4 and that should it become wedged the pin b as the upper section is drawn up, coming in contact with the member g', tilts the slide so as to free it, whereupon it may be raised.

What I claim is—

1. In an extension-ladder, the combination of two ladder-sections; retaining-guides on one section for the other section; means for supporting one section in the extended position upon the other section; a movable retaining-slide on each side bar of one section clasping the adjacent side bars of both sections; and means carried by one section for automatically adjusting the position of said slides.

2. In an extension-ladder, the combination of the sections A and B, retaining-guides on the section A for the other section B; a support for the section B carried by the section A; a movable retaining-slide on each side bar of one section clasping the adjacent side bars of both sections; and pins on the side bars of said section B for engaging with and moving said retaining-slides.

3. In an extension-ladder, the combination of the sections A and B, retaining-guides on the section A for the other section B; a support for the section B carried by the section A; a movable retaining-slide on each side bar of one section and clasping the adjacent side bars of both sections, each slide consisting of two angularly-disposed members; and pins on the side bars of said section B for engaging with and moving said retaining-slides.

4. In an extension-ladder; the combination of the ladder-sections A and B; the retaining-guides a, on the section A; the support C; the retaining-slides movable on both sections, one slide being on each side bar of the section A and clasping the adjacent side bars of both sections; the pins b, on the section B for moving said slides; and the stops on the side bars of the section A.

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