July 12, 1960 C. SHORE ET AL 2,944,625

EXTENSION LADDER

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Fig. 1

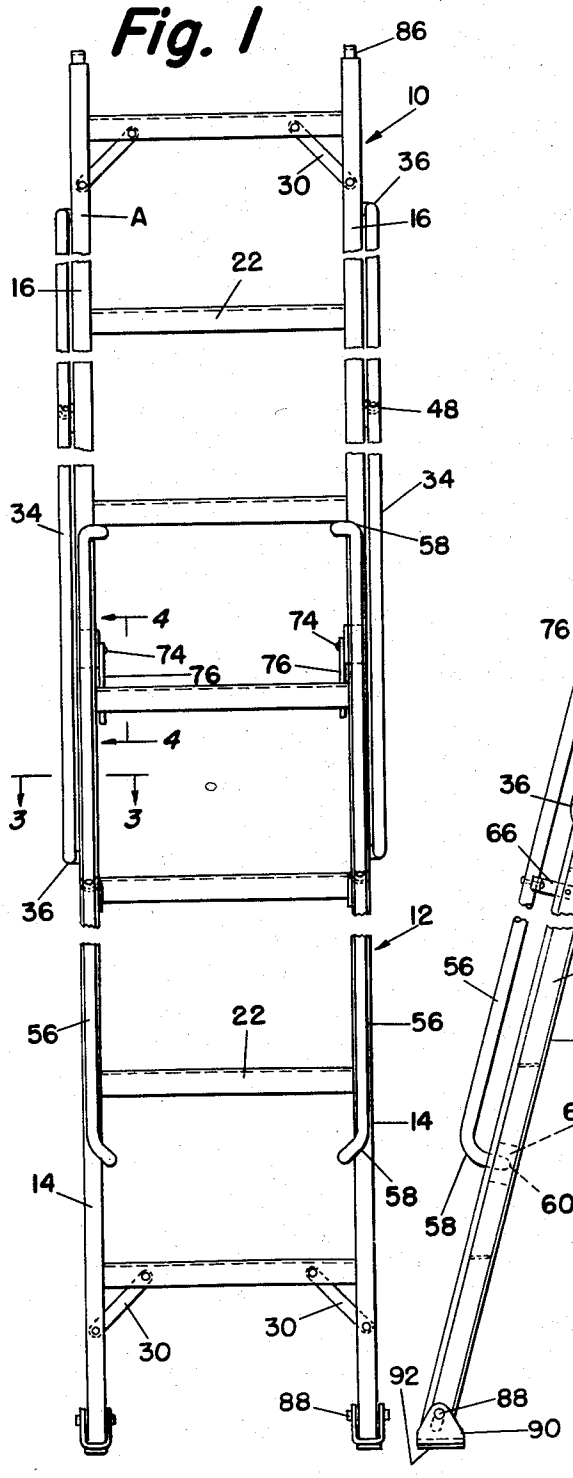
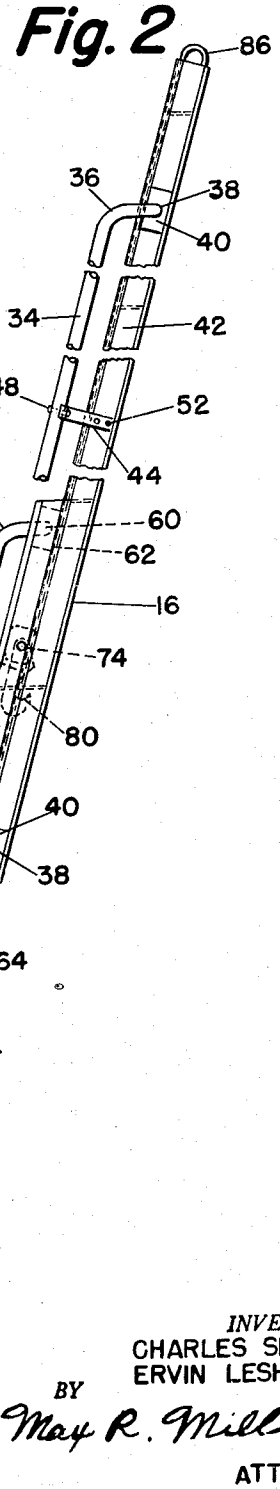


Fig. 2



INVENTORS
CHARLES SHORE
ERVIN LESHNER

BY
May R. Millman
ATTORNEY

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Fig. 3

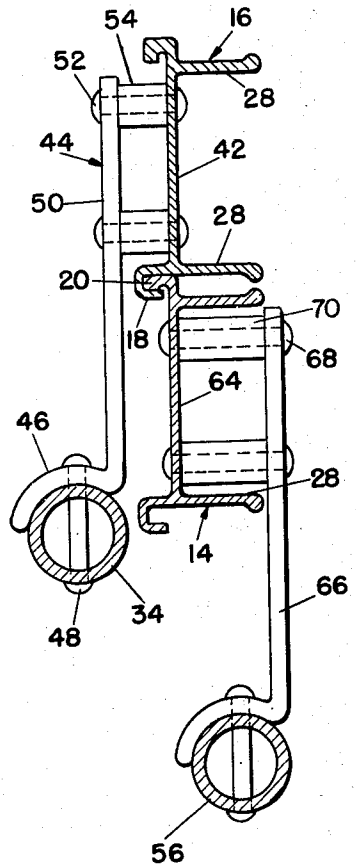


Fig. 4

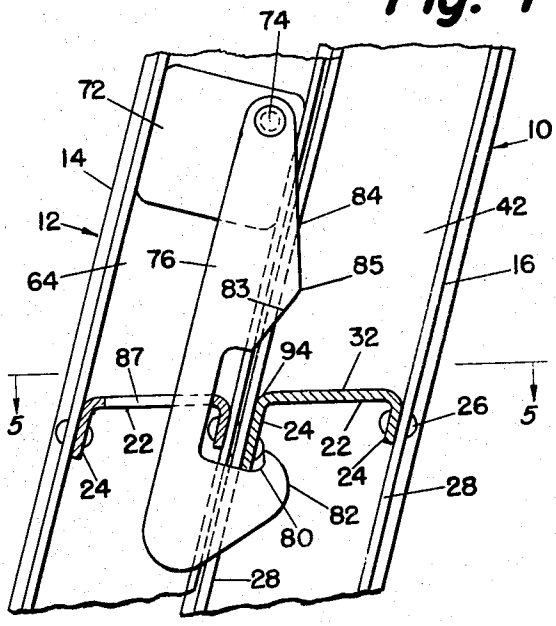
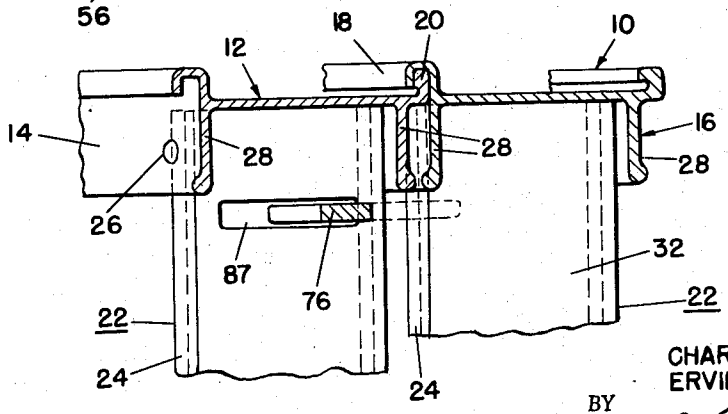


Fig. 5



INVENTORS
CHARLES SHORE
ERVIN LESHNER

BY
May R. Millman

ATTORNEY

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EXTENSION LADDER

Charles Shore, Cheltenham, and Ervin Leshner, Philadelphia, Pa., assignors to Falco Products Co., Philadelphia, Pa., a corporation of Pennsylvania

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2 Claims. (Cl. 182—106)

This invention relates to an extension ladder, the primary object of which is to provide a light-weight extensible unit, preferably fabricated of aluminum, which is provided with a means serving the dual function of stiffening the ladder and increasing its resistance to twisting along its longitudinal axis, thereby rendering the same safe and secure in use.

Another object of the invention is to provide a light-weight extension ladder wherein the rungs are flat instead of round as in the conventional extension ladders, thus rendering the mounting thereof more secure.

Another object of the invention is to provide an extension ladder employing a novel latch means for releasably attaching the sliding units at desired positions with ease of manipulation.

And yet another object of the invention is to provide an extension ladder which is light, safe and secure, yet relatively simple in construction and inexpensive.

These and other objects of the invention will become more apparent as the following description proceeds in conjunction with the accompanying drawing, wherein:

Figure 1 is a front elevation of the ladder;

Figure 2 is a side elevation showing the ladder leaning against a wall;

Figure 3 is an enlarged sectional view taken on the line 3—3 of Figure 1;

Figure 4 is an enlarged sectional view taken on the line 4—4 of Figure 1 with the ladder inclined towards the wall; and

Figure 5 is a sectional view taken on the line 5—5 of Figure 4.

Specific reference is now made to the drawings wherein similar reference characters are used for corresponding elements throughout.

The ladder basically comprises an upper section or unit 10 which is slidably mounted behind and on a lower section or unit 12, the length of the sections being optional. The pairs of legs 14 of the lower section and the pairs of legs 16 of the upper rear section are generally U-shaped extrusions, preferably of the same contour as shown more particularly in Figure 3. Movable connection between the legs is effected by having the channel portions 18 of the rear legs 16 slidably engage the lip portions 20 of the front legs 14.

Spaced along the length of each section are steps 22, each of generally U-shape, the ends of which extend into the hollows of the opposing pairs of ladder legs 14 and 16. Each step is an integral extrusion having depending portions 24 which are riveted as at 26 to the flange portions 28 of the ladder legs 14 and 16. The steps are additionally braced by diagonal bars 30 terminally riveted to the ladder legs and the steps adjacent the ends of the latter. The treading surface 32 of each step is flat, is approximately as wide as the ladder legs and is inclined rearwardly at a slight angle. Because the steps are not round, footing on them is surer. Also, round rungs must extend through holes in the ladder legs which

weaken the structure, particularly if the ladder is fabricated of relatively thin gage metal.

Since an extension ladder can attain considerable length, if it is made of a light-weight metal it is subject to twisting along its longitudinal axis. This can occur when, upon mounting the ladder, one shifts his weight to one side or the other and when the twisting occurs, the ladder is rendered unsafe. In the instant construction a means is provided to minimize this twisting, the means serving other functions as well as will appear hereinafter.

This means comprises hand rails of particular construction for each ladder section. For the upper or rear section 10 there are hand rails 34 of substantially circular cross-section which extend along the major length of the ladder legs 16. Each rail is an integral pipe member which is provided with a substantially right-angle bend 36 adjacent its free ends 38, the latter being secured by appropriate brackets 40 to the web portions 42 of the legs 16 near the upper and lower ends thereof as shown in Figure 2. As will be evident from Figures 1 and 2, the rails 34 are disposed on the outside of the ladder legs because the ends of the rails are secured to the outer surfaces of the web portions 42. It is manifest that the portions of the rails 34 between their terminal bends 36 are spaced forwardly from the ladder legs 16 to serve not only as hand rails but as safety guards, should one standing on the ladder lean towards one side or the other of the ladder. The hand rails are further supported along their lengths by spaced brackets 44. One end of the bracket has a curved portion 46 engaging the underside of the rail 34 there to be secured by an appropriate rivet 48. The other portion of the bracket is a bar 50 which extends rearwardly and on the outside of the ladder leg 16, there to be secured to the web portion 42 by appropriate rivets 52 and spacers 54.

The means to restrain longitudinal twisting of the ladder also includes integral hand rails 56 of substantially circular cross-section which extend along the greater length of the legs 14 of the lower or front ladder section. Near its ends, each rail 56 is provided with a substantially right-angle bend 58. At this point the rail is also bent inwardly and its free ends 60 are secured by appropriate brackets 62 to the web portion 64 on the inside of the ladder legs 14. As in the case of the upper or rear hand rails 34, the lower or front hand rails 56 are further supported along their length by spaced brackets 66 which are identical in construction as the support brackets 44 previously described except that said brackets 66 are secured by rivets 68 and spacers 70 to the inner face of the web portions 64 of the lower section ladder legs 14.

It is postulated that the hand rails 34 and 56 and the manner in which their ends are bent and secured to the ladder legs serve as inverted trusses which restrain twisting of the ladder along its longitudinal axis. The hand rails also effectively increase the moment of inertia of the legs because the rails are secured at their ends and also by support brackets 44 and 66 to the legs, thereby stiffening the ladder.

The instant ladder is also provided with an easily operated releasable latch mechanism as follows. Secured to the inner faces of the web portions 64 of the legs 14 of the lower or front ladder section 12 adjacent the upper ends of said legs are plates 72 carrying pivot pins 74, the latter pivotally suspending a latch member 76 at its upper end. The edge of the latch member facing the rear is cut out to form an opening 78 terminating in a lower hook 80. The edge of the hook facing the rear is rounded as at 82. The edge of the opening 78 vertically opposite the hook is a forwardly and downwardly inclined cam surface 83. The rear edge of the

latch from the opening 78 to the position of the pivot pin is a forwardly and upwardly inclined cam surface 84 which joins the cam surface 83 at a point 85.

The tread portion 32 of the step immediately below the hook pivots 74 is cut away as at 87 to allow the hooks to pass through the step as clearly shown in Figure 4.

The upper ends of the legs 16 of the upper or rear section 10 includes curved wall-engaging members 86, while the lower ends of the legs 14 of the lower or front section 12 have pivoted thereto as at 88, U-shaped feet 90, preferably provided with ground-engaging tread 92.

When the ladder is inclined towards the wall with the members 86 touching the wall and the feet 90 spaced therefrom as shown in Figures 2 and 4, the latch members 76 tend to hang in a position normal to the ground. In this position, the rear portions of the latch members including their lower hooks 80 bridge the juncture between the front and rear ladder sections as shown in Figure 4. In this position, the hooks 80 engage the front depending portion 24 of a selected step 32 of the rear section 10 thereby supporting the rear section in an adjusted position relative to the front section 12 with the rear step being in substantial alignment with the step of the forward section having the cut-outs 87.

To lower the rear section relative to the forward section, the rear section is first raised so that the front corner 94 of the engaged step of the rear section strikes cam surfaces 83, thereby pivoting the latches so that the hooks are out of engagement with said rear step. Quick lowering of the rear section allows the previously engaged step to pass the hooks 80 before the same have had time to swing back into engagement position. Succeeding steps of the rear section engage the cam surfaces 84 of the hooks again moving the hooks 80 out of engaging position until a selected step of the rear section for adjustment is reached. This step is lowered slowly to give the hooks 80 time to swing into engagement positions.

To raise the rear section relative to the forward section the engaged step of the rear section is lifted out of the hooks as described above. Upon further upward movement of the rear section, the next approaching step strikes cam surfaces 82 moving the hooks away, allowing said step to pass the hooks. Then the rear section is slowly lowered whereby the selected step is engaged in the hooks 80.

While a preferred embodiment of the invention has been shown and described herein, minor variations may be made by a skilled artisan without departing from the spirit of the invention and the scope of the appended claims.

We claim:

1. A light-weight metallic extension ladder comprising at least two slidably interconnected sections and means releasably latching said sections together in adjusted positions, each section including a pair of elongated legs of channel cross-section with the channels opening towards each other, and substantially flat steps whose ends are received and secured in said channels, said steps being spaced apart predetermined distances along the lengths of each section, said latching means including members pivoted at their ends to the legs of one section above one step thereof, said members having portions extending through apertures provided in said one step and open hook portions at their ends opposite their pivot points, said hook portions engaging a selected step of the other section and retaining the same in substantial vertical registry with said one step.

2. The combination of claim 1 and means connected with each section restraining twisting action of the associated sections around their longitudinal axes, said twist-restraining means comprising hand rails extending along the major lengths of said legs, each rail being an integral member having substantially right angle bends adjacent its free ends, said free ends being secured to each leg adjacent the ends of the latter and brackets spaced between said free ends securing said rail to said leg at points along the length thereof.

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