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FIREMAN'S EXTENSION LADDER FOR ROOFS

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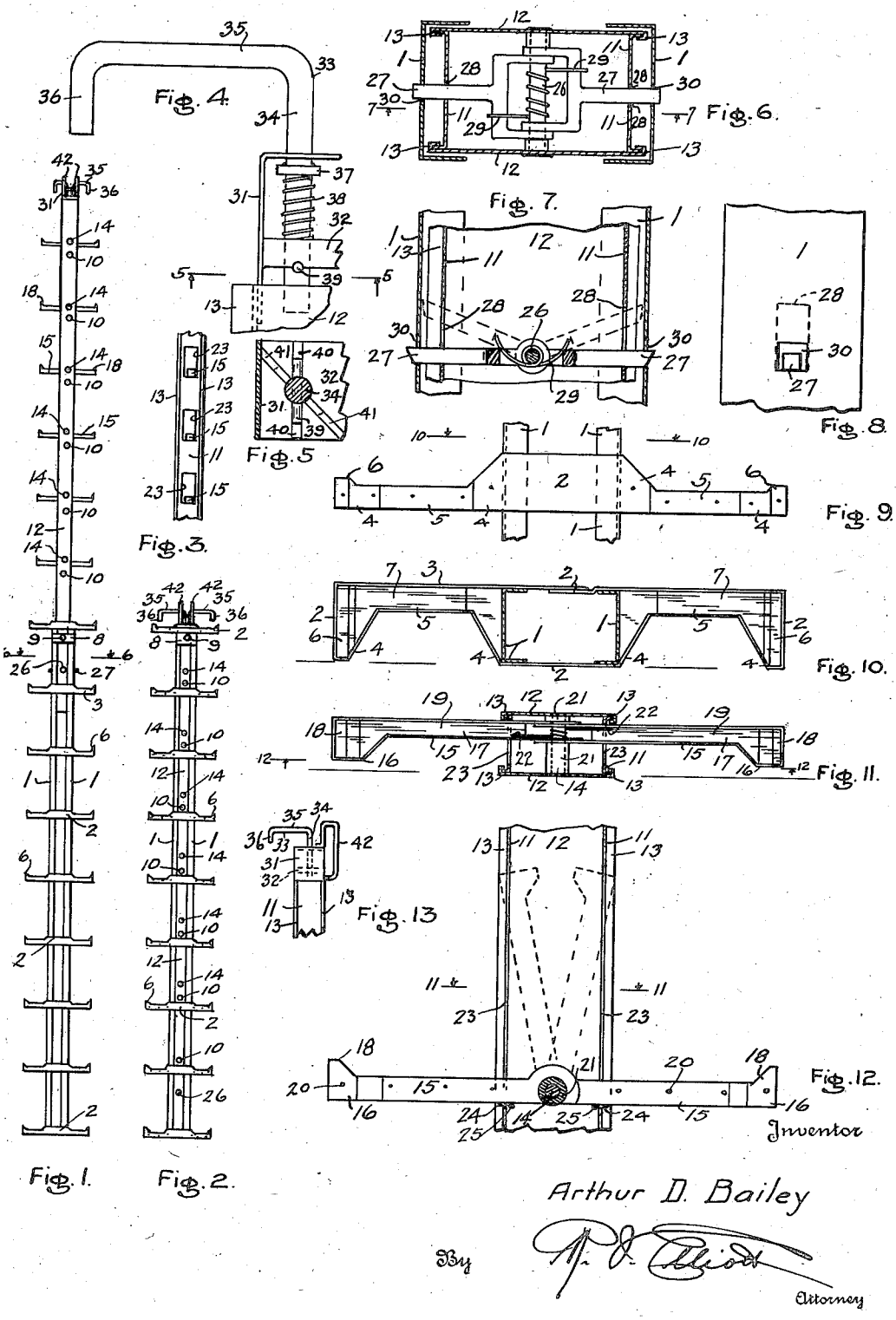


Fig. 1. Fig. 2. Fig. 3. Fig. 4. Fig. 5. Fig. 6. Fig. 7. Fig. 8. Fig. 9. Fig. 10. Fig. 11. Fig. 12. Fig. 13.

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FIREMAN'S EXTENSION LADDER FOR ROOFS

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6 Claims. (Cl. 228—39)

This invention relates especially to that class of ladders adapted for use by firemen for scaling and operating on roofs, and has for its objects to provide a light, fire-proof ladder of great strength; which may be telescoped from its extended position so as to be easily portable through doors or windows and so as to be stowed readily on the fire or hose truck; which, when so telescoped, takes up no more room than a single section thereof; which is adapted to be slid up the grade of the roof; which is adapted to be hooked on to the ridge or peak of the roof; in which the hooks may be folded into positions parallel with and immediately over the steps of the base section when the ladder is telescoped, or may be turned therefrom to extend at an angle suitable for engaging the roof ridge; which provides substantial handholds at each step, even when the ladder is resting flat on the roof; which may be extended to any desired length within the capacity of the structure; which, when so extended, is locked in such position; which is provided with an automatic stop which prevents the ladder from being inadvertently pulled apart; and which is cheap to make, easy and safe to operate, and effective in use.

I attain these and other objects by the devices and arrangements illustrated in the accompanying drawing, in which—

Fig. 1 is a front elevation of my improved firemen's roof ladder, extended; Fig. 2 is a similar view of the said ladder, telescoped; Fig. 3 is a side elevation of a portion of the extension part thereof; Fig. 4 is a front elevation of a portion of the upper part of the ladder, showing particularly one of the pair of hooks and the means by which it is mounted on the ladder; Fig. 5 is a section thereof taken on the line 5—5 in Fig. 4; Fig. 6 is a horizontal section thereof taken on the line 6—6 in Fig. 1; Fig. 7 is a vertical section thereof tken on the line 7—7 in Fig. 6; Fig. 8 is a side elevation of a portion thereof; Fig. 9 is a rear elevation of a portion of the main section of the ladder, showing one of the steps thereof; Fig. 10 is a horizontal section thereof taken on the line 10—10 in Fig. 9; Fig. 11 is a section taken on the line 11—11 in Fig. 12; Fig. 12 is a vertical section of a portion of the ladder extension, taken on the line 12—12 in Fig. 11, showing the step extended for use, and in dotted lines, the same step folded up into the ladder as when the ladder is telescoped; and Fig. 13 is a side view of the upper end of the ladder extension, showing especially the skid on which the ladder may be slid up the roof, and the hook adapted to engage over the ridge of the roof.

Similar numerals of reference refer to similar parts throughout the several views.

The main section of the ladder is composed of a hollow post made of two parallel inturned metal channel side bars 1, secured together in spaced relation to each other by means of the steps of the main section. Each step comprises a sheet-metal frame 2 (Figs. 9 and 10) which is welded to the two said channel bars 1, both on the front and rear flanges thereof, said frame passing around the said post and extending laterally in a single plane on the front side 3 but being bent inward on each side of the central post, as indicated at 4 (Fig. 10) to form a handhold 5, which is thereby suitably raised from the level of the roof, if the ladder be lying flat thereon, to allow the fingers and knuckles of the fireman using the ladder to freely pass under the step. Also the top edge of the step is provided with an upturned lug 6 (Fig. 9) at the outer ends to prevent the fireman's foot from slipping laterally therefrom. The said step frame 2, above described, is filled in, between the front and rear surfaces thereof, with wooden pieces 7, suitably riveted or otherwise secured to the frame 2. The steps are suitably spaced on the post. The bottom step is positioned at the bottom of the post and forms a base for the ladder; the top step is secured to the extreme upper end of the bars 1.

The upper end of the main post is provided with cross plate 8, positioned immediately below the top step 2, said plate carrying a suitable pin 9 adapted to pass through any of the holes 10 in the extension part of the ladder to fasten and lock the extension in any extended position. The main post may be conveniently about twelve feet long.

The extension part of the ladder comprises a rectangular sheet-metal post formed of two side strips 11 (Fig. 6), each having out-turned flanges, and front and rear strips 12, having their edges 13 bent around the flanges of the said side strips 11, the joint so formed being made tight and firm by suitable means common in the art. This post fits neatly, but not tightly, within the hollow main post formed by the channels 1, above described, and is of a length substantially corresponding therewith.

A series of pivoted, upwardly folding, steps are mounted on the extension post at suitable intervals. A series of pivots 14 are secured in the central axis of the plates 12 of the extension post and are spaced apart to correspond with

the steps of the main part of the ladder. Each said pivot holds the two opposite steps of the extension part of the ladder (Figs. 1, 11 and 12).

Each step of each pair comprises a sheet-metal loop-shaped frame 15, bent and shaped so that the said pivot 14 passes through its two ends and extending therefrom along parallel lines and having a bulge or enlargement 16 on the end adapted to keep the step from contact with the roof, and thereby providing a suitable hand-hold 17; and also another enlargement 18 on the end of the upper side of the step to keep the fireman's foot from slipping laterally off the step. The frame, thus formed, is filled in with a wooden piece 19, suitably shaped and secured therein by rivets 20, or otherwise. The two steps, thus formed, forming a pair, are mounted on the single central pivot 14 and are held from longitudinal motion thereon by the bushings 21. A spring 22 is wound around the pivot 14 and its ends engage the wooden pieces 19 of the two steps in such manner as to always tend to throw the steps outward from folded position into operative position (Fig. 12).

The side strips 11 of the extension post are provided with holes 23 at each step (Figs. 3, 11 and 12) which are of such size and position as to permit the said steps to freely swing upward from their operative into their folded position (Fig. 12) and to rest on the lower margin of said holes when in their horizontal or operative position: the said lower margin of the hole 23 may be turned inward or outward to form a flange 24 on which the step may rest. Also, if so desired, rivets 25 (Fig. 12) or other means may be placed across the post in line with the lower margin flange 24 of the hole 23, to provide a greater bearing surface for the step on the post.

Thus it will be seen that, as the extension post is withdrawn from the main post, each pair of steps of the extension post successively swings out, under the action of its spring 22, into operative position as soon as it leaves contact with the channels 1 of the main post, and also that both said steps will be swung up into folded position as they pass downward into the said main post when the ladder is being telescoped.

The lower end of the extension post is provided with a retrievable stop adapted to prevent the said post from being inadvertently pulled entirely out from the main post. This device is illustrated particularly in Figs. 6, 7 and 8. A pin 26 extends across the post from front to rear, being secured in the parts 12 thereof. A pair of fingers 27 are pivotally mounted on the said pin 26, said fingers extending laterally through openings 28 in the side members 11 of the said extension post. The openings 28 are of such size and position as to prevent said fingers from passing downward below a horizontal position, but permit them to pass freely upward therefrom, as indicated in dotted lines in Fig. 7. A spring 29 is wound around the pin 26 and its opposite ends engage the two fingers 27 in such manner as to tend to turn them on the pin 26 into horizontal positions. Normally the said fingers 27 occupy the positions indicated by the dotted lines having their ends engaging and resting against the inner surfaces of the channels 1 of the main post.

A pair of holes 30 are made in the upper part of the said channel bars 1, said holes being so positioned as to permit the ends of the fingers 27 to pass therethrough when the extension post is pulled out to its fullest intended extent. Thus it will be seen that when such position has been reached, the fingers are acted on by the spring 29 and move into their horizontal positions through the holes 30, and therefore prevent any further outward movement of the extension post. But, as soon as the lock pin 9, holding the extension part in such extended position, is withdrawn from the holes 10 in which it had been placed to hold the ladder in extended position, the extension post may then be freely slid inward into telescoped position since the fingers 27 will at once turn upward into their folded position, as shown in dotted lines in Fig. 7.

The upper end of the extension post is provided with a pair of engaging hooks mounted in the following manner:—A metal loop or bridge 31 is secured across and above the upper ends of the side members 11 of the extension post, said loop lying a few inches above the post and having an intermediate strong metal plate 32 firmly welded or otherwise secured thereto. Each hook 33 comprises a straight shank 34, passing through the plate 32 and the loop 31, and then bent to provide a horizontal arm 35, ending in a down-turned hook or barb 36. The shank 34 is free to turn in the parts 31 and 32. A shoulder 37 is formed on or secured to the shank 34 at a point below the bridge 31. A spring 38 is wound around the shank 34 and is compressed between the said shoulder 37 and the upper side of the plate 32. A pin 39 passes through a hole in the shank 34 at a point below the said plate 32 and a pair of grooves 40 and 41 (Fig. 5) are made in the lower surface of said plate 32, said grooves being radial to the center of the hole in said plate 32 through which said shank 34 passes. The position of the groove 40 is such that the pin 39 lies therein (under the action of the spring 38) when the hook arm 35 and barb 36 lie transversely of the ladder and in the same plane as that of the several steps thereof, so that when the extension part is telescoped into the main part, the said hooks 33 lie immediately over the top step 2 of the main section of the ladder (Fig. 2). The position of the other groove 41 is such that the same pin 39 lies therein when the hook arm 35 and barb 36 extend rearward at an angle of about forty-five degrees from said above-described stowed position, thus being adapted to be hooked over the ridge of the roof, or other part, to hold the ladder.

Also the upper end of the extension post is provided with a pair of skids 42 on the front side, opposite to the said above-described hooks, for the purpose of permitting the said ladder to be slid up a roof, in reversed position, until its end has passed over the roof ridge, whereupon the ladder is turned over to permit the said hooks to engage the ridge. These skids 42 comprise a pair of metal bars secured by welding, or otherwise, to the bridge 31 and to the extension post, and shaped so as to extend a few inches forward from the front of the ladder, as clearly shown in Fig. 13. Thus the ladder may be slid up the roof after the hooks 33 have been turned into engaging positions without interfering with the said hooks, the ladder being then turned to swing the hooks over the roof ridge, as above described.

It will be understood that many changes may be made in the details of construction of my improved ladder without departing from the spirit of my invention as outlined in the appended claims.

What I claim and desire to secure by Letters Patent is:

1. In an extension ladder, the combination of a hollow main post; steps secured thereto and ex-

tending laterally therefrom; an extension post fitting within said hollow main post; and steps pivotally mounted in said extension post and adapted to be swung upward on their pivots into stowed positions within said main and extension posts or to swing downward from said stowed position into horizontal positions extending laterally from both sides of said extension post.

2. In a ladder as set forth in claim 1, wherein said hollow main post is composed of two parallel inturned channel bars secured together in spaced relation to each other by means of the several steps.

3. In a ladder as set forth in claim 1, wherein said main hollow post is composed of two parallel inturned channel bars secured together in spaced relation to each other by means of the several steps, and wherein each said step comprises a horizontal metal loop centrally enclosing said main post and extending laterally therefrom on each side and welded to the flanges of said channel bars wherever the metal loops cross the post flanges.

4. In a ladder as set forth in claim 1, wherein said steps on the main post are composed of horizontal metal loops centrally enclosing said main post and extending laterally therefrom on each side and secured to said main post; together with wooden fillers secured within the loops, outside of said main post.

5. In a ladder as set forth in claim 1, wherein said steps on the main post are composed of horizontal metal loops centrally enclosing said main post and extending laterally therefrom on each side and secured to said main post; said extended portions of each step being bent inward, on the rear side of the ladder, between the post and the end, thereby forming handholds on each step.

6. In a ladder as set forth in claim 1, wherein said steps on the extension post comprise a pair of strap loops, each independently mounted on a common pivot pin, centrally secured in the extension post, said post being provided with suitable cavities in its sides to receive said steps when they are swung upward therein into stowed position, said loops being adapted to rest on the lower edge of said cavity when swung outward into horizontal operative position.

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