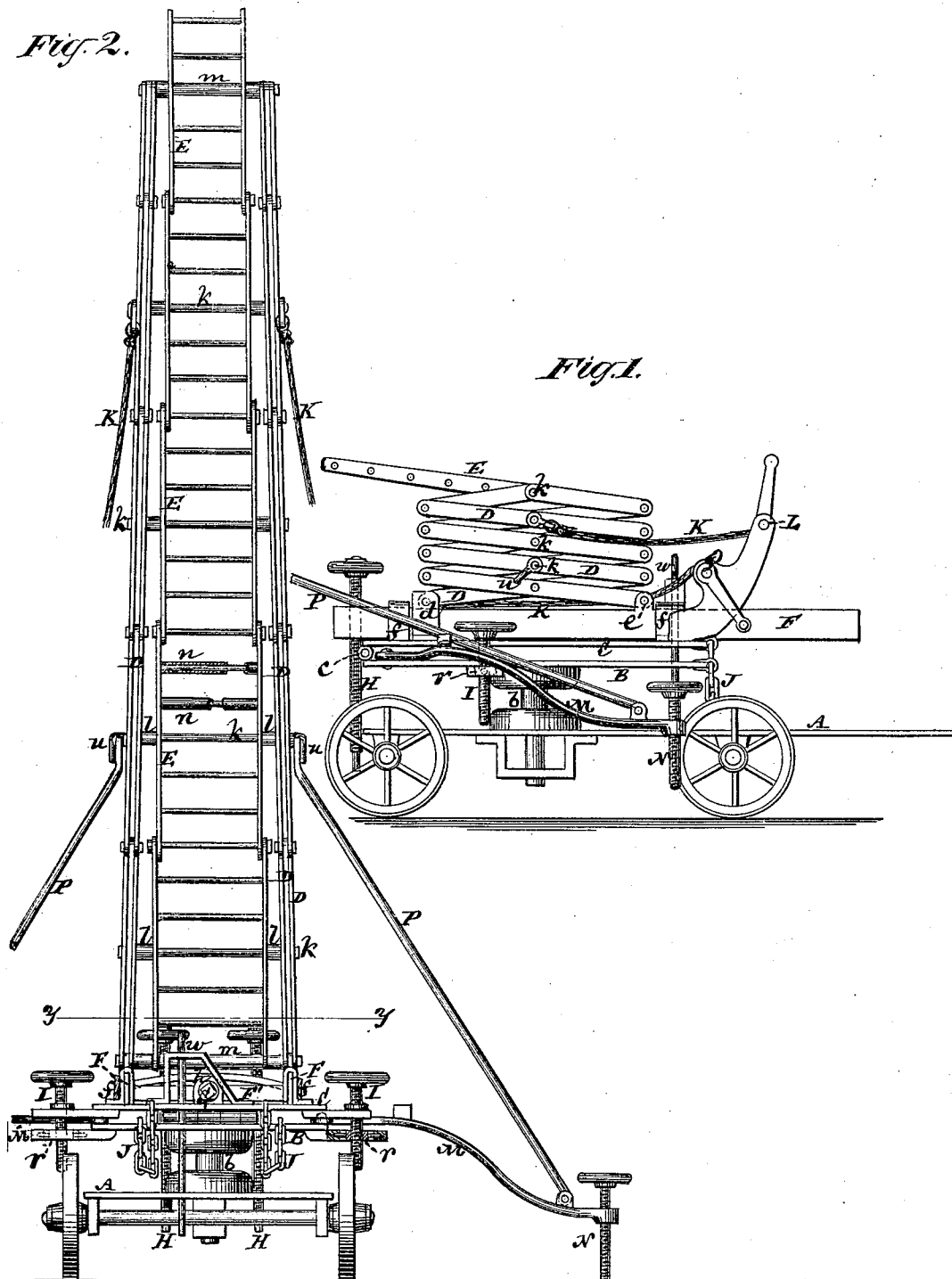


A. WILLIS.
FIREMEN'S LADDER.

No. 175,544.

Patented March 28, 1876.

Fig. 2.



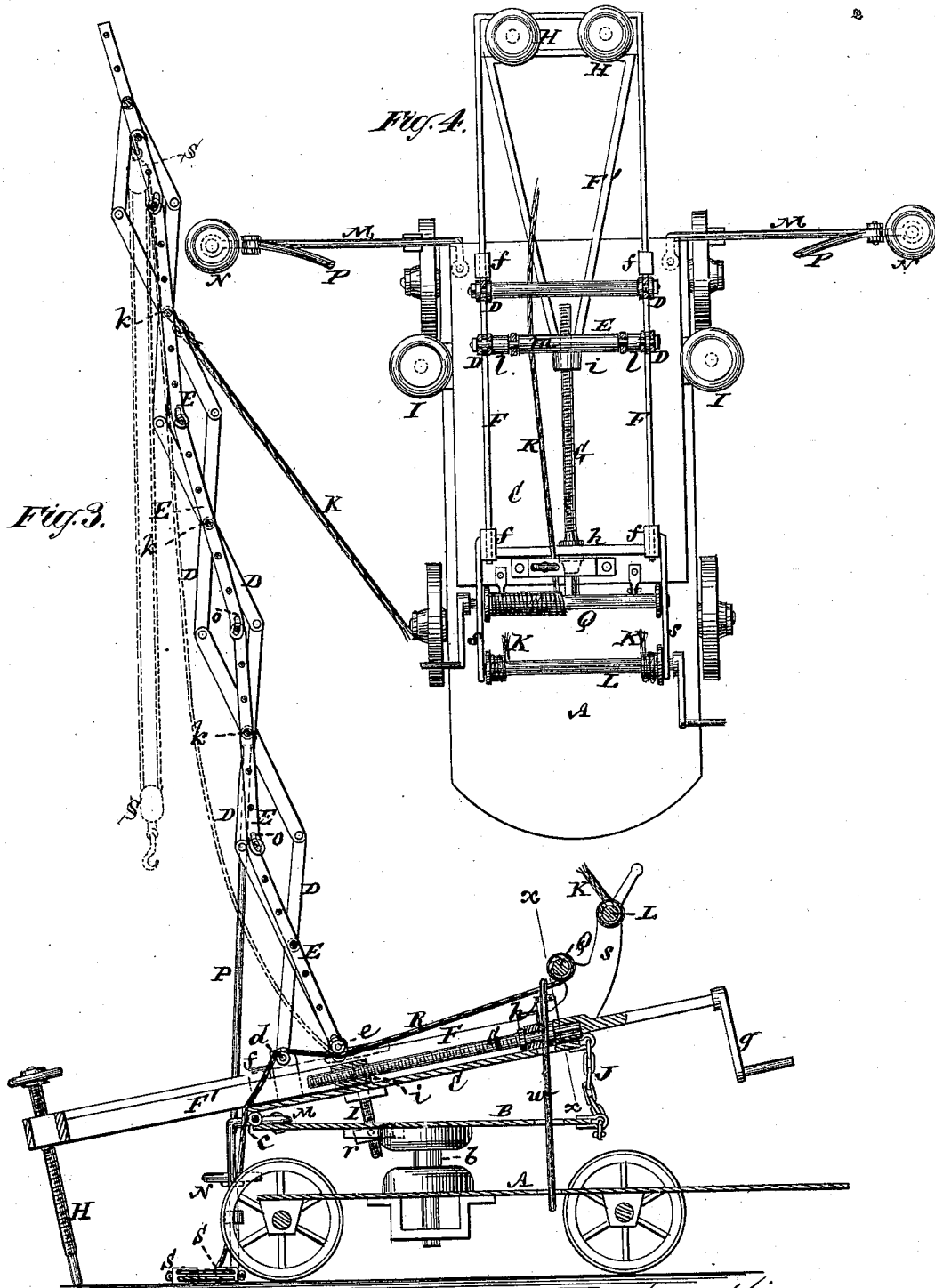
Witnesses
John Becker.
E. W. Haynes

Asa Wallis
Cyprus Attorney
Brown & Allen

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John Becker
Fred. Haynes

Asa Willis
by his Attorneys
Brown & Allen

UNITED STATES PATENT OFFICE.

ASA WILLIS, OF NEW YORK, N. Y.

IMPROVEMENT IN FIREMEN'S LADDERS.

Specification forming part of Letters Patent No. **175,544**, dated March 28, 1876; application filed January 26, 1876.

To all whom it may concern:

Be it known that I, ASA WILLIS, of the city, county, and State of New York, have invented certain new and useful Improvements in Portable Ladders and Derricks, applicable as a fire-escape, and for other purposes; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, which forms part of this specification.

This invention relates to that class of folding ladders and derricks, and fire-escapes, in which the folding sections of the ladder are combined with lazy-tongs levers, for the purpose of extending them.

My improvements consist in certain novel means of operating, adjusting, and bracing or staying the lazy-tongs frame and its attached ladder.

Figure 1 represents a side view of an apparatus constructed in accordance with my invention, and with the lazy-tongs frame and attached sectionally-constructed ladder, as lowered and closed. Fig. 2 is a sectional end view of the same, with the ladder and lazy-tongs frame raised or extended, said section being taken through the base frames or supports of the apparatus, as indicated by the line *x x* in Fig. 3, which is a side view of the apparatus, with the ladder and lazy-tongs frame raised or extended, and adjusted to incline from a vertical position. Fig. 4 is a horizontal section mainly, as indicated by the line *y y*.

A is a truck by which the apparatus is carried, and may be conveyed from place to place, as, for instance, when using it as a fire-escape. B is a lower working base frame or support, suitably mounted to swing horizontally, when required, on or above the truck, by means of an upright pivot or king bolt, *b*, to adjust the machine or apparatus to various positions. Hinged to this lower working base-frame B, at its back end, as at *c*, is an upper working base frame or support, C. D D is the lazy-tongs frame made in duplicate, with the sectionally-constructed ladder E E in between it. One of the lower levers of the lazy-tongs frame on both sides of the ladder is jointed at *d* to

a projection on the upper working base-frame C, and the other lower lever of the lazy-tongs frame on both sides of the ladder, pivoted at *e*, to a frame, F, which is fitted to slide longitudinally, either on rollers or plain surfaces, over the upper working base-frame C, and through slotted guides *f f* attached to said frame C.

G is a screw, which may either be single or double threaded, or compound. This screw, which forms the primary operating device, may be actuated by a crank or handle, *g*, and has its bearing in a fixed collar, *h*, at or near the one end of the upper working base-frame C. Said screw serves to operate the sliding frame F, and, by the hereinbefore-described attachment of the lower levers of the lazy-tongs frame, motion is communicated to the latter and its attached ladder, to raise and lower or fold and unfold them, as required. The connection of the screw G with the sliding frame F is through a nut, *i*, on an inner forwardly-projecting frame or branch frame, F', attached to or forming part of the sliding frame F. By this arrangement of the inner frame and nut I am enabled to use a short operating-screw, G, and the nut *i* is free to work between the guides *f f* of the sliding frame. Instead of the screw G having its bearings *h* on the upper working base-frame C, it may be similarly carried by the lower working base-frame B, and the branch frame F', which has the nut *i* attached to it, be hinged at its back to the sliding frame F. In this case, the upper base-frame C should be cut away to provide for the frame F' and nut *i* passing through it. By such arrangement of the screw G on the frame B, there is no lifting of it when the frame C is raised. The lazy-tongs lower levers may be bent at their lower ends to enable the screw to get a more direct pull on them.

Accordingly as the screw G is turned to the right or to the left, will the lazy-tongs frame D D and its attached ladder be lowered and folded, as represented in Fig. 1, or be unfolded and raised, as represented in Figs. 2 and 3.

When it is not required to swing or adjust the apparatus horizontally on its truck around the king-bolt *b*, but it is desired to keep the

working base-frames B C in line with the truck or in their normal position, then a locking-pin, *w*, is inserted through the frames B C and platform of the truck.

The central joint or fulcrum-rods *k* of the levers of the lazy-tongs frame D D may extend across from side to side of said frame, and be made to serve as the central rungs of the ladder-sections E E, which are fitted to freely turn on or with said rods. Washers *ll* are placed on these rods *k*, between the sides of the ladder-sections and the sides of the lazy-tongs frame, to stiffen and keep the ladder in position.

Metallic sleeves *m m* may also be arranged on the outer and central rungs of the ladder-sections, or either of them, between the sides of said sections to further stiffen the ladder.

It is proposed to cover or clothe the rungs of the ladder with sleeves *n n* of a soft and flexible material, such as rubber, gutta-percha, or leather, to prevent slipping of the feet when ascending the ladder. Only certain of the rungs are thus shown clothed in Fig. 2.

The ladder-sections E E, which are carried intermediately of their length by the central or fulcrum rods *k* of the lazy-tongs frame, as hereinbefore described, may be a little longer than the levers of said frame, and are jointed with each other at their meeting ends by connecting-rods or rungs passing in a close-fitting manner through the upper ends of the ladder-sections, and through curved slots *o* in the meeting or adjacent lower ends of the ladder-sections E E. This mode of attachment provides for the folding and unfolding of the ladder in common and in like manner with the lazy-tongs frame, between which the ladder is arranged, and by the central or fulcrum rods *k* of which it is carried.

Attached to the back or outer ends of the sliding frame F are underpinning-screws H H, for steadying or holding the apparatus when raised or extended.

To give the lazy-tongs frame and its attached ladder any desired inclination from a vertical position, the upper working base and hinged frame C are provided with one or more (preferably one on each side) adjusting-screws, I. These screws enter pivoted or rocking nuts *r* on or in the lower working base-frame B, which swinging or pivoted nuts provide for the curvature described by the adjusting-screws I in or during the up and down adjustment of the frame C. One or more chains, J, are attached to the opposite ends of the upper and lower working base-frame C B to check or stop the upper base-frame C when fully inclined or thrown up. The apparatus, when raised or extended, may also be supported, especially when set inclining backward, by means of ropes or chains K, attached at their one end to an upper central or fulcrum pin, *k*, of the lazy-tongs frame, and connected and operated at their opposite ends by a windlass, L, carried by arms *s* at the one or forward end of the upper base-frame C.

To brace the apparatus laterally, when raised or extended, the lower working base-frame B has pivoted to it, at or near its rear end, laterally-swinging rods or arms M, provided at their front ends with underpinning-screws N, which bite into or bear on the ground. These rods or arms M have jointed to them, at or near their forward ends, side braces P, which, when raised or extended, lock under or with hooks or projections *u* on or extending from one of the upper fulcrum-rods *k* of the lazy-tongs frame D D. These braces serve to give a spread and laterally-extended support to the apparatus when the rods M are thrown outward, and the underpinning-screws N are adjusted as required. When, however, it is not necessary to thus support the raised or extended apparatus at its sides, or when moving the apparatus from place to place, the braces P may be let down, and the same folded and shut sidewise, together with the rods or arms M, against or within the machine, as represented in Fig. 1.

By the construction of the apparatus as shown and described the sectionally-constructed ladder may be extended, so as to be straight, or nearly so.

To utilize the apparatus as a derrick for raising and lowering goods, there is carried by the arms *s* of the frame C a windlass, Q, to which is fastened the one end of a rope or "fall," R, of tackle-blocks S S, the one of which is hooked onto an upper rung of the ladder E E, or upper fulcrum-rod *k* of the lazy-tongs frame, and the other or moving block has the goods to be raised or lowered attached to it. When such hoisting or lowering attachment is not required to be used it is simply unhooked from the ladder-rung or fulcrum-rod of the lazy-tongs frame, and allowed to drop to the ground, or is packed away on one or other of the working base-frames, or on the platform of the truck.

Fig. 3 shows by full and dotted lines said pulley or tackle-block attachment in its liberated position and in working connection with a rung of the ladder.

I claim—

1. The combination of the lower working base-frame B, the upper working base-frame C, hinged at or near its one end to the frame B, the slide F, and the lazy-tongs frame D D, with its attached sectionally-constructed ladder E E, essentially as described.

2. The combination of the screw G with the nut *i*, attached to the inner forwardly-projecting frame F', the main sliding frame F, and the slotted guides *f f*, substantially as specified.

3. The ladder-sections E, provided with curved slots *o* at their lower ends, in combination with the outer rungs passing through said slots and through the upper ends of adjacent ladder-sections, the lazy-tongs frame D D, and the fulcrum-rods *k* of said frame, essentially as described.

4. The combination of one or more end un-

derpinning-screws, H, with the sliding frame F and the lazy-tongs frame D D, with its attached ladder, substantially as specified.

5. The combination, with the hinged upper working base-frame C and lower working base-frame B, of the side adjusting-screws I I and the pivoted nuts *r r*, essentially as described.

6. The windlass L, and rope or chain braces K, operated by said windlass, in combination with the lazy-tongs frame D D and upper adjustable base-frame C, substantially as specified.

7. The pivoted or jointed side braces P, in combination with the laterally-swinging side arms or rods M, the underpinning-screws N, and the hooks or projections *u u*, with or under which the braces P lock, essentially as described.

ASA WILLIS.

Witnesses:

BENJAMIN W. HOFFMAN,
FRED. HAYNES.