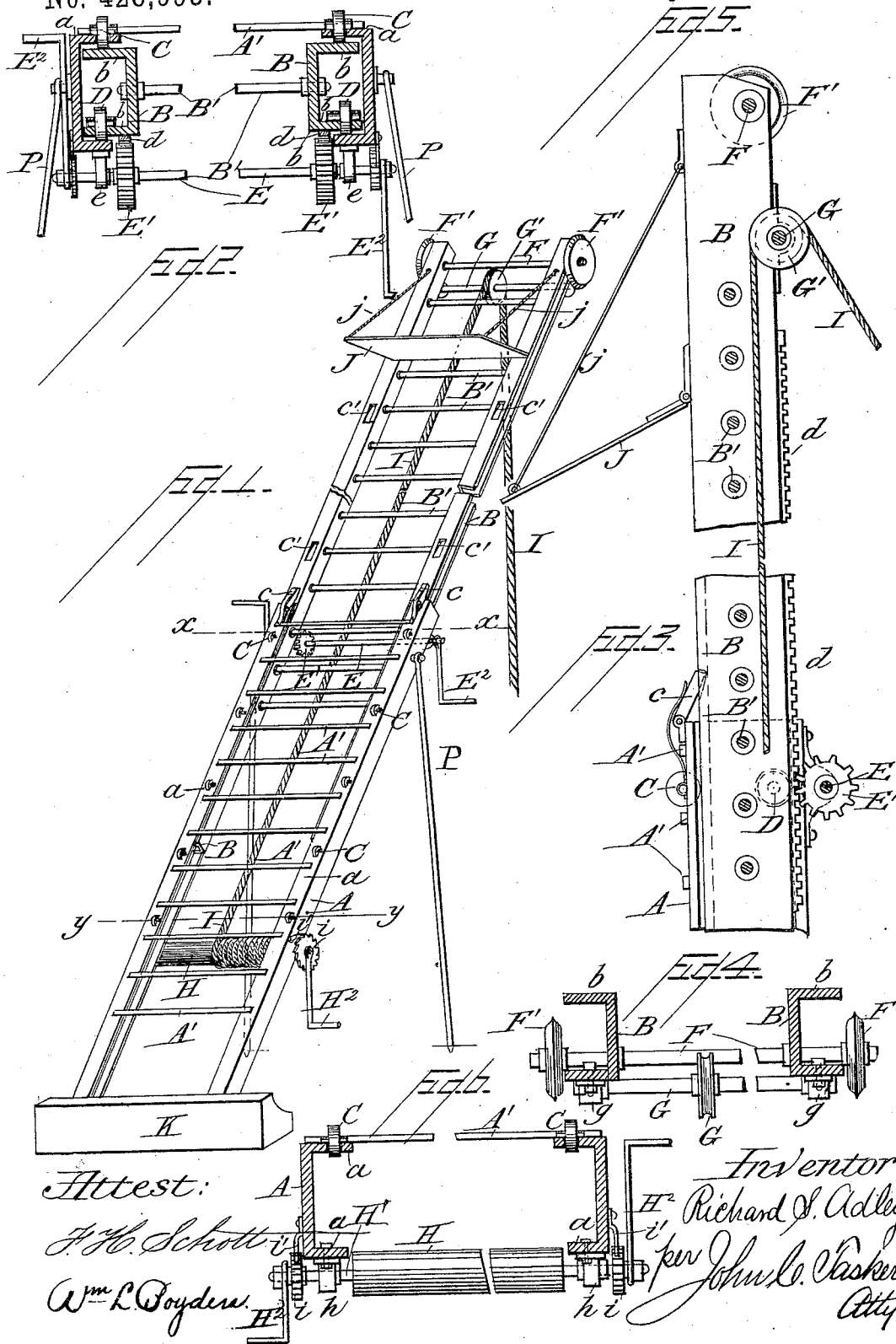


(No Model.)

R. S. ADLEY.
EXTENSION LADDER.

No. 428,995.

Patented May 27, 1890.



UNITED STATES PATENT OFFICE.

RICHARD S. ADLEY, OF MUSKEGON, MICHIGAN.

EXTENSION-LADDER.

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To all whom it may concern:

Be it known that I, RICHARD S. ADLEY, a citizen of the United States, residing at Muskegon, in the county of Muskegon and State of Michigan, have invented certain new and useful Improvements in Extension-Ladders; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to an improvement in that class of devices denominated "ladders," and particularly to that division of the class known as "fire-ladders," the object of my present improvements being to simplify, perfect, and cheapen the construction of extensible fire-ladders and enable the same to perform more valuable and useful service than heretofore; and the invention consists in the construction, arrangement, and combination of parts, substantially as will be hereinafter described, and then more particularly pointed out in the ensuing claims.

In the accompanying drawings, which assist in more clearly defining and pointing out the character of my present invention, Figure 1 is a perspective view of my improved extensible fire-ladder. Fig. 2 is a horizontal sectional plan view on the line *xx* of Fig. 1. Fig. 3 is an enlarged detail side view of a portion of the upper ladder. Fig. 4 is a sectional end view at the top of the device. Fig. 5 is an enlarged detail side view of the upper end of the upper ladder. Fig. 6 is a horizontal cross-sectional plan on the line *yy* of Fig. 1.

Like letters of reference designate corresponding parts throughout all the different figures of the drawings.

My improved fire-ladder consists, essentially, of two main parts, one of which slides within the other, so that the total length of the ladder may be made longer or shorter, as desired. This total length will of course vary with different ladders, and will depend upon the length of each section. For instance, a ladder having each of its sections or main parts twenty-five feet long would when said parts are extended form a ladder having a length of fifty feet, and when the parts are

closed obviously the length of the ladder would be but twenty-five feet.

The proportions and size of the main ladder-sections, as well as of the other constituent and incidental parts, may vary at the pleasure of the constructor and user of the ladder, and I am limited to no precise form or size.

The lower ladder-section consists of side bars made hollow or with grooves to receive the upper ladder-section when the two parts are closed together. These side bars have the side portions *AA*, provided with the right-angled flanges or sides *aa*. By referring to Fig. 2 the construction of these side bars will be clearly seen, and it will be evident that they afford guideways within which the upper ladder-section may slide. The said side bars are connected together by means of a series of parallel horizontal rounds *A'*, secured to the outer faces of the flanges or sides *aa*, as indicated.

The upper ladder-section is constructed similarly to the lower ladder-section. It likewise has side bars composed of flat sides *BB*, which are provided with the sides *bb* at right angles thereto, so that these side bars are three-sided and hollow. These side bars are connected together by a parallel series of horizontal rounds *B'*, which are bolted or otherwise securely fastened to the flat sides *B*. (See Fig. 2.)

The upper ladder-section is located within the lower ladder-section, so as to slide conveniently and smoothly therein, it being arranged, as shown, with the sides *bb* of the side rails located contiguous to the sides *A* of the side bars of the lower ladder-section, so that in reality it may be said that the side bars of the lower section have a construction the reverse of that of the side bars of the upper ladder-section.

In order that the upper section may move freely and quickly and that friction may be avoided, I provide rollers located at suitable distances apart.

The upper ladder-section is provided with one series of rollers and the lower ladder-section with another series of rollers.

C C C indicate the rollers with which the lower ladder-section is provided. They are

located in slots in the flanges or sides *a a* on the upper side of the ladder, supposing the same to be in the inclined position of Fig. 1. Said rollers *C C* have their spindles journaled in suitable bearings formed on the top faces of the sides *a a*, by which the rollers are carried, and the peripheries of the rollers projected within the side bars, so as to be in contact with the faces of the sides *b b*, belonging to the side bars of the upper ladder-section. Furthermore, said upper ladder-section has its rollers *D D D* located in slots in the lower sides *b b*, the spindles of said rollers being held in suitable bearings on the face of said sides *b b*, and the peripheries of these rollers *D D* projecting through the slots wherein the rollers are located, so as to come into convenient contact with the lower flanges or sides *a a* of the side bars of the lower ladder-section, all of which is clearly represented in Fig. 2 of the drawings. By this arrangement it will be seen that the upper ladder-section moves between these anti-friction rollers, and hence the ladder is capable of being extended with ease and promptness.

The top ends of the side bars of the lower ladder-section are provided with dogs or catches *c c*, pivoted to said upper ends of the side bars, as indicated in Fig. 3, and adapted to enter notches *c' c'*, located at convenient distances apart on the face of the side bars of the upper ladder; hence the upper ladder is by means of these dogs held at any desired point to which it may have been extended. In order to cause the dogs to engage the upper ladder, it is simply necessary to throw them into engagement with the notches or indentations just referred to. These dogs are severally provided with a spring consisting of a flat piece of steel of suitable size and strength, one end of which is fastened to the side bars of the lower ladder. The other rests upon the dog at a suitable point near the end which engages with the notches or indentations just referred to, by means of which springs the dogs become self-acting and enter into engagement with the notches or indentations just referred to by the force exerted by the steel springs. As the ladder is extended, these dogs pass over the notches with a sharp forcible click induced by the steel springs, and as points of the dogs engage with the notches or indentations the ladder is held firmly in position at any point or degree of extension.

In order to extend the ladder and cause the upper section thereof to ascend, I provide the horizontal shaft *E*, located in bearings *e e*, affixed to the side bars of the lower ladder-section, said shaft being provided with the crank-handles *E² E²*, one at each end of the shaft. On the shaft *E* are two gears *E' E'*, which engage rack or toothed bars *d d*, secured to the edges of the upper ladder, as shown; or there may be a single gear which engages a rack or toothed bar secured at the middle of the

rounds of the upper ladder. It is evident, therefore, that if the handles *E² E²* are grasped and the shaft *E* rotated the gears or single gear, as the case may be, being in mesh with the toothed bars or bar, as the case may be, will operate to lift or depress the upper ladder, as the case may be. In this manner the upper ladder is easily extended to the desired limit, at which it is held as long as desired by causing the aforesaid dogs to properly engage the upper ladder. In addition to these dogs there is a ratchet-wheel on each end of the shaft *E*, into which a dog or pawl plays and assists the dogs *c c* in keeping the ladder at the desired elevation and in preventing it from slipping or falling, and in holding it firmly in position at any point or degree of extension. The last-named ratchet-wheels are so arranged on the axle as not to engage the dogs simultaneously, but alternately.

The upper ladder is provided at its upper end with a horizontal shaft *F*, journaled therein and carrying at each end a wheel or roller *F' F'*. These two wheels *F' F'* are of considerable size—say, preferably, about a foot or more in diameter—and they are capable of revolution on the shaft *F*, which carries them. These rollers are each formed with two sharp peripheral edges, resembling in form somewhat two saucers placed face to face. The purpose of the sharp edges on the rollers is to enable the ladder to be held firmly against the wall which supports it, so that all slipping thereof upon the wall may be prevented and that it may have a tight and secure grasp. Furthermore, the rollers or wheels are made of considerable diameter, so that they may readily pass over projections on the side of the house, such as window-sills and other similar projecting parts. As the ladder is being elevated and its upper end is mounting along the side of the building, said end might be abruptly brought in contact with these projecting parts, and the same might be damaged or the ladder might be injured or impeded in its movement were it not for the provision of these guide-rollers. They permit the ladder to have an easy ascending motion along the side of the building, so that when projecting parts are encountered they easily ride upon the same, and thus the upper end of the ladder is guided freely and accurately toward the point of destination. Furthermore, the top portion of the upper ladder is provided with a platform *J*, which is hinged to the side bars, as indicated in Fig. 5, and which is supported by ropes *j j*, fastened to the platform near its outer edge, and fastened likewise to the side bars of the upper ladder. This platform will be in a substantially horizontal position when the ladder is in position against the side of the building, and it serves to enable the person ascending the ladder to mount upon the roof of the house more easily, and obviates the difficulty of getting onto a roof after the up-

per end of the ladder has been placed beneath the cornice or eaves of the building. The platform extends out, say, about three feet or so, and by its use the facility and ease with which the action of the firemen or other person may work are greatly enhanced.

Near the lower part of the lower ladder is a drum or roller H, mounted on an axle H', turning in bearings h h, carried by the side bars of the lower ladder, said axle H' being provided at one or both ends with a crank-handle H², whereby it is manipulated. Said shaft or axle H' carries also a ratchet-wheel i, which is engaged by a pawl i', pivoted to one of the side bars. Around this drum or roller H is wound a rope I, which runs upward and passes around a grooved pulley G', carried by a shaft G, the ends of which are journaled in bearings g g on the side bars of the upper ladder near the upper end of these bars. The rope I, after passing around this grooved pulley or sheave, passes downward behind the ladder, as indicated in Fig. 1. This windlass-and-rope arrangement will serve many valuable uses in connection with the other parts of my improved fire-ladder. By it objects may be lowered from the top of the ladder without requiring the person to carry them down by a descent upon the rounds or steps thereof. It may be used as an elevator to carry up tools or fire-extinguishers, or anything else that may be required, or to elevate a box into which children or infirm people may be put and lowered to the ground. In many ways it may be brought into useful service.

P denotes a rod secured at its upper end to the lower section of the ladder at a point near the upper end thereof. This rod P is of a convenient length and size, consisting, preferably, of gas-pipe of suitable size, plugged with wood and provided at its lower end, preferably, with a wrought-iron point. It is designed as the ladder is raised to rest at its lower end upon the ground, and to gradually change its position, and thus keep it from swaying at any point or degree of ascension.

K denotes the base of the ladder, consisting of a suitable block, to which the ladder is attached for use. This base is intended to be carried on the front of a wagon used by the fire department, or it may be used in the street, upon which to place the lower end of the ladder when it is to be elevated.

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

1. In a ladder, the combination of the lower ladder-section having its side bars composed of a flat side provided with right-angled sides, the upper ladder-section having its side bars located within the side bars of the lower ladder-section, and similarly constructed with flat sides provided with right-angled sides, said side bars of the two sections having their recesses or cavities located toward each other, and the devices for sliding the upper ladder-section, and thus extending the length of the ladder.

2. The combination of the lower ladder having side bars consisting of flat sides provided with sides at right angles thereto to form grooves, the rounds secured to the right-angled sides of said side bars, the upper ladder having its side bars composed of flat sides provided with right-angled side, and the rounds secured to said flat sides of the side bars, the series of rollers arranged in the side bars of the lower ladder and in the side bars of the upper ladder to give said upper ladder a free and easy movement when being manipulated, and the devices for manipulating the same, as described.

3. The combination of the lower ladder having its side bars composed of sides provided with right-angled pieces, the upper ladder having its side bars composed of sides provided with right-angled pieces, said side bars of the upper and lower ladders having their grooves or recesses located toward each other, the series of rollers arranged in the side bars of the lower ladder and the series of rollers arranged in the side bars of the upper ladder, the operating-shaft carrying gears engaging toothed bars on the upper ladder, and the dogs for holding the upper ladder in its extended position, as specified.

4. The combination of the lower ladder with its hollow side bars provided with a series of rollers, the upper ladder with its hollow side bars located within the side bars of the lower ladder, and thus presenting its cavity or recess opposite that of the lower ladder, and similarly provided with a series of rollers, the shaft with its gears engaging racks on the side bars of the upper ladder, the large guide-wheel at the upper end of the upper ladder, and the dogs for holding the upper ladder when extended, as specified.

In testimony whereof I affix my signature in presence of two witnesses.

RICHARD S. ADLEY.

Witnesses:

ROBT. E. BUNKER,
JOSEPH A. HANNA.