

(No Model.)

4 Sheets—Sheet 1.

H. HOFFMANN.
EXTENSIBLE LADDER TOWER.

No. 526,318.

Patented Sept. 18, 1894.

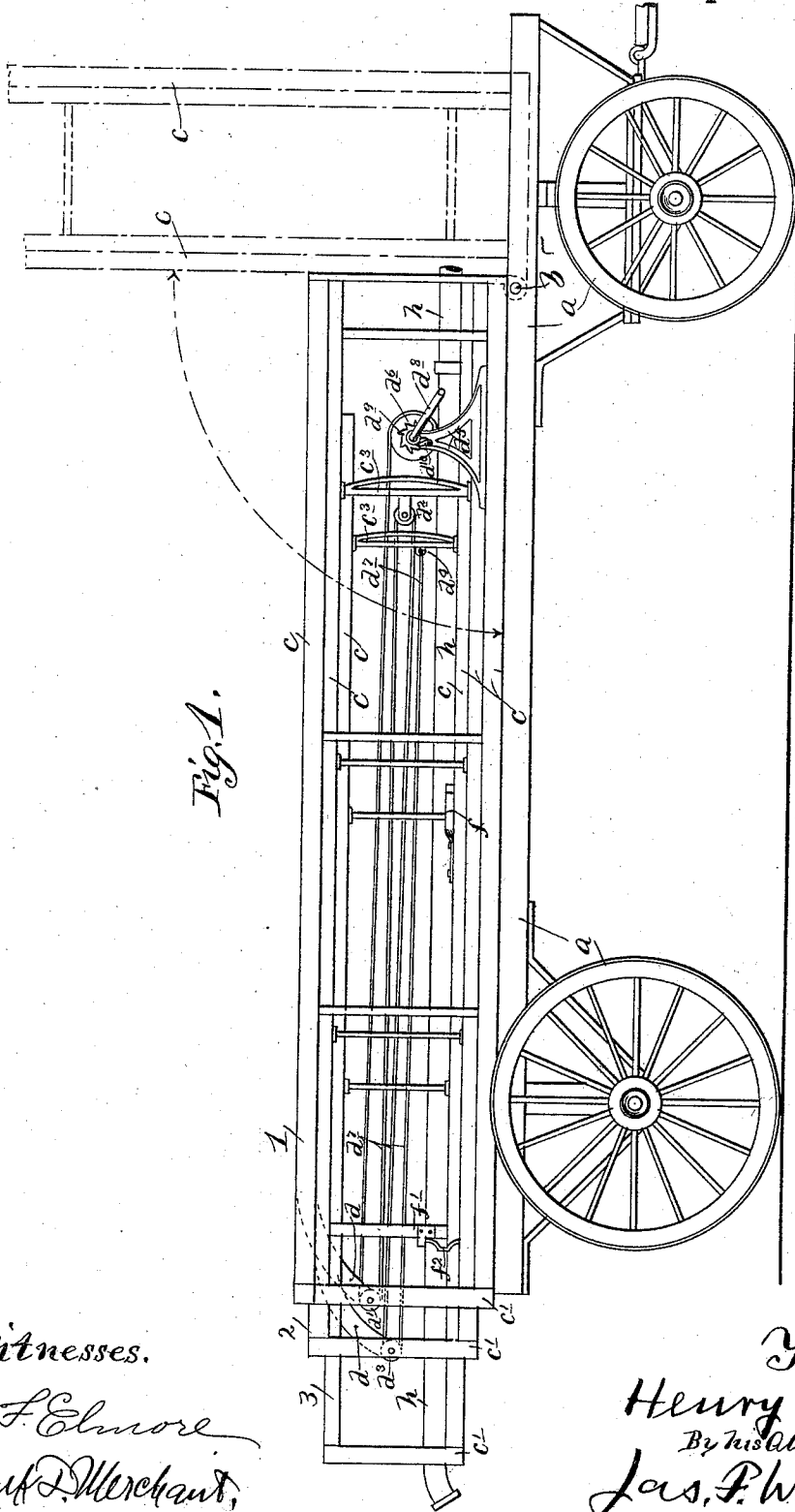


Fig. 1.

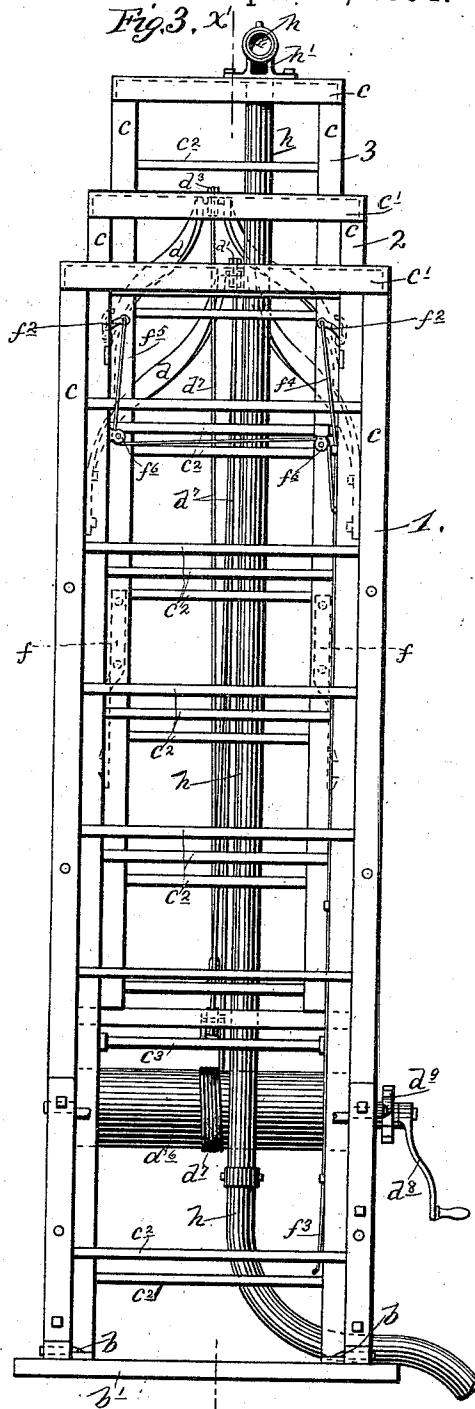
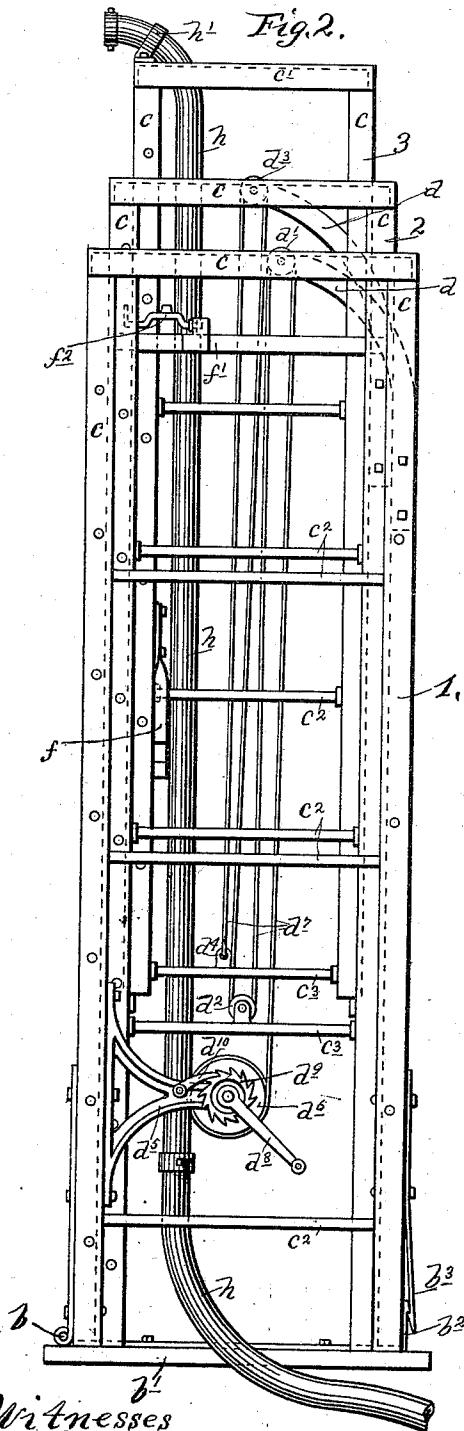
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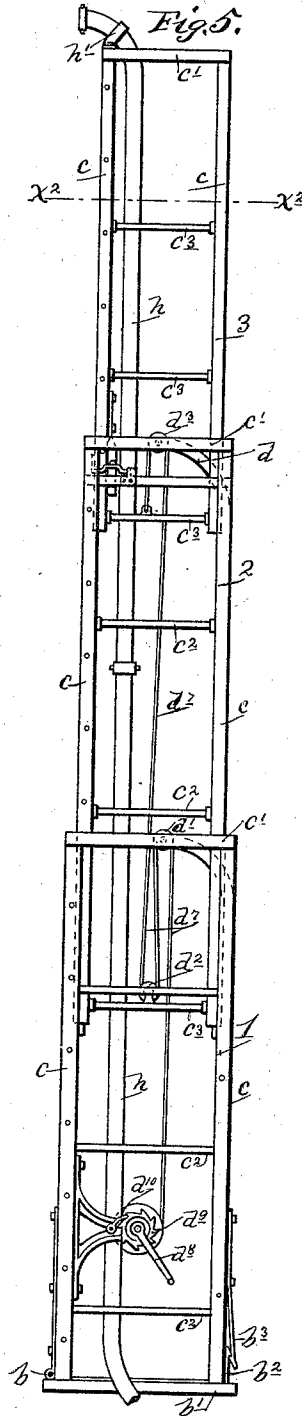
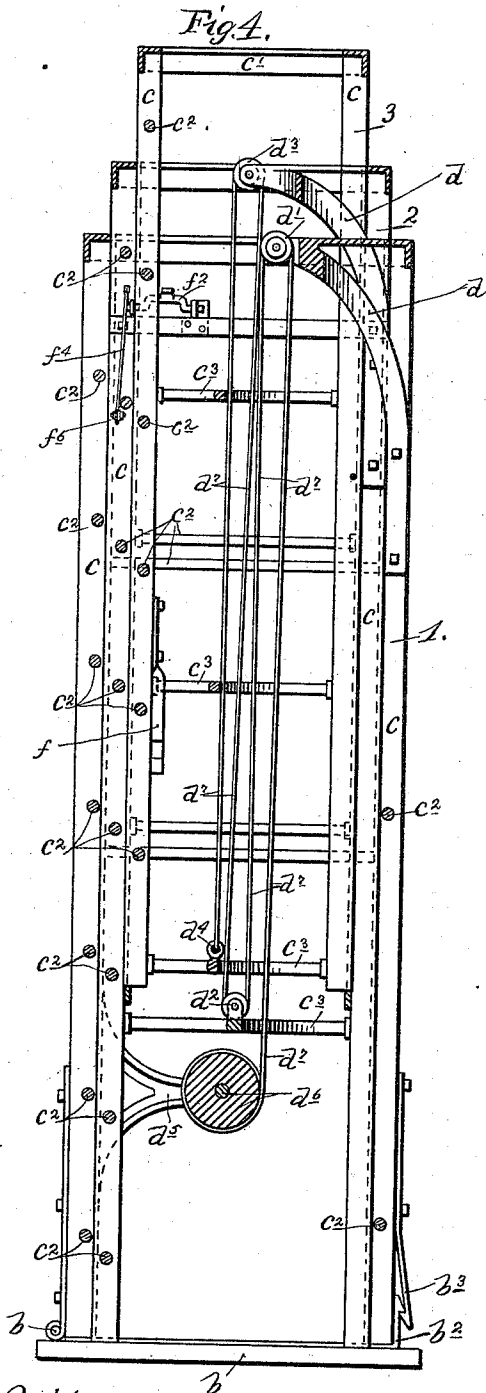
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Fig. 6.

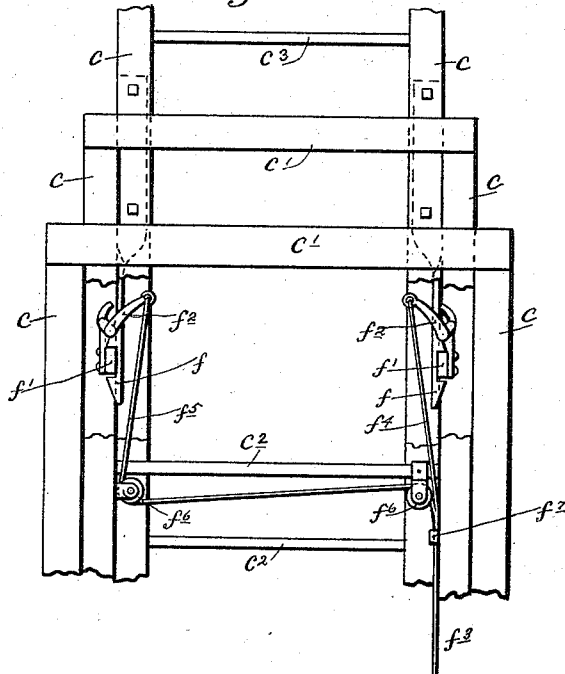


Fig. 8.

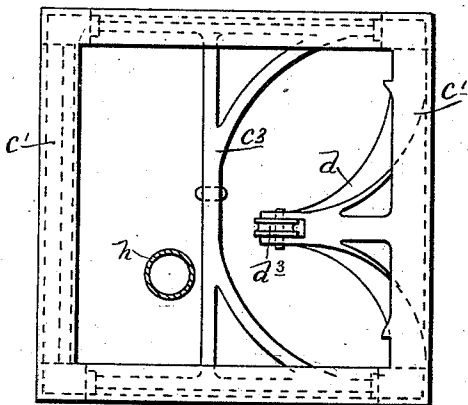
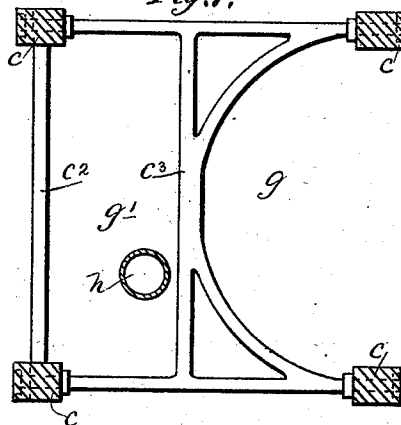


Fig. 7.



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UNITED STATES PATENT OFFICE.

HENRY HOFFMANN, OF MINNEAPOLIS, MINNESOTA.

EXTENSIBLE LADDER-TOWER.

SPECIFICATION forming part of Letters Patent No. 526,318, dated September 18, 1894.

Application filed May 1, 1894. Serial No. 509,645. (No model.)

To all whom it may concern:

Be it known that I, HENRY HOFFMANN, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Extensible Ladder-Towers; 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.

My invention has for its object to provide an improved ladder tower, for firemen's use.

To this end, my invention consists of certain novel devices and combinations of devices, which will be hereinafter fully described and be defined in the claims.

The accompanying drawings illustrate my invention, wherein, like letters and figures referring to like parts—

Figure 1 is a side elevation, showing the ladder-tower, as mounted on a truck, laid down into its horizontal position. Fig. 2 is a right side elevation, and Fig. 3 is a front elevation of the ladder-tower, detached. Fig. 4 is a vertical section, from front to rear, on the line X' X' of Fig. 3. Fig. 5 is a right side elevation, showing the parts as drawn out into their most extended position, the view being on a small scale, as compared with the other figures. Fig. 6 is a detail in front elevation, with some parts broken away, showing the catches for locking the second and third sections together, to move as one, and the trip-levers for releasing the same. Fig. 7 is a cross section, on the line X² X² of Fig. 5; and Fig. 8 is a plan view of the top section, detached.

The truck *a*, on which the ladder-tower is to be mounted, may be of any suitable construction; and the ladder-tower may be pivotally connected thereto, in any suitable way, which will afford the necessary power for turning the same from its horizontal to its upright position, or vice versa. For purposes of illustration merely, the ladder-tower is shown as connected to the truck, by a hinge *b*, secured to a base-plate *b'*.

The ladder-tower is shown, as composed of three sections, marked with the numerals 1, 2 and 3. Each of these ladder sections has several sides, four as shown, the several mem-

bers of which unite with each other, to form a self bracing structure of tower-like form, with a central hollow shaft or space between the skeleton frame formed by the four sides of the ladder. As shown, each section consists of corner standards *c*, rectangular skeleton-caps *c'* and suitable rungs or cross-braces uniting the said standards. These rungs in the case of the lower or base section 1, are in the form of cross-bars or rods *c²*, bolted or riveted to the standard *c*. In the case of the intermediate or middle section 2, they are the same as in the lower section, the exception of the fact, that the rungs at the back are omitted, for a purpose which will presently appear, and that the rungs at the lower end of the said second section, are formed integral with cross-braces of yoke like form, constituting a single casting *c³*, the sides of which make up the rungs for the sides of the tower, and the central portion and the curved portions of which serve to rigidly brace the back standards from the other parts of the structure. The front rung at the same level as the casting *c³*, is similar to the rungs *c²*, employed for the steps of the lower or base section and all of the second section, except the lower member made up of the castings *c³*. All the rung-members of the upper section 3, are made up of castings *c³*, like that just described, cooperating with individual rungs *c²*, at the front of said section.

To the back of the base section 1, and the second section 2, at the upper ends of the same, are fixed inwardly projecting sheave brackets *d* of crane-like form, the upper portions of which may be formed integral with the rear sections of the cap-frames *c'*. In these brackets *d*, are mounted sheaves *d'* *d²*. The lower casting *c³* of the second section, is provided with a sheave *d²*, at its center; and the lower casting *c³* of the upper section, is provided at its center, with an eye-lug or hook *d⁴*. On brackets *d⁵* projecting from the standards of the lower section 1, is mounted a windlass-roller *d⁶*, from which extends a cable *d⁷*, which passes over the sheaves *d'* *d²* *d³*, in the order named, and has its outermost end secured to the eye-lug *d⁴*, on the base casting *c³* of the top section. The windlass roller *d⁶* is provided with an operating crank-handle *d⁸* and a ratchet *d⁹*, with which ratchet

a retaining pawl d^{10} co-operates, in the usual way, for holding the windlass-roller, whenever set.

The top section 3, is provided with spring catches f (see Fig. 6) which are adapted to engage under inside rungs f' , fixed to the second section, near the top of the same, and serve to limit the upward movement of the top section, on the second section and to support the same, when the said parts are engaged from the second section. Bell crank levers f^2 are carried by the second section, the short arms of which are in position to bear against the outer surfaces of the spring-catches f , for releasing the same from the rungs f' , at will, as when it is desired to lower the ladder. An operating flexible connection f^3 , composed of rope or other suitable material, has branches $f^4 f^5$, connected to the long arms of the bell-crank levers f^2 ; for permitting an operator, at the windlass level, to pull the said trip-levers inward and release the catches f from the rungs f' , at will. The rope branch f^5 passes over suitable guide-sheaves f^6 , for properly directing the pull of the rope on the trip-lever. The body portion of the said rope is shown as passing through suitable guide-keepers f^7 , on the ladder section 2. With this construction, on the initial action of the windlass, the top or third section will be first moved upward to its limit, when by the camming action of the parts, the catches f will engage with the inner rungs f' , on the second section of the ladder; and thereupon, on the further movement of the windlass, the two sections 2 and 3, will be moved upward together, and be held by the cable and the windlass.

On the reverse motion of the windlass, the two upper sections will be lowered together to the downward limit of the second section; and when this point is reached, the trip-levers f^2 will be operated, by the trip-rope f^3 , thereby permitting the upper section to be lowered to its downward limit, under the further unwinding motion of the windlass. The fact that the second section is open at its back and is provided with the yoke-like casting c^3 , at the bottom, and the fact that all the rungs and cross braces of the upper section are composed of these yoke-like castings c^3 , affords the necessary clearance, for permitting the two movable sections to pass the sheave brackets $d d$. These yoke-like castings c^3 on the upper section, serve to divide the tower-shaft into two compartments $g g'$, in the back member of which extends the cables m , for effecting a telescoping movement; and in the front member g' of which, is located a hose section h , which may be secured thereto in any suitable way, such as by keeper-brackets h' , fixed to the ladder-section and embracing the hose. With this construction, the hose section h will be movable with the uppermost ladder section, and will be always available for connection with the supply and de-

livery sections of the water-hose; and in virtue of the casting c^3 , the said hose section h is afforded a free passage-way, in the compartment g' which is protected from interference from the ladder-cables. As hereinbefore stated, the lower ladder section is shown as provided with a rectangular base-plate b' , to which the said ladder section 1, is hinged or pivoted, as shown at b , with the said base b' shown as secured to the truck, for purposes of illustration, in Fig. 1. As shown in the other views, the base section b' is provided with detents b^2 , which are engageable by spring-catches b^3 , fixed to the said lowermost ladder section, for holding the ladder in its upright position, in respect to the said base-plate b' . As before stated, these parts b to b^3 inclusive, are simply illustrative of some means, for securing the ladder-tower to the truck, with freedom for turning the same from the horizontal to the vertical position. In practice, these parts would have to be of a much more substantial character than is here shown; and for convenience and quick handling, power devices would have to be provided, for effecting this pivotal movement of the tower.

From the foregoing description and an inspection of the drawings, it will be seen, that the second section telescopes within the first section, and the third section within the second section; that all the sections are self-bracing and that the whole tower is self-supporting on the base section. I believe this to be a new principle of construction for extension ladders. As shown, the different sections are four-sided, and this is the desirable construction; but they might be made self-supporting, if composed of three sides or if constructed in the form of cylindrical shell. The multiple side-ladder tower, is not only an advantage in this respect of being self-supporting, but affords a large amount of ladder surface available for use by a number of different firemen, when necessary. The whole structure is comparatively simple and cheap to make, and is capable of quick manipulation for the purposes required. Changes, of course, might be made in the details of the construction, without departing from the spirit of my invention.

In practice, the ladder-tower may, of course, have any desired number of telescoping sections, to afford the requisite elevation. For ordinary service, a single sliding section is sufficient; in which event, the intermediate section 2 would be dispensed with and the upper section 3 be made to telescope directly with the base section 1.

What I claim, and desire to secure by Letters Patent of the United States, is as follows:

1. The combination with the multiple sided ladder-tower composed of telescoping sections, of a windlass on the lowermost or base section, sheaves on inwardly projecting brackets fixed to all except the uppermost section,

and a single cable running over said sheaves to said windlass and operative to extend the ladder, substantially as described.

2. The combination with the multiple sided ladder tower composed of telescoping sections, of the windlass on the base sections, hoisting sheaves on all except the top section, a single cable running over said sheaves to said windlass, means for locking two or more of the telescoping sections to move together as one, and means for unlocking the same to permit the upper to be lowered on the next lower elevated section, substantially as described.

3. The extensible ladder-tower composed of telescoping sections, the upper member of which is provided with central cross braces dividing the shaft into two vertical compartments, a hose section secured to said upper ladder section in one of said compartments and hoisting cables, for said upper section, working in the other of said compartments, substantially as described.

4. In the multiple sided tower-like ladder, the combination with the crane-like sheave

brackets, of the yoke-like center braces on the movable ladder sections, for affording clearance to pass said sheave brackets, substantially as described.

5. The combination with the ladder section 3, having the spring catches f , of the ladder section 2 having the detent rungs f' , the pivoted bell-crank trip levers f^2 , for releasing said catches with a camming action, and the trip rope or connection $f^3 f^4 f^5$, all arranged and operating, substantially as described.

6. The combination with the ladder sections 1, 2 and 3, of the sheave brackets d , secured to the sections 1 and 2, and the yoke-like castings c^3 forming all the cross braces and side rungs of the upper section, and the lower brace for the second section 2, substantially as described.

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

HENRY HOFFMANN.

Witnesses:

JAS. F. WILLIAMSON,
E. L. ELMORE.