

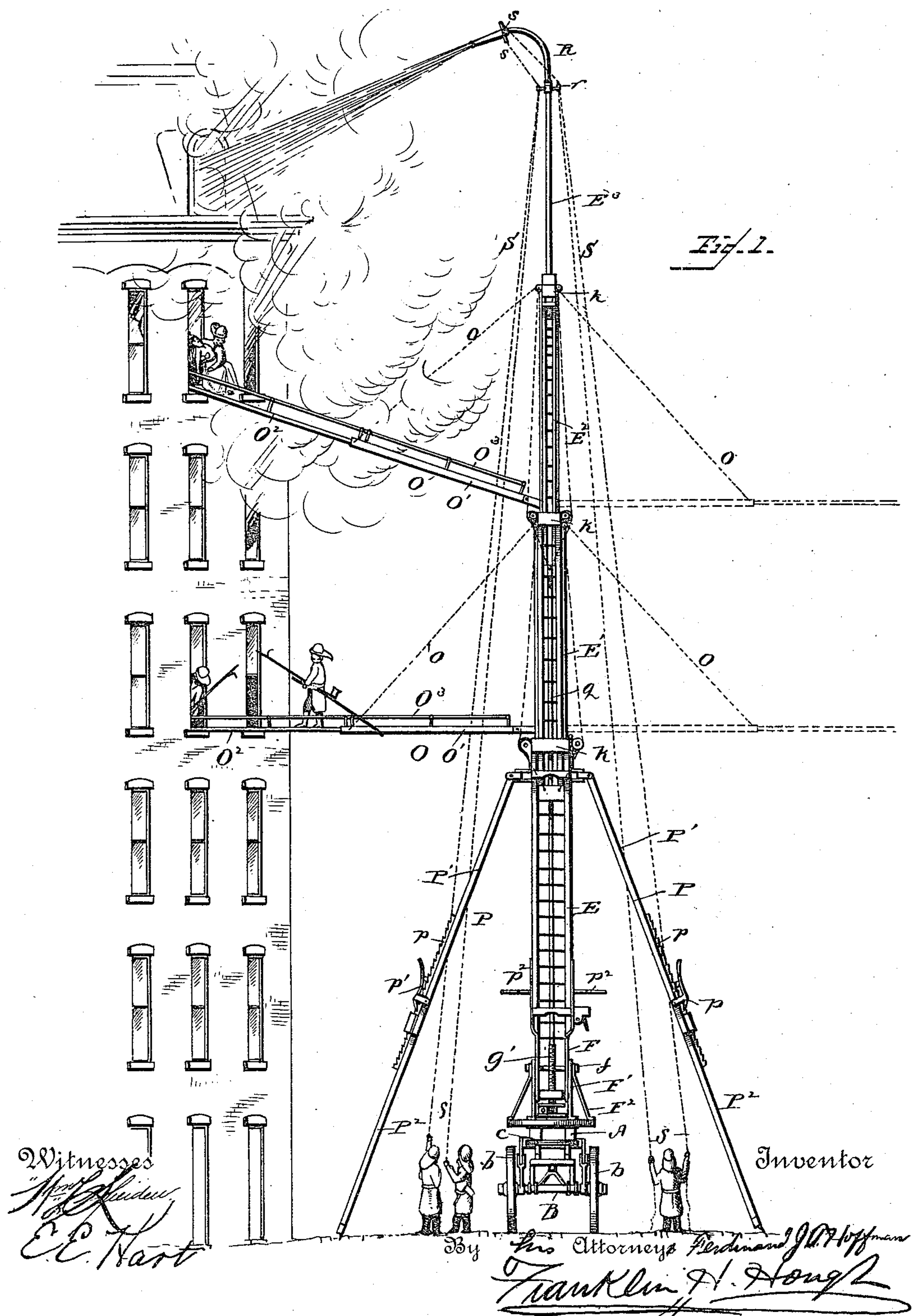
(No Model.)

5 Sheets—Sheet 1.

F. J. A. HOFFMAN.
FIRE ESCAPE TOWER.

No. 440,827.

Patented Nov. 18, 1890.



(No Model.)

5 Sheets—Sheet 2.

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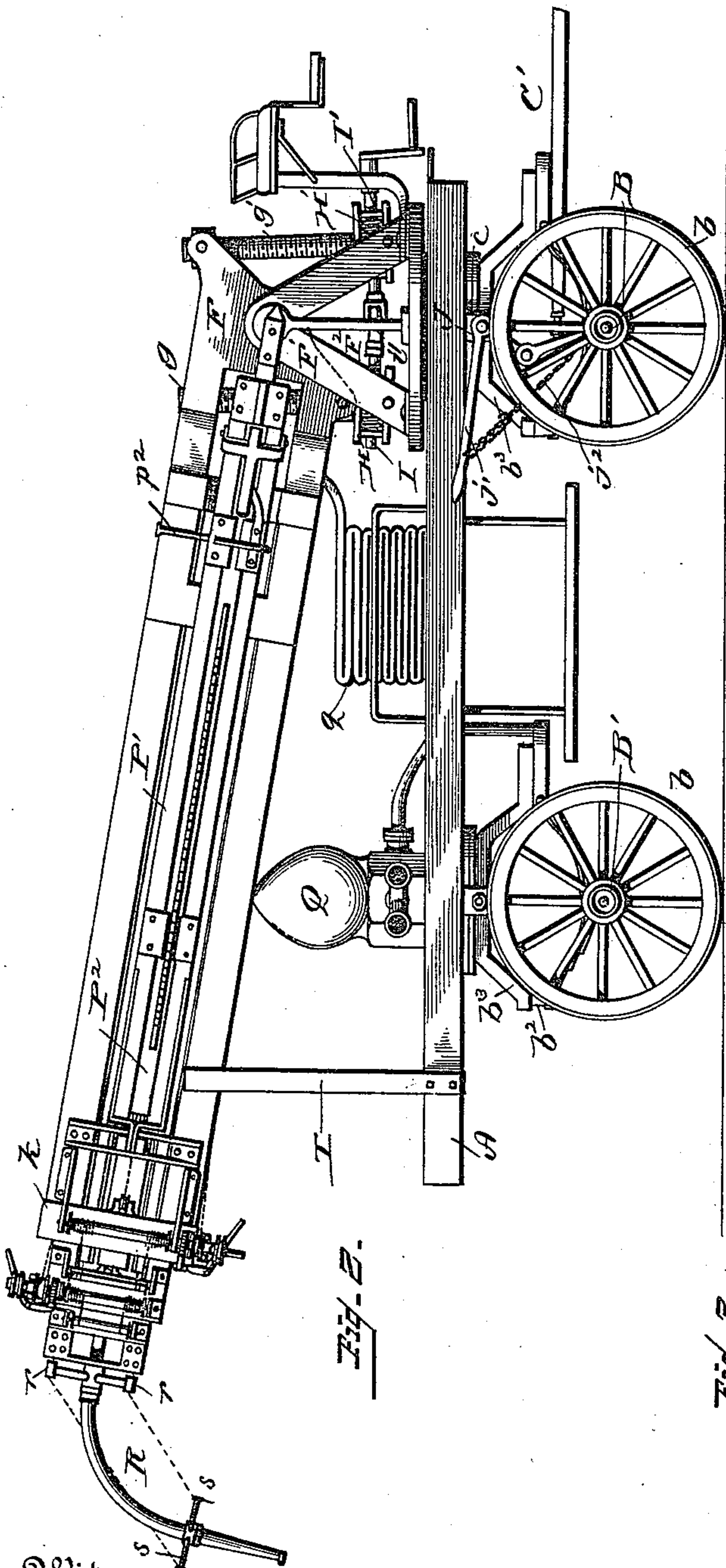


Fig. B.

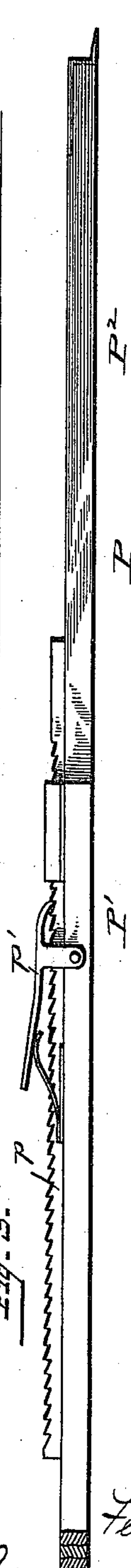


Fig. C.

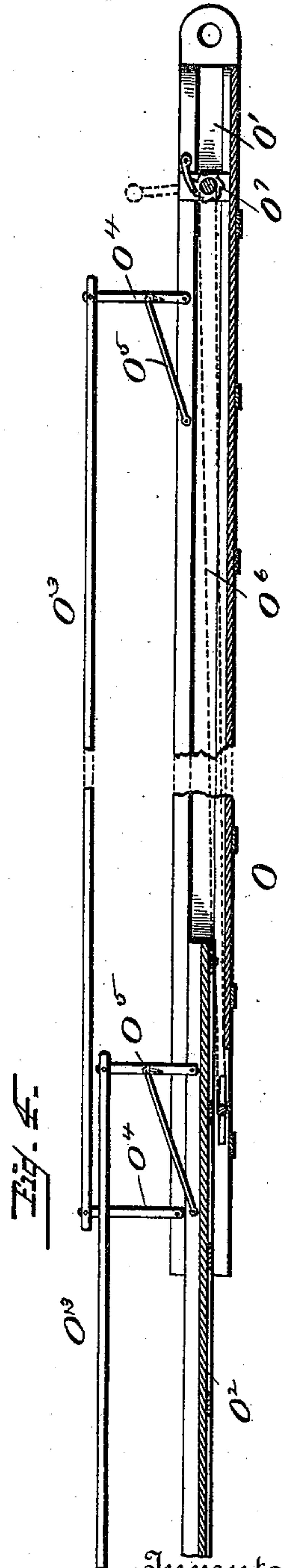


Fig. D.

Witnesses
Wm. H. H. H.
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Inventor
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By *His Attorney*
Franklin A. Hough

(No Model.)

5 Sheets—Sheet 3.

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Fig. 5.

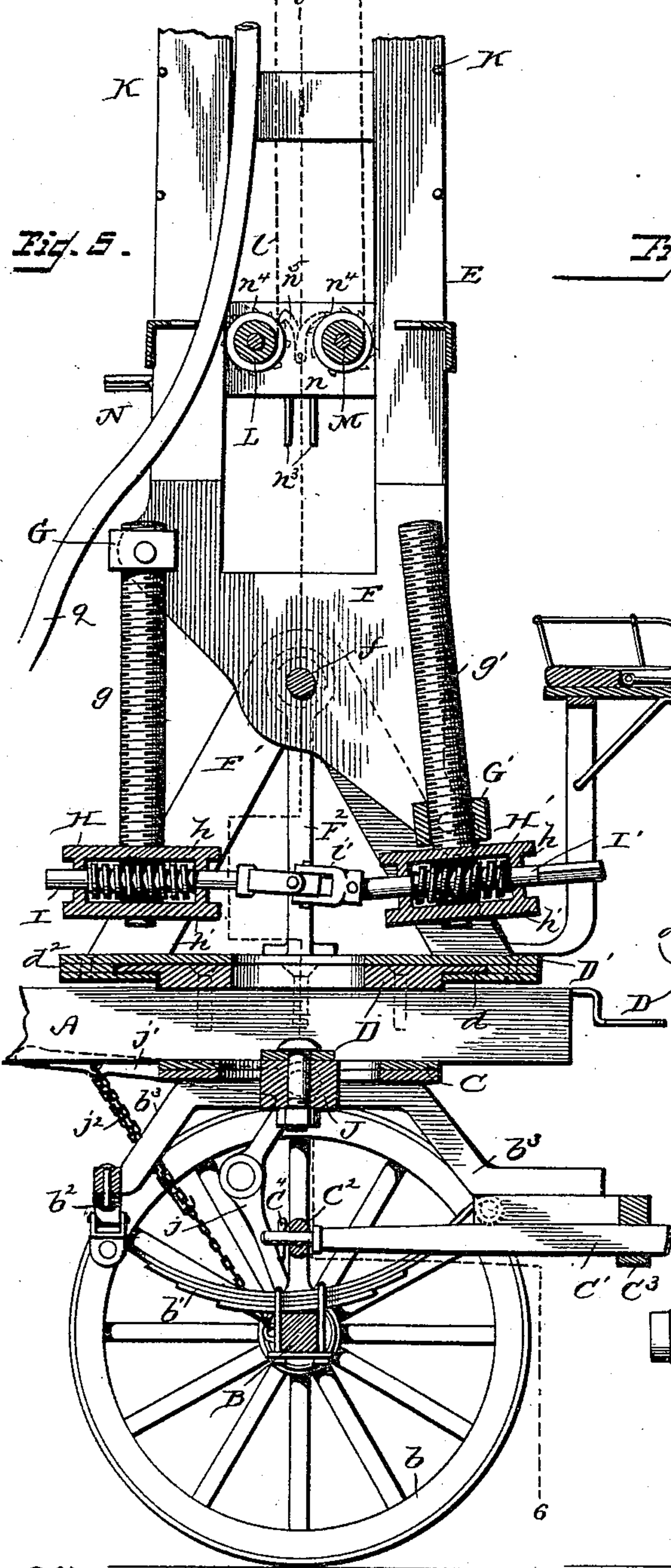
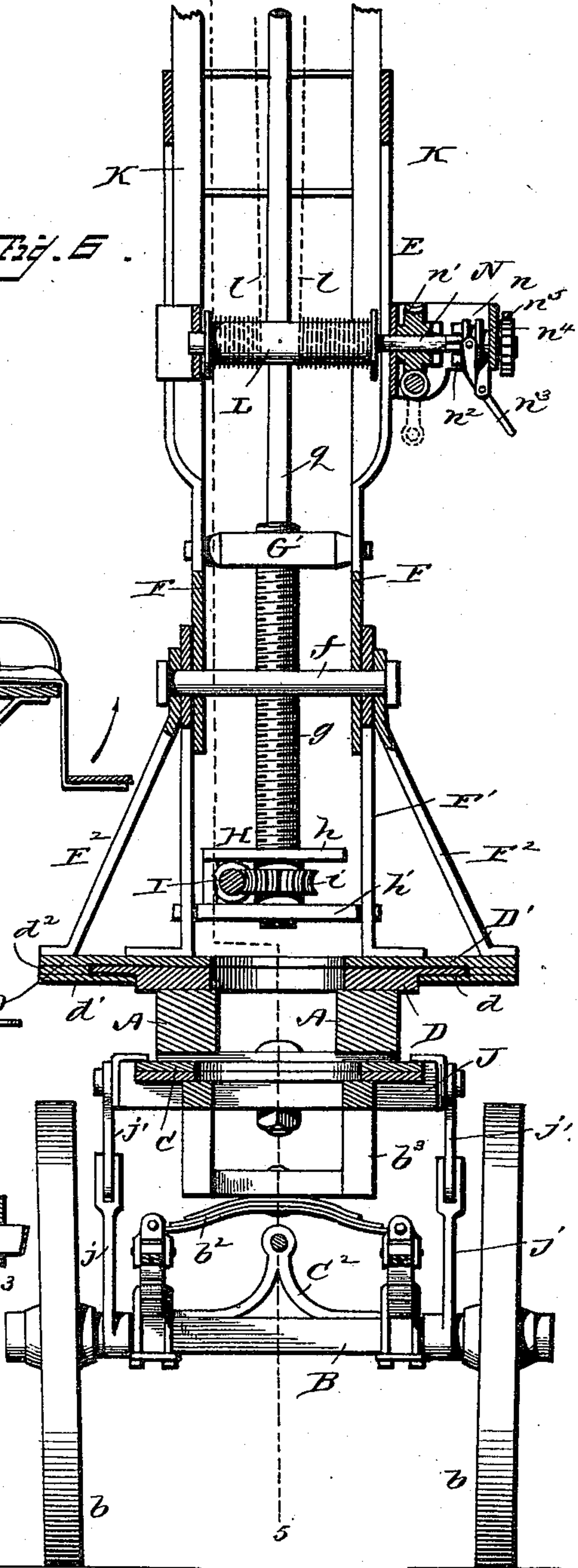


Fig. 5.



Witnesses
[Signature]
[Signature]

Inventor
Ferdinand J. A. Hoffman
By *[Signature]* Attorney
[Signature]

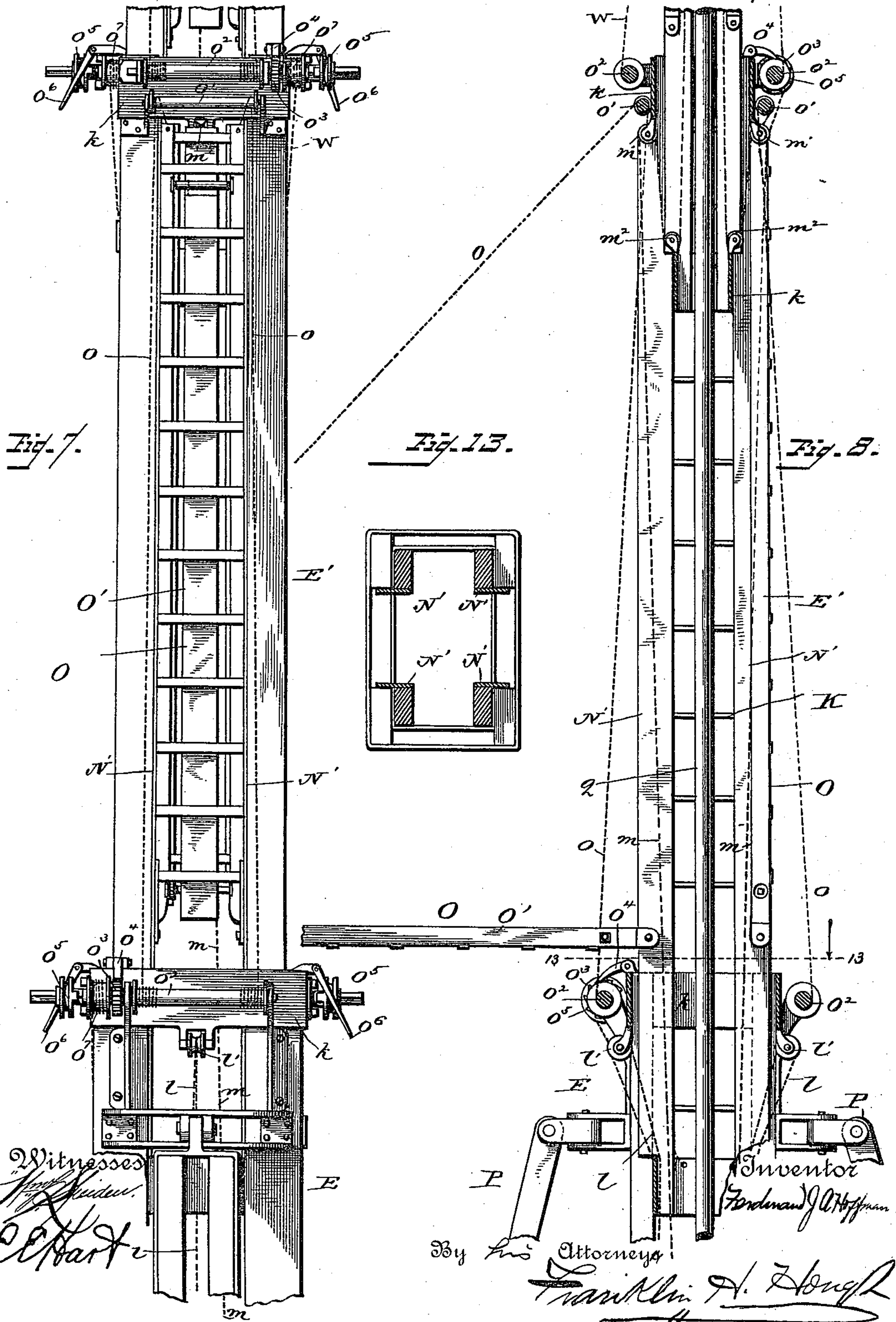
(No Model.)

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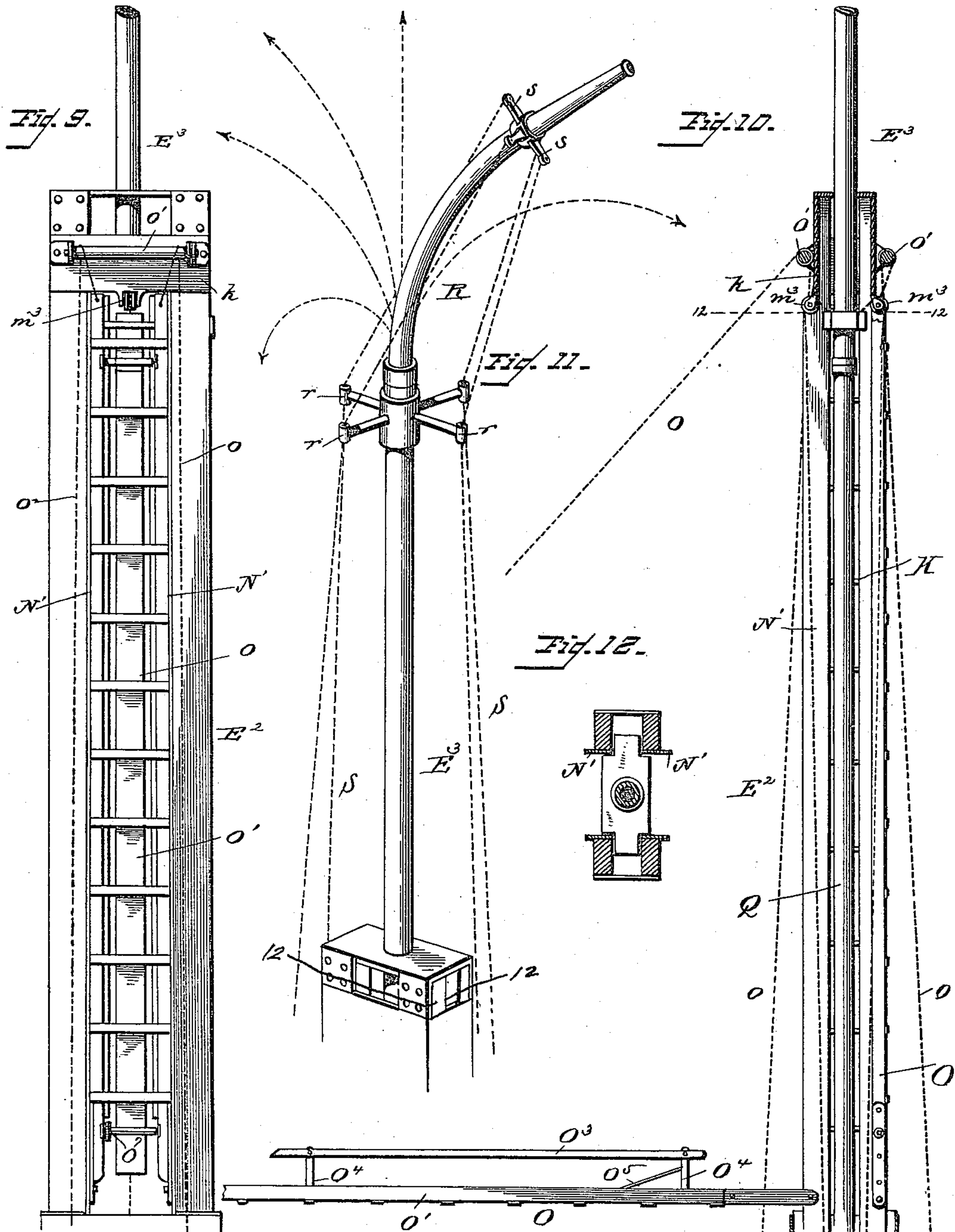
(No Model.)

5 Sheets—Sheet 5.

F. J. A. HOFFMAN.
FIRE ESCAPE TOWER.

No. 440,827.

Patented Nov. 18, 1890.



Witnesses
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UNITED STATES PATENT OFFICE.

FERDINAND J. A. HOFFMAN, OF MILWAUKEE, WISCONSIN.

FIRE-ESCAPE TOWER.

SPECIFICATION forming part of Letters Patent No. 440,827, dated November 18, 1890.

Application filed August 8, 1890. Serial No. 361,501. (No model.)

To all whom it may concern:

Be it known that I, FERDINAND J. A. HOFFMAN, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Fire-Escape Towers; and I do 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, reference being had to the accompanying drawings and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to life-saving apparatus, being especially designed for rescuing persons from burning buildings or other high structures which are in imminent danger of destruction and in which the ordinary means of exit are cut off, and also adapted for saving property.

A further purpose of the invention is to provide an apparatus which will be portable, easily manipulated, and capable of being brought into efficient service in a comparatively short space of time, and which can be extended rapidly within certain limits, and will be provided at its sides with folding and extensible gangways, which may be thrown out to reach the windows or other openings in the structure from which the persons are to be rescued, and which will be provided with hose that is elevated as the structure is extended, so that water may be had at the highest possible point.

Another purpose of the invention is to provide a flexible discharge-nozzle, which can be controlled from the ground to throw a stream of water in any required direction, cords or ropes extending from said nozzle to within convenient reach of the ground and passing through guide-arms near the exit end of the said nozzle.

A still further purpose of the invention is the provision of simple and efficient mechanism for extending the sections or ladders comprising the extensible structure in progressive series, and for bringing the structure to the perpendicular or to any angle between the horizontal and the perpendicular, whereby overhead obstructions may be

avoided in the elevation of the device for active service.

Another purpose of the invention is to relieve the springs of the truck on which the structure is mounted of the said structure and bring the weight of the same directly upon the axle, thereby preventing any vibratory or oscillatory motion being imparted to the structure when in use, as would be the case if the weight were carried upon the said springs.

Still another purpose of the invention is the provision of folding and extensible gangways at intervals in the length of the structure, which can be adjusted to any inclination to reach an exit in the structure from which escape is to be effected, and which will be securely braced by the means which effect the adjustment.

The chief object of the invention is an apparatus for the purposes aforesaid that will be capable of being erected in a short space of time and which can be braced without the intervention of guy-ropes, and which will combine the features of a truck, ladder, and hose-carriage, the hose being attached to a receiving-dome, to which the water-service of the city, town, or district is connected. When not in use, the ladders will telescope, and the apparatus will be reduced to a compact form, thereby occupying the least amount of room.

The improvement consists in the novel features and in the peculiar construction and combination of parts which will be hereinafter described and claimed, and which are shown in the annexed drawings, in which—

Figure 1 is a side elevation of the apparatus, showing it in active operation. Fig. 2 is a side view of the apparatus, showing it in its compact form. Fig. 3 is a side view, the upper end being broken away, of one of the lateral braces. Fig. 4 is a horizontal section, the outer end being broken away, of one of the gangways, showing the movable section projected and the guide-rails in an elevated position. Fig. 5 is a vertical section on the line 5 5 of Fig. 6. Fig. 6 is a section on the line 6 6 of Fig. 5. Fig. 7 is a side view of that portion of the tower or telescoping ladders immediately above that portion of the

ladders shown in Fig. 5. Fig. 8 is a front view of that portion of the tower or telescoping ladders directly over and forming a continuation of the part shown in Fig. 6. Fig. 9 is a continuation of the upper portion of Fig. 7. Fig. 10 is a continuation of the upper portion of Fig. 8, showing a gangway lowered into operative position, the outer end of said gangway being broken away. Fig. 11 is a perspective view of the upper portion of the tower, showing the flexible hose-nozzle and various positions of the same indicated by dotted lines. Fig. 12 is a cross-section on the line 12 12 of Fig. 11. Fig. 13 is a cross-section on the line 13 13 of Fig. 8.

The truck for supporting the apparatus is composed of the sills A and suitable running-gear, such as axles B and B', wheels b , the side bow-springs b' , which are secured to the axles, the cross-springs b^2 , which are secured at their ends to the side springs by suitable shackles, and the rigid frame b^3 , which is secured at one end to spring b^2 and at the other end to the free ends of the side springs b' . The fifth-wheels c , forming connection between the sills and the frames b^3 , are substantially the same at each end of the truck, the rear one being held rigid and the front one free to turn to guide the truck. The tongue C' passes through the supports C² and C³, being held in place by the pin C⁴, which is passed transversely through the reduced end of the support C². On removing the pin C⁴ the tongue can be removed.

The turn-table on which the tower or telescopic ladder is mounted is composed of the circular ring or plate D, having the reduced portion d near its periphery, the annulus or disk D' and the ring D' overlapping the reduced portion d and secured to the ring D' near its outer periphery, a ring or portion d^2 about the thickness of the reduced portion d being interposed between the rings d' and D'. The ring or plate D is fastened to the sills of the truck, and the tower or escape ladder is secured to the ring or plate D'.

The tower is composed of a series of sections E, E', E², and E³, which are constituted to be telescoped within each other, so that the apparatus may be reduced to a compact form when not in use.

The lower section or base of the tower is secured to metal plates F, which are pivoted to the standards F', projected up from the turn-table by the pivot or bolt f . The standards F' are of an inverted-V shape and are braced laterally by the stays F². The lower ends of the plates F F are oblique, and between them are placed the nuts G and G', which have pivotal connection with the said plates at their ends. The frames or boxes H and H', each composed of an upper and a lower plate h and h' , respectively, are journaled at their ends to the standards F' F'. The feed-screws g and g' are journaled in the frames H and H' and work through the nuts G and G', respectively. The worm-threaded

shafts I and I', which are journaled in the frames H and H', and which mesh with the worm-pinions i on the feed-screws, have their opposing ends connected by the universal coupling i' , which permits the said shafts to adapt themselves to the change of position of the feed-screws when raising or lowering the tower.

When it is required to relieve the springs of the truck of the superimposed load of the tower and transfer the weight of the same directly to the axle, recourse is had to the following instrumentalities, which are provided for effecting the desired result—i. e., the bell-crank levers j' , which are pivotally connected with the ends of the bolster J and which have pivotal connection with the arms j , that are projected from the axle B. The chain j^2 , fastened to the said axle and passed through an opening near the outer end of the lever, holds the said lever in position, the end of the chain terminating in a hook which is adapted to be engaged with the links of the chain when the lever is adjusted to the required position.

The several sections comprising the tower are similarly constructed. Hence a detailed description of one will suffice for all, in that each is composed of two escape-ladders K K, which are placed in parallel position and secured together at their ends by metallic bands k .

The sections are made of graduated sizes in cross-sectional area, whereby one may telescope within the other, and are projected by ropes or cords in the following manner: The ropes are secured at their ends to the windlass L, and pass over guide-pulleys l' at the upper end of the section E, and are made fast to the lower end of the section E'. The ropes m are fastened at their lower ends to the windlass M, and pass over guide-pulleys m' at the upper end of section E', thence around guide-pulleys m^2 at the lower end of section E² and around guide-pulleys m^3 , and secured to the lower end of the tubular section E³. From the foregoing description, reference being had to the accompanying drawings, it will be seen that on operating windlass M the tubular section E³ will be projected its full limit, the section E² will be extended, and on operating the windlass L section E' will be projected, carrying with it the sections E³ and E². To facilitate the operation of the windlasses alternately, the shaft N is provided and journaled in the frame n , which is attached to the side of the section E near its lower end. This shaft is provided with a worm-thread which meshes with the worm-pinions n' , that are loosely mounted on the shafts or journals of the windlasses L and M. These pinions have half-clutches on their outer sides, which are adapted to be engaged by corresponding half-clutches n^2 on the said windlass-shafts and which are moved thereon by the shipping-levers n^3 . The half-clutches n^2 are constructed to turn with the said wind-

lass-shafts, but are free to move thereon to and from the pinions n' , whereby the said pinions may be locked to revolve with the said windlasses. The ratchet-wheels n^4 , keyed on the outer end of the windlass-shafts, and pawls n^5 serve to hold the windlasses from turning back when the sections are projected. The plates or metallic strips N' , secured on the inner edges of the rises of the ladders which compose the sections E' and E^2 , are provided for the double purpose of guiding the said sections E' and E^2 in their movements and to form housings for the gangways O . The lateral braces P are pivotally connected at their upper ends near the top of the section E in such a manner that they can be swung laterally and to and from the truck, as may be required. Each of these braces is composed of two sections P' and P^2 , the section P^2 sliding within the section P' , whereby the brace may be lengthened or shortened, as required. The lower section P' is provided with a notched or toothed bar p , and the section P^2 has a spring-actuated catch p' , which is adapted to engage with the said notched or toothed bar p and hold the said section P' at the required position. When not in use, the section P' slides within the section P^2 , and the brace thus reduced in length is held in the supports p^2 near the lower end of the section E .

The gangways O are pivotally connected at their inner ends with the sections of the towers, and are provided in sufficient number so that when properly adjusted a window or opening in the building or structure from which escape is to be effected can be readily reached. These gangways are raised or lowered and held at their proper inclinations by ropes o , which are secured to the gangways near their outer ends and pass over guide-rollers o' near the upper ends of the said sections and around windlasses o^2 , which are journaled at or near the upper end of the next lower section. These windlasses are held from turning back by the ratchet o^3 and the pawl o^4 . The clutch o^5 , mounted on the end of the windlass-shaft o^2 , is operated by the lever o^6 to key the spool o^7 with the said windlass. The gangway is composed of two sections O' and O^2 , each of which is provided with side guide-rails O^3 , that are connected with the sills of the sections by pivoted standards O^4 , the rails being held in an elevated position by the hooks O^5 , engaging with eyes or other projections on the standards O^4 . The opposing sides of the sills of section O' are grooved, and the section O^2 slides in the said groove formed in the sills of the said section O' , being projected and drawn back by the cords O^6 , which are secured at their ends to the said section O^2 and wound around in reverse directions on the windlass O^7 at the inner end of the section O' , one of the cords O^6 passing around a guide-roller at the outer end of section O' and the other cord passing direct to the said windlass. Obviously on op-

erating windlass O^7 in one direction the section O^2 will be projected, and on operating the said windlass in the reverse direction the said section will be drawn in.

The dome or chamber Q , to which the fire-engines or other water-supply is coupled, is an air-chamber, and may be provided with either single or twin couplings, to which the engines or water-supply are attached. The hose q , which is connected with the tubular section E^3 , is coupled with the said dome and conveys the water therefrom to the tubular section E^3 and flexible nozzle R . When the tower is reduced, the surplus hose is carried in a basket on the truck, or in any other convenient manner. The hose passes through the center of the tower and is elevated as the sections are projected.

The flexible nozzle R is sufficiently stout to stand in a perpendicular position, and is controlled from the ground by the guide-ropes S , which are provided in sufficient number and located at such points as to effect the desired results. These ropes S pass through guide-arms r , provided at the upper end of the tubular extension E^3 , and are connected with arms s near the discharge end of said nozzle. Obviously the ropes S may be attached directly to the nozzle and extend to the ground without passing through any guides; but the best results are obtained from the construction shown, in that the stream may be directed to any point of the compass and delivered at any angle by drawing down upon either of the ropes or upon any two, as will be readily understood.

When the apparatus is not in use, the gangways are folded within the sections thereof, and the said sections are telescoped and the lateral braces are reduced and folded to the tower, the free ends resting in the supports p^2 , and the structure turned about in the position shown in Fig. 2 and resting at its outer end on the support T .

Provision is had for automatically winding up the cords O as the sections telescope, thereby preventing slack in the said cords, by the cords or ropes W , which are secured at one end to the foot or lower portion of the section to which the gangway is attached, and at their other end to the spool O^7 on the section immediately below that to which the said cords W are secured. When the sections are projected, the cord is wound up on the spools, and when the said sections telescope the cords W will be unwound from the spools, which spools at this time are keyed to revolve with the windlasses and effect a winding of the cords O on the windlasses.

The operation of the invention is manifest to one skilled in the art to which the invention appertains, and hence a detailed description of the same is deemed unnecessary.

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

1. In a life-saving apparatus, the combina-

tion, with a support and the ladder or tower pivotally connected with said support, of nuts having pivotal connection with the ladder or tower on each side of the pivotal connection thereof with the said support, the vertical feed-screws journaled at their lower ends on the said support and having their upper ends passed through the said nuts, and provisions for simultaneously operating the feed-screws for positively acting on the diametrically-opposite sides of the ladder when elevating and lowering the same, substantially as set forth.

2. In a life-saving apparatus, the combination, with a support and the ladder or tower pivotally connected with the said support, of nuts pivotally connected with the said tower or ladder on diametrically-opposite sides of the pivotal connection thereof with the said support and at equal distances above and below the said pivotal connection, two vertical feed-screws having engagement with the said nuts and having bearings at their lower ends on the said support, and a shaft having a universal joint between its ends and in gear with the said feed-screws and adapted to simultaneously operate the said feed-screws, substantially as described.

3. The combination, with a support and the ladder or tower pivotally connected with the support, of nuts having pivotal connection with the ladder or tower, frames having pivotal connection with the support, feed-screws journaled in the frames and working through the nuts, and a shaft gearing with the said feed-screws and having a universal joint between its ends, substantially as set forth.

4. The combination, with the support having vertical standards and the ladder or tower pivoted between the standards and having nuts on each side of the pivotal support, frames journaled between the standards, and feed-screws journaled in the frames and working through the nuts, of worm-pinions on the said feed-screws and worm-threaded shafts journaled in the frames and meshing with the worm-pinions, the opposing ends of the said shafts being connected by a universal joint, substantially as described.

5. The combination, with the truck and the escape ladder or tower, of arms projecting from the axle of the truck, and approximately bell-crank levers connected with the said arms and adapted to be operated to relieve the springs of the superimposed load of the ladder or tower and bring the said weight upon the axle, substantially as and for the purpose specified.

6. In a life-saving apparatus, the combina-

tion, with the tower composed of a series of telescoping sections and windlasses, each having connection with separate sections and having ratchet and pawl to prevent retrograde movement, of pinions loosely mounted on the shafts of the windlasses to turn thereon, means for simultaneously operating the said pinions, clutches mounted on the said windlass-shafts to turn therewith and adapted to move thereon, and independent levers for moving the clutches on the said shafts to and from the said pinions, substantially as described, and for the purpose specified.

7. The combination, with the tower comprising telescoping sections, of a gangway having pivotal connection with the lower end of one section and adapted to be folded upward, of a windlass, means for connecting the said windlass with the upper end of the next lower section, and ropes connected at one end with the said windlass and passing over a guide-roller near the upper end of the section to which the gangway is pivoted and secured at their other ends to the said gangway, substantially as specified.

8. The combination, with the tower, of a folding gangway, rails, bars pivotally connected at their ends with the rails and with the gangway, whereby the said rails can fold, and a hook for bracing the bars when the same are opened or unfolded, substantially as described.

9. The combination, with the tower and a hose, of a flexible nozzle provided with guide-arms, and guide-ropes connected with the said arms, substantially as and for the purpose specified.

10. The combination, with the tower having guide-arms at its upper end and a hose, of a flexible nozzle provided with guide-arms, and ropes connected with the arms on the nozzle and passing through the arms on the tower, substantially as described, and for the purpose specified.

11. The combination, with the telescoping sections, the gangways, and ropes for effecting adjustment of the gangways, of windlasses, a spool on the shaft of the windlasses, and connections between the said spool and telescoping sections for automatically winding the gangway-operating cords on the said windlasses, substantially as described.

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

FERDINAND J. A. HOFFMAN.

Witnesses:

FRANK HINSEN KERNEY,
ALBIN ROBERT STELZNER.