

(No Model.)

5 Sheets—Sheet 1.

F. A. WARNER.
EXTENSION FIRE LADDER.

No. 365,556.

Patented June 28, 1887.

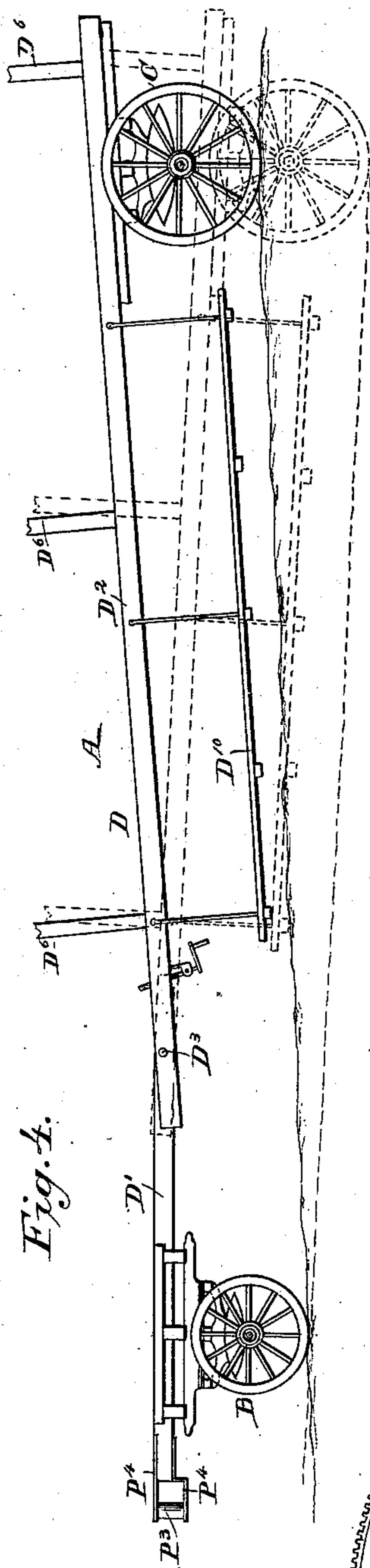


Fig. 4.

WITNESSES :

George Pinkenburg
C. Sedgwick

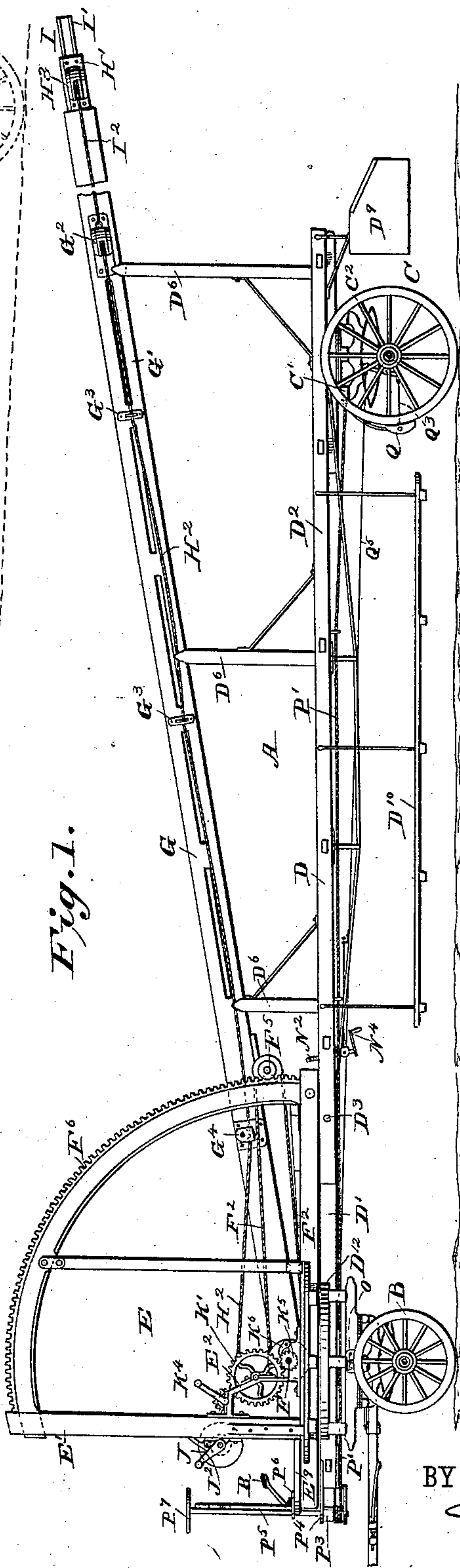


Fig. 1.

INVENTOR:

F. A. Warner

BY

Munn Co

ATTORNEYS.

(No Model.)

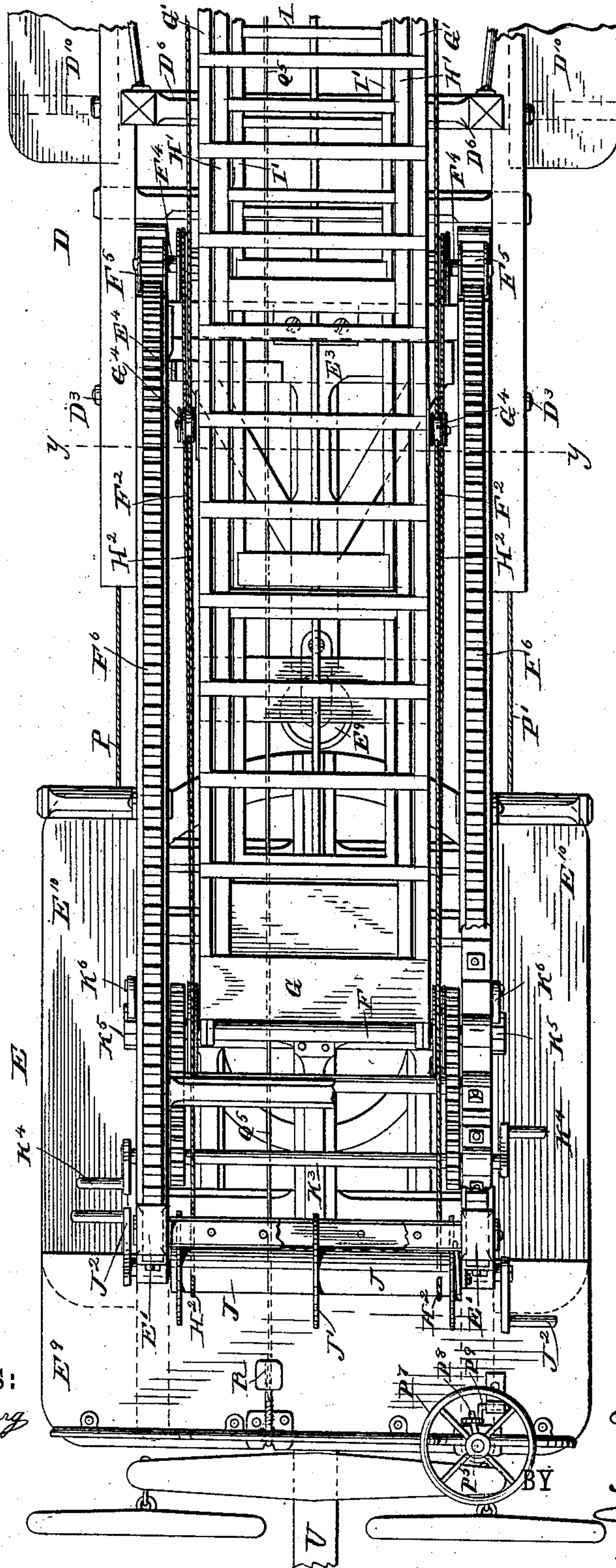
5 Sheets—Sheet 2.

F. A. WARNER.
EXTENSION FIRE LADDER.

No. 365,556.

Patented June 28, 1887.

Fig. 2.



WITNESSES:
George Binkenburg
C. Sedgwick

INVENTOR:
F. A. Warner
BY *Munn & Co.*
ATTORNEYS.

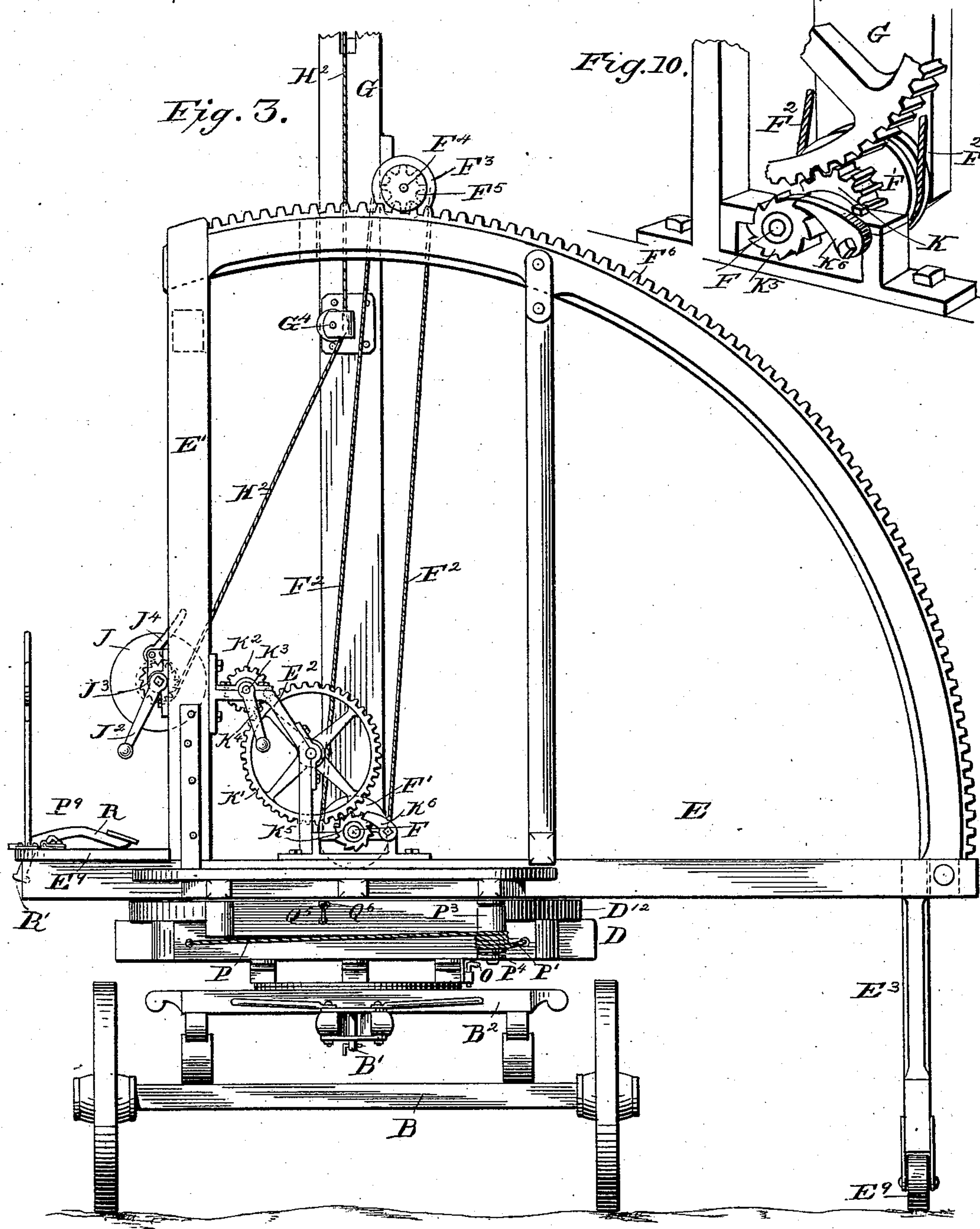
(No Model.)

5 Sheets—Sheet 3.

F. A. WARNER.
EXTENSION FIRE LADDER.

No. 365,556.

Patented June 28, 1887.



WITNESSES:

George Binkenburg
Bedford

INVENTOR:

F. A. Warner

BY

Munn & Co

ATTORNEYS.

(No Model.)

5 Sheets—Sheet 4.

F. A. WARNER.
EXTENSION FIRE LADDER.

No. 365,556.

Patented June 28, 1887.

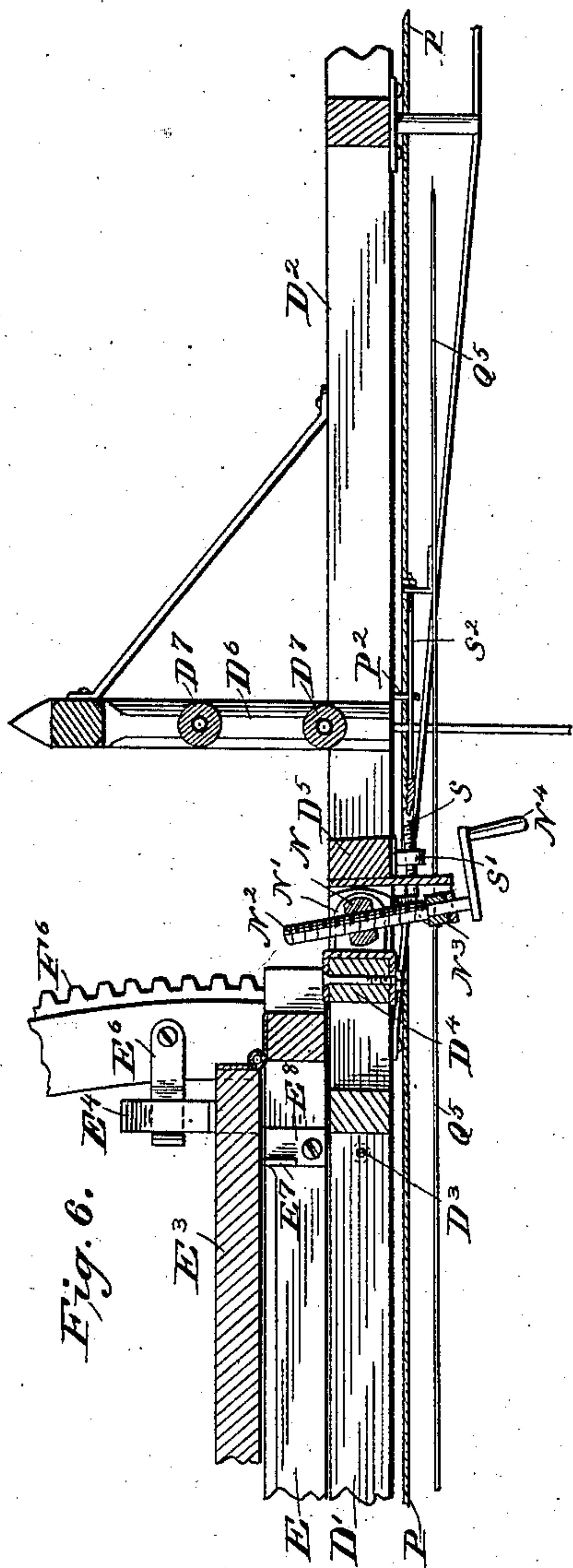


Fig. 6.

WITNESSES:
George Binkenburg
C. Sedgwick

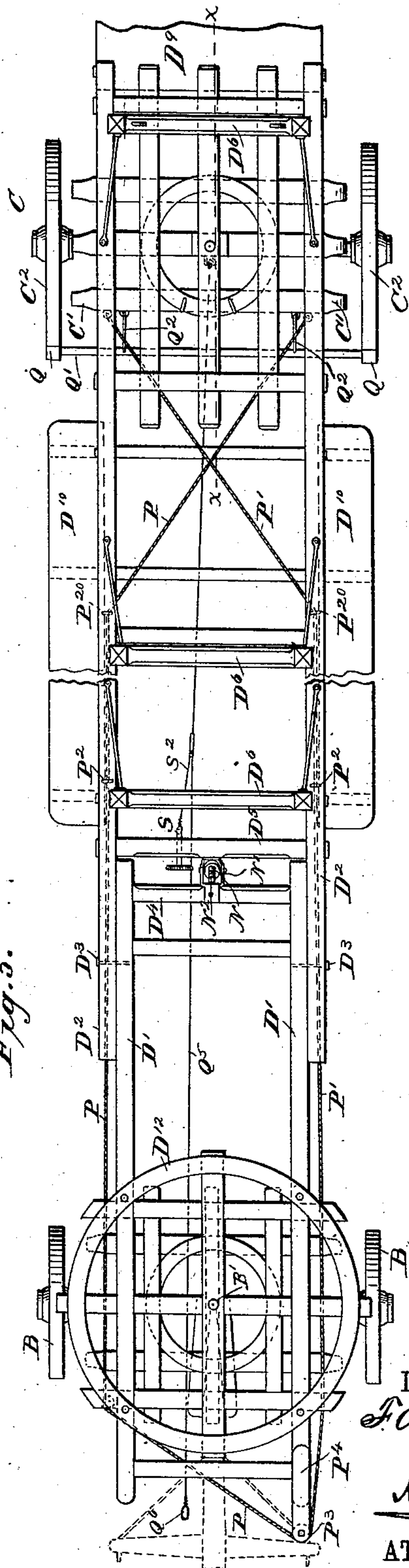


Fig. 5.

INVENTOR:
F. A. Warner
Munn & Co.
ATTORNEYS.

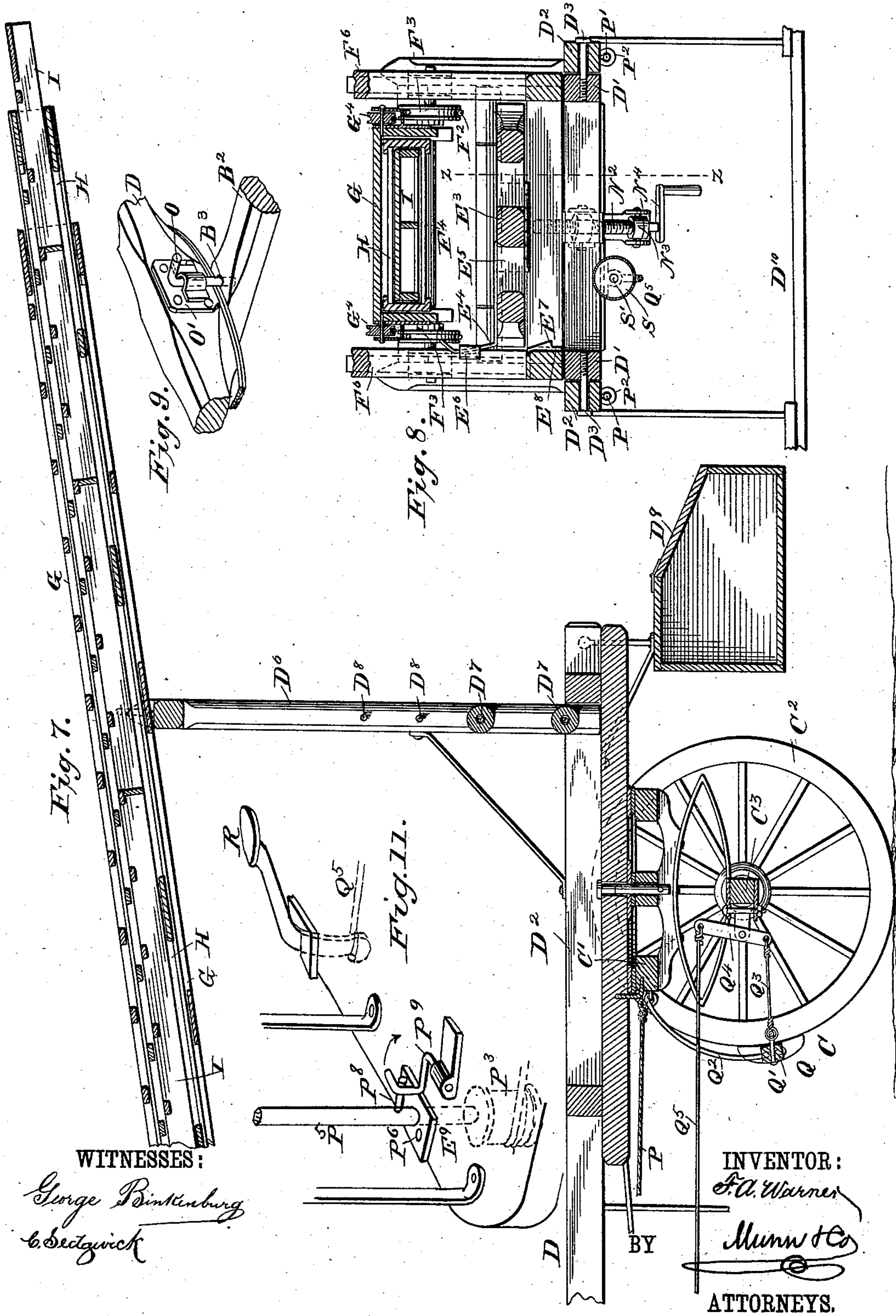
(No Model.)

5 Sheets—Sheet 5.

F. A. WARNER.
EXTENSION FIRE LADDER.

No. 365,556.

Patented June 28, 1887.



UNITED STATES PATENT OFFICE.

FREDERICK ALEXANDER WARNER, OF HALIFAX, NOVA SCOTIA, CANADA.

EXTENSION FIRE-LADDER.

SPECIFICATION forming part of Letters Patent No. 365,556, dated June 28, 1887.

Application filed November 20, 1886. Serial No. 219,465. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK ALEXANDER WARNER, of Halifax, in the Province of Nova Scotia and Dominion of Canada, have invented
5 a new and Improved Extension Fire-Ladder, of which the following is a full, clear, and exact description.

The object of my invention is to provide a new and improved fire-ladder capable of being
10 quickly moved about, raised, and set to any angle in a narrow or wide street, and provided with means for leveling the front truck carrying the ladder.

The invention consists of the construction
15 and arrangement of parts and details and combinations of the same, as will be fully described hereinafter, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification,
20 in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of my improvement, showing the ladder closed and at rest on the truck. Fig. 2 is a plan view of the front
25 part of the same. Fig. 3 is a front elevation of the same, with the ladder-carriage swung at an angle to the ladder-truck. Fig. 4 is a side elevation of the truck standing on uneven ground. Fig. 5 is a plan view of the truck.
30 Fig. 6 is a sectional side elevation of the means for leveling the front truck, the section being taken on the line $z z$ of Fig. 8. Fig. 7 is a sectional side elevation of the rear part of the truck and the extension-ladder on the line $x x$
35 of Fig. 5. Fig. 8 is a vertical cross-section of part of my improvement on the line $y y$ of Fig. 2. Fig. 9 is a perspective view of the device for locking the carriage to the front part of the truck; and Figs. 10 and 11 are detail views
40 of the invention.

The ladder-carriage A consists of the front truck, B, the rear truck, C, and the truck-frame D, pivoted on the front and rear trucks, B and C, and turning on fifth-wheels on the
45 same in the usual manner.

On the king-bolt B' of the front truck, B, is pivoted the ladder-supporting frame E, which rests on a circular bed, D¹², on the truck-frame D. In suitable bearings above the center of
50 the truck B on the frame E is mounted a shaft, F, on which is fulcrumed the lower end of the

ladder G, in which telescopes the extension-ladder H, in which in turn telescopes a second extension-ladder, I.

To the lower ends of the side beams, H', of the extension-ladder H are secured the chains or wire ropes H², each running in a groove formed in the respective side beam, H', and passing through an aperture formed in the side beam, G', of the ladder G, and each passing
55 over a grooved pulley or sheave, G², secured to the outside of the side beams, G', near its upper end, and the ropes, after passing through a number of eyes, G³, on the beams G', pass over pulleys or sheaves G⁴, and
60 to a windlass-drum, J, on which the ropes are wound. The windlass J is mounted in suitable bearings on the standards E', erected on the frame E, and is provided with a partition, J', so that the ropes H² wind independently of
65 each other upon the said drum without coming in contact. The windlass is operated by the usual crank-arms, J², and the ratchet-wheel J³ and pawl J⁴ serve to lock the windlass in any desired position.
70

To the lower end of each of the beams I' of the ladder I is secured a rope, I², which runs in a groove formed in the outer edge of the said beams I', and then passes through an aperture in the upper end of the beam H' and to
75 and over a pulley or sheave, H³, secured near the said aperture to the outside of the upper end of the beam H'. The rope I² leads from the pulley or sheave H³ to the sheave G², and is secured to the same in any suitable manner.
80

The ladders G, H, and I are provided with the usual rungs secured to the respective side beams.

The shaft F is provided on each side of the ladder-beams G' with a pulley, F', over which
85 passes an endless belt or chain, F², which also passes over a pulley, F³, attached to a shaft, F⁴, mounted in suitable bearings secured to the ladder G and carrying on each end a pinion, F⁵, which meshes into a toothed segment, F⁶, having its center in the shaft F and secured
90 by one end to the horizontal part of the ladder-frame E, and by its other end to one of the standards E', carrying the windlass J. Additional braces attached to the frame E
100 assist in supporting the segments F⁶.

Alongside of each pulley F' is secured on

the shaft F a pinion, K, meshing into an intermediate gear-wheel, K', journaled on the bracket E² and meshing into the pinion K², attached to the cross-shaft K³, mounted in suitable bearings on the said brackets E², and carrying on each end, outside of the said brackets E², a crank-arm, K⁴. The shaft F extends beyond its bearings on the frame E, and is provided on each end with a ratchet-wheel, K⁵, which engages a pawl, K⁶, pivoted on the bearings.

On the inner end of the ladder-frame E is pivoted a T-arm, E³, capable of being swung into a horizontal position and locked therein by a spring-catch, E⁴, secured to the hinged arm E⁵, and engaging a hook, E⁶, attached to the segment F⁶. The T-arm E³ is held in a vertical position by the same spring-catch, E⁴, engaging a shoulder, E⁷, formed on the arm E⁵, attached to one side beam of the frame E. The lower end of the T-arm E³ carries a wheel or caster, E⁹, which rests and travels on the ground when the frame E is swung sidewise, as shown in Fig. 3, and thus supports the outer end of the said frame.

The truck-frame D is made in two parts, D' and D², pivoted together at D³, so as to permit of leveling the front part, D', when the trucks D and C stand on uneven ground, as shown in Fig. 4.

The device for setting the front part, D', carrying the extension-ladder, level consists of a nut, N, (see Figs. 5 and 6,) pivoted in bearings N', secured to the cross-beam D⁴ at the inner end of the part D', and of the screw N², screwing in the said nut N, and held in the swivel N³, pivoted on the bearing secured to the cross-bar D⁵ at the inner end of the truck-frame part D². The lower end of the screw N² is provided with a crank-arm, N⁴, by which the said screw N² is turned.

The part D² of the truck-frame D is provided with a number of rests or supports, D⁶, on which the ladder G rests when not in use, and the rests D⁶ are so constructed that the ladder G is slightly inclined upward toward the rear end, as shown in Fig. 1. A number of rollers, D⁷, are also arranged crosswise on the said rests D⁶, and serve to support the hooks and ladders or other appliances.

On the rear end of the part D² is secured a box or casing, D⁹, in which are placed the tools or other appliances used in connection with the extension-ladder, and for other purposes. The truck-frame D² also supports the side boards, D¹⁰, arranged on each side of the frame D, and supporting the firemen when going to a fire.

The truck-frame E can be locked in position on the front truck, B, by a bolt, O, held in a keeper, O', secured to a beam of the truck-frame D, the said bolt O engaging an aperture, B³ on one of the truck-beams B², as shown in Fig. 9.

The device for steering the machine consists of two cables or chains, P and P', fastened near the outer ends of the cross-beam C' of the

rear truck, C, (see Fig. 5,) and then crossed and passed through eyes or sheaves P²⁰, secured to the under side of the side beams of the truck-frame D, and, running along the said side beams, are guided in eyes P², and both ropes P and P' are passed to and wound upon a vertical drum, P³, mounted to rotate in a suitable bracket, P⁴, attached to the front end of one of the side beams of the frame D. The drum P³ is provided on its upper end with a square aperture, into which fits a correspondingly-shaped steering-shaft, P⁵, which passes through a keeper, P⁶, secured to the platform E⁹ on the front part of the ladder-frame E. The keeper P⁶ is so arranged that when the machine is in the position shown in Figs. 1 and 2, then the steering-shaft P⁵, passing through the said keeper P⁶, enters the square aperture in the drum P³, and the latter can be operated by turning the hand-wheel P⁷, secured to the upper end of the steering-shaft P⁵. The latter is also provided with a projecting arm or lug, P⁸, which can be locked by a hook, P⁹, hinged on the platform E⁹.

The brake mechanism consists of the usual brake-shoes, Q, acting on the wheels C² of the rear truck, C, and are attached to the brake-beam Q', hung on the usual rods, Q², secured to the rear truck, C. The brake-beam Q' (see Fig. 7) is connected by the rod Q³ with the vertical lever Q⁴, fulcrumed on the truck-axle C³, and having a rod or rope, Q⁵, attached to its upper end, which rod or rope Q⁵ leads to the front end of the truck-frame D, and is provided on its front end with a loop, Q⁶, which engages with the hook end R' of the foot-lever R, pivoted in the middle of the platform E⁹ of the ladder-frame E. The rod or rope Q⁵ can be easily attached to or detached from the hook R'; but when the machine is running the foot-lever R and the said rope Q⁵ are connected with each other, and the brake Q can be applied by pressing on the inner end of the said foot-lever R. When the truck is at rest and the ladder-frame E is to be turned, then the rope or rod Q⁵ is disengaged from the hook end R' of the foot-lever R; but the brake can be then held applied by the screw-rod S, screwing in a nut, S', secured to the cross-beam D⁵ of the frame D, near the leveling device, the said screw-rod S being connected by the rod or rope S² with the rod or rope Q⁵, as shown in Fig. 5. The front truck, B, is provided with the usual tongue and connections for moving the machine.

The operation is as follows: The machine, as shown in Figs. 1 and 2, is ready to be run to a fire, the extension-ladder resting on the supports D⁶ of the truck-frame D. The rod or rope Q⁵ is engaged by the foot-lever R, so that the operator, standing on the platform E⁹, can operate the brake mechanism, while another operator can apply the steering mechanism by turning the hand-wheel P⁷, which causes the drum P³ to wind up one of the ropes, P or P', which pulls on the cross-bar C' of the truck C, and thereby turns or steers the latter. The

front truck, B, is turned by the horses pressing on the tongue U. The bolt O is disengaged, so as to permit the truck B to revolve on its king-bolt B' under the part D' of the truck-frame D. When the machine reaches the fire, the truck B is locked to the frame D by causing the bolt O to engage the aperture B³ in the beam B² of the truck B. The rod or rope Q⁵ is unhooked from the foot-lever R, and the steering-shaft P⁵ is removed from the drum P³, so that the ladder-frame E is free to revolve on its king-bolt B'. The truck B is then leveled when standing on uneven ground, as shown in Fig. 4, by turning the crank-arm N⁴, so that the screw N² causes the part D' of the truck-frame D to swing up or down, the axle of the truck B being the fulcrum. The ladders G, H, and I are then preferably swung into a vertical position by turning the crank-arms K⁴, which cause the shaft F' to revolve, whereby a similar motion is transmitted by means of the pulleys F' and F³ and the endless ropes F² to the shaft F⁴, so that the pinions F⁵, engaging the segments F⁶, travel up on the same and thus raise (as the shaft F⁴ is mounted on the ladder G) the ladder from the rests D⁶ to any desired angle. The frame E is then turned on the king-bolt B' to any desired position, after which the T-arm E³ is swung downward, so as to support the outer end of the ladder-frame E, as shown in Fig. 3. The ladders H and I are then raised by turning the crank-arms J², so that the windlass J winds up the ropes H², whereby the ladder H slides upward in its guides in the ladder G, and this upward motion of the ladder H causes a pull on the ropes I², which causes the ladder I to slide upward in its guides in the ladder H. As soon as the desired height is reached, the extended ladders are swung sidewise to any desired angle by turning the crank-arm K⁴ in an opposite direction until the upper end of the ladder I leans against the building. The pawls K⁶, engaging the ratchet-wheels K⁵, then hold the extension-ladder in any angular position, and the pawls J⁴, engaging the ratchet-wheels J³, hold the extended ladders H and I in a locked position. The ladders H and I are closed and caused to telescope downward by disengaging the pawl J⁴ from its ratchet-wheel J³, so that the weight of the ladders H and I is sufficient to telescope the same, and the ropes H² are unwound from the windlass J. The ladder-frame E is then swung to its normal position, as shown in Figs. 1 and 2, and the ladder is lowered upon the rests D⁶ by disengaging the pawls K⁶ from the ratchet-wheels K⁵ and turning the crank-arm K⁴, so that the pinions F⁵ travel downward on the toothed segments F⁶ until the ladder G is supported by the rests D⁶, as shown in Fig. 1. The brake-rope O⁵ can then be again connected with the foot-lever R, and the steering-shaft P⁵ is again inserted into the drum P³, so as to enable the operator to steer the machine.

Having thus fully described my invention, I

claim as new and desire to secure by Letters Patent—

1. In an extension-ladder, the frame E, the shaft F, supported by the said frame E, means for revolving the said shaft, the pulleys F', secured to the said shaft F, and the toothed segments F⁶, supported on the said frame E, in combination with the ladder G, fulcrumed on the said shaft F, the shaft F⁴, mounted on the said ladder G, the pinions F⁵, secured on the said shaft F⁴ and engaging the said toothed segments F⁶, the pulleys F³, fastened on the said shaft F⁴, and endless belts F², passing over the said pulleys F³ and F', substantially as shown and described.

2. In an extension-ladder, the frame E, the shaft F, supported by the said frame E, means for revolving the said shaft F, the pulleys F', mounted on the said shaft F, the ratchet-wheels K⁵, attached to the outer ends of the said shaft and engaging the pawls K⁶, and the toothed segments F⁶, supported on the said frame E, in combination with the ladder G, fulcrumed on the said shaft F, the shaft F⁴, mounted on the said ladder G, the pinions F⁵, secured on the said shaft F⁴ and engaging the said toothed segments F⁶, the pulleys F³, attached to the said shaft F⁴, and the endless belts F², passing over the said pulleys F³ and F', substantially as shown and described.

3. In an extension-ladder, the frame E and the windlass J, having a partition and mounted on the said frame E, the shaft F, means for revolving said shaft, the pulleys F' on said shaft, and the toothed segment F⁶, in combination with the ladder G, fulcrumed on a shaft on the said frame E, the shaft F⁴ on said ladder, the pinion F⁵ on the shaft F⁴, the pulleys F³ on shaft F⁴, endless belt F², encompassing said pulleys F' and F³, the ladder H, telescoping in the said ladder G, the ropes H², fastened on the lower end of the said ladder H, and passing over pulleys on the ladder G to the said windlass J, the ladder I, telescoping in the ladder H, and the ropes I², fastened by one end to the lower end of the said ladder I, and passing over pulleys on the ladder H, and then fastened at its other end to the ladder G, substantially as shown and described.

4. In an extension-ladder, the trucks B and C, and the truck-frame D, supported on the said trucks B and C, in combination with the ladder-frame E, swinging on the king-bolt B' of the truck B, the extension-ladder held on the said frame E, the T-arm E³, hinged on the outer end of the said frame E and supporting the same, and means for locking the said hinged arm E³ in a vertical or horizontal position on the said frame E, substantially as shown and described.

5. In an extension-ladder, the combination, with the ladder-frame E, supporting the extension-ladder and swinging on the truck-frame D, of the T-arm E³, hinged on the said frame E, the wheel or caster E⁹ on the lower end of the said arm E³, and the spring-catch E⁴, at-

5 tached to the said T-arm E³, and the shouldered arm E⁶, fastened on the said frame E, and adapted to engage the said spring-catch E⁴, so as to hold the said T-arm E³ in a vertical position, substantially as shown and described.

10 6. In an extension-ladder, the combination, with the trucks B and C, of the truck-frame D, made in two parts, D' and D², hinged together at D³, and means for leveling the front part, D', of the said truck-frame D, carrying the frame E, supporting the extension-ladder, substantially as shown and described.

15 7. In an extension-ladder, the combination, with the trucks B and C, of the truck-frame D, made in two parts, D' and D², pivoted together at D³, and the screw N², held on the part D², and engaging a nut secured on the part D', substantially as shown and described.

20 8. In an extension-ladder, the front truck, B, the truck-frame part D', mounted on the said truck B, and the swiveled nut N, held on the said part D', in combination with the rear truck, C, the truck-frame part D², supported on the said rear truck, C, and pivoted to the part D' at D³, and the screw N², swiveled on the said part D³, and engaging the said nut N, substantially as shown and described.

25 9. In an extension-ladder, the ladder-carriage A and the frame E, supporting the extension-ladder, in combination with the brake mechanism acting on the rear truck of the said ladder-carriage, a rope or rod connected with a lever operating the said brake mechanism and having a loop on its front end, and a foot-lever, R, pivoted on the said frame E, and provided with a hook engaging the said loop of the rope or chain, substantially as shown and described.

30 10. In an extension-ladder, the combination,

40 with the brake mechanism, of a lever connected with the said brake mechanism, a rod or rope, Q⁵, connected with the said lever, a rod or link, S², connected with the said rod or rope Q⁵, and a screw, S, connected with the said link S², and serving to act on the rod or rope Q⁵ when its foot-lever R is disengaged, substantially as shown and described.

11. In an extension-ladder, the trucks B and C, the truck-frame D, supported on the said trucks B and C, the frame E, swiveled on the king-bolt B' of the truck B, and supported by the said truck-frame D, and the ladder G, supporting the ladders H and I, in combination with the ropes P and P', secured by one end to a cross-beam of the truck C, and running under the side beams of the truck-frame D after being crossed, the drum P³, mounted on the front end of the said truck-frame D, and on which the said ropes P and P' are wound, and the steering-shaft P⁵, engaging the said drum P³, and adapted to turn the same from the frame, substantially as shown and described.

12. In an extension-ladder, the steering-drum P³, carrying the ropes P and P', acting on the rear truck, C, and the steering-shaft P⁵, engaging the said drum P³, and having a projecting arm, P⁸, in combination with the locking-arm P⁹, engaging the said projecting arm P⁸, so as to prevent the steering-shaft P⁵ from being turned, and holding the rear truck, C, in a straight position in relation to the truck-frame D, substantially as shown and described.

FREDERICK ALEXANDER WARNER.

Witnesses:

PETER S. SMITH,
EDWARD C. WARNER.