(No Model.)

3 Sheets—Sheet 1.

W. J. HORTON.

FIRE LADDER APPARATUS.

No. 528,126. Patented Oct. 23, 1894.

Fig 1

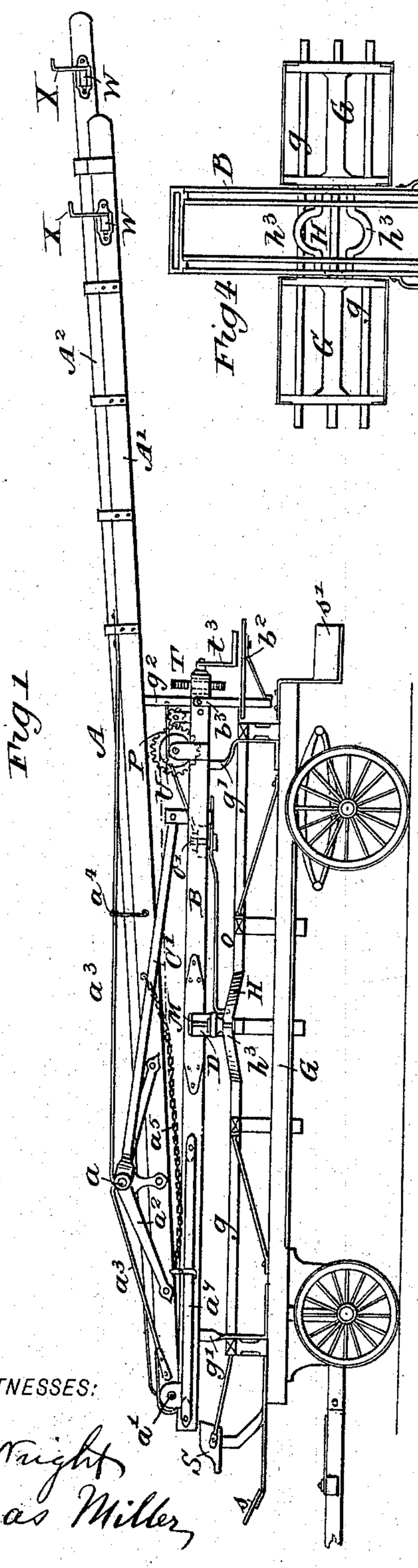


Fig 4

Fig 2

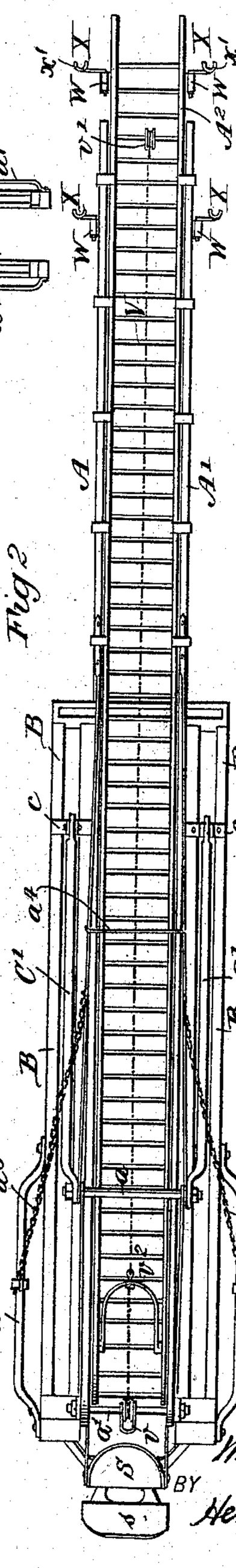
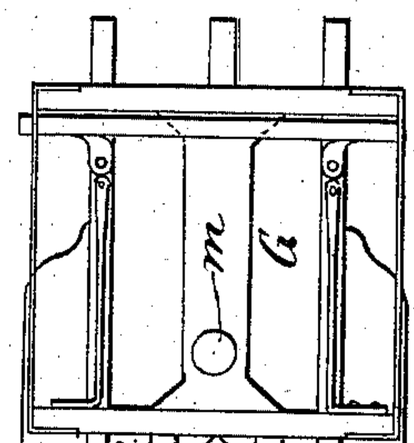


Fig 3



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(No Model.)

3 Sheets—Sheet 2.

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Fig. 5.

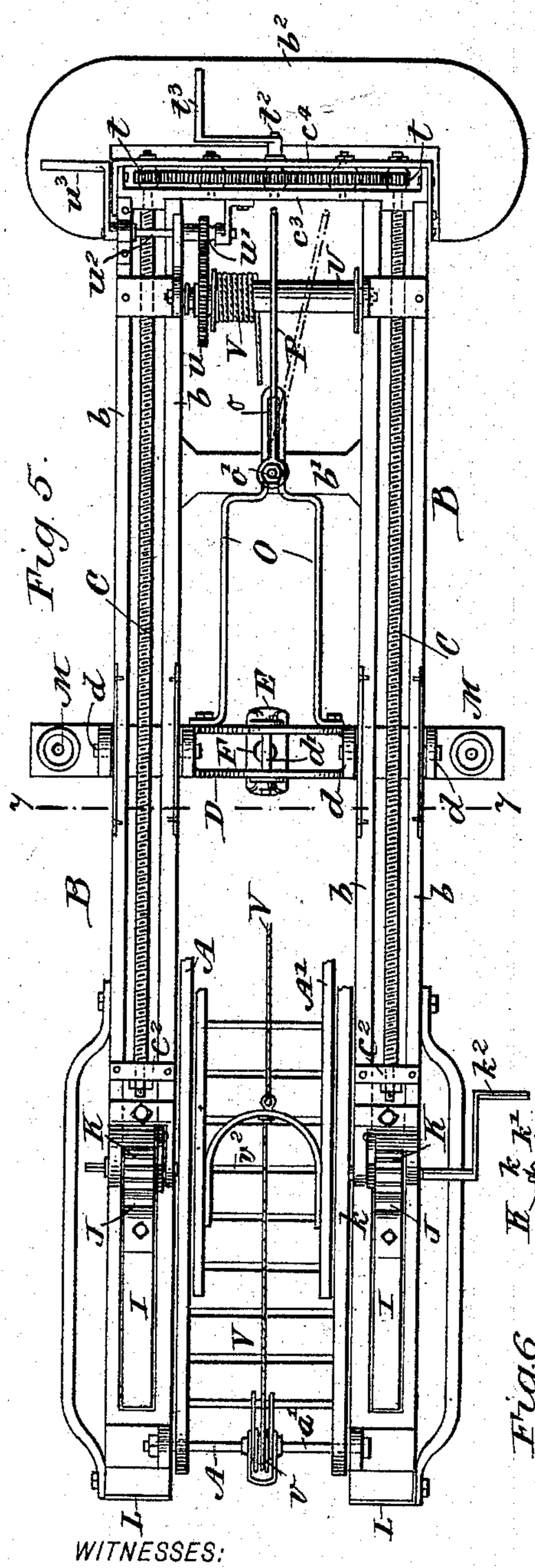

Fig. 9.

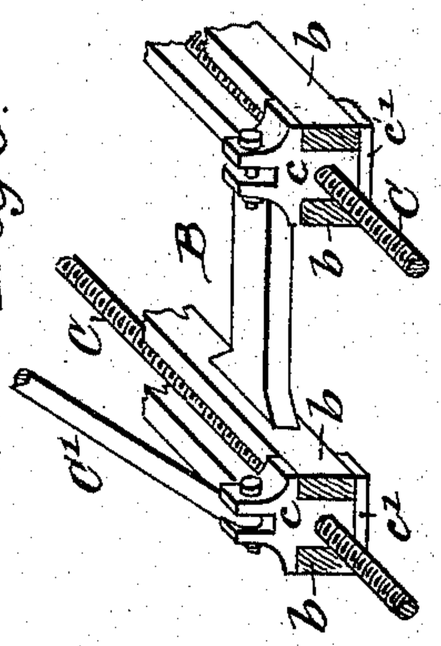

Fig. 10.

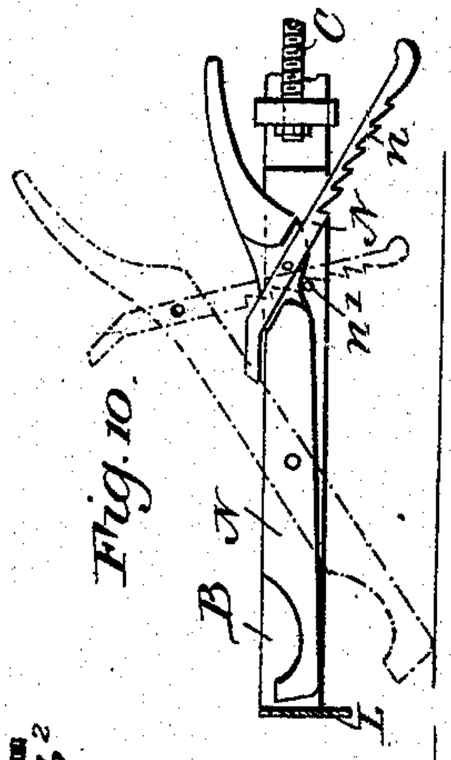

Fig. 8.

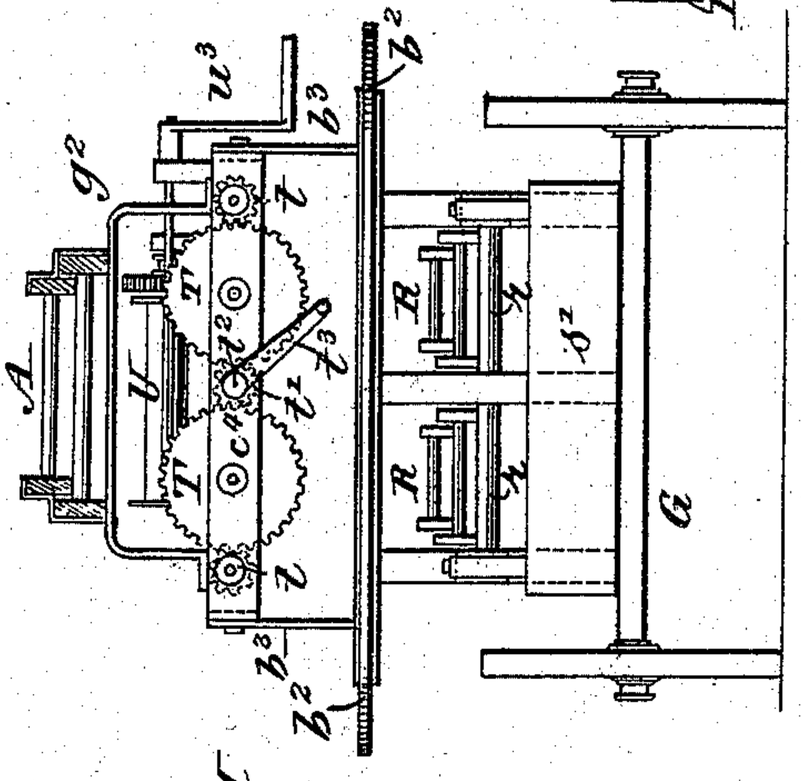

Fig. 6.

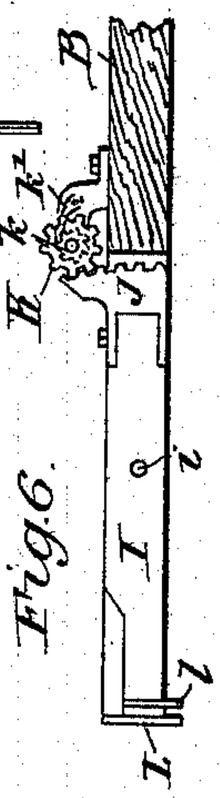

Fig. 7.

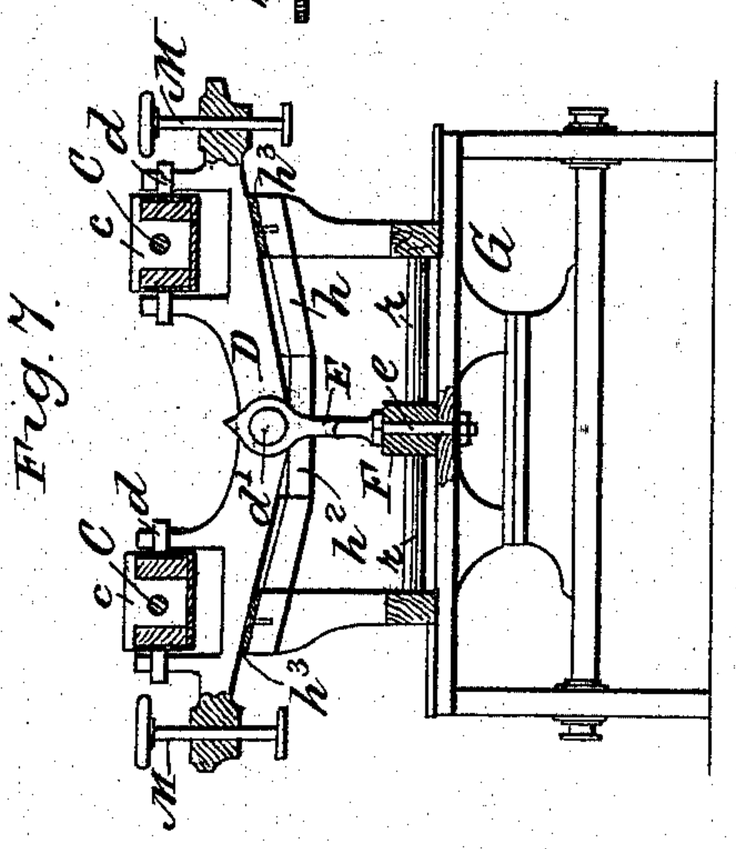

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Fig 13.

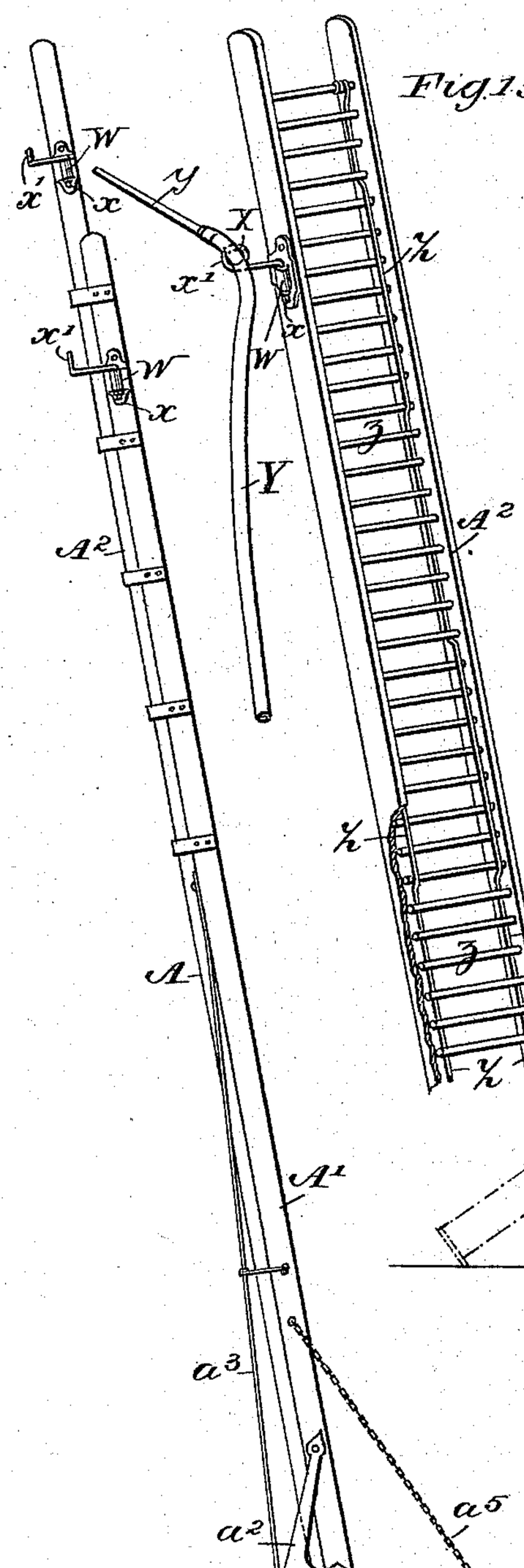


Fig 14.

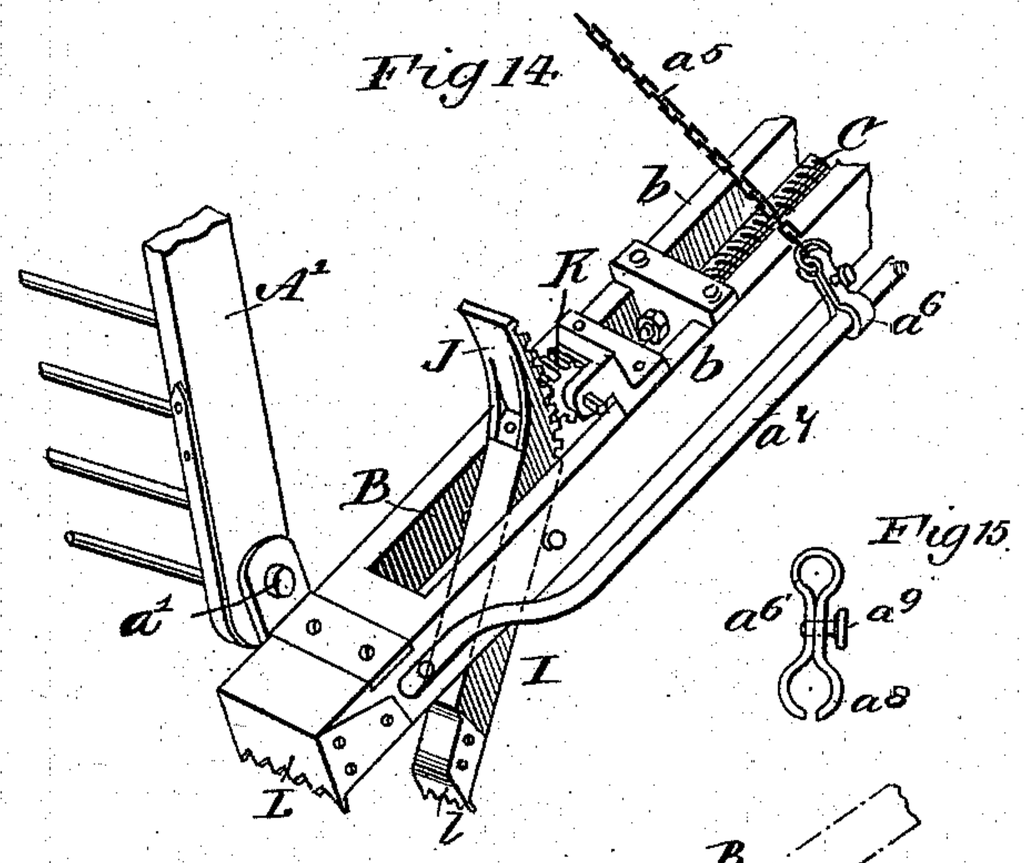


Fig 15.

Fig 12.

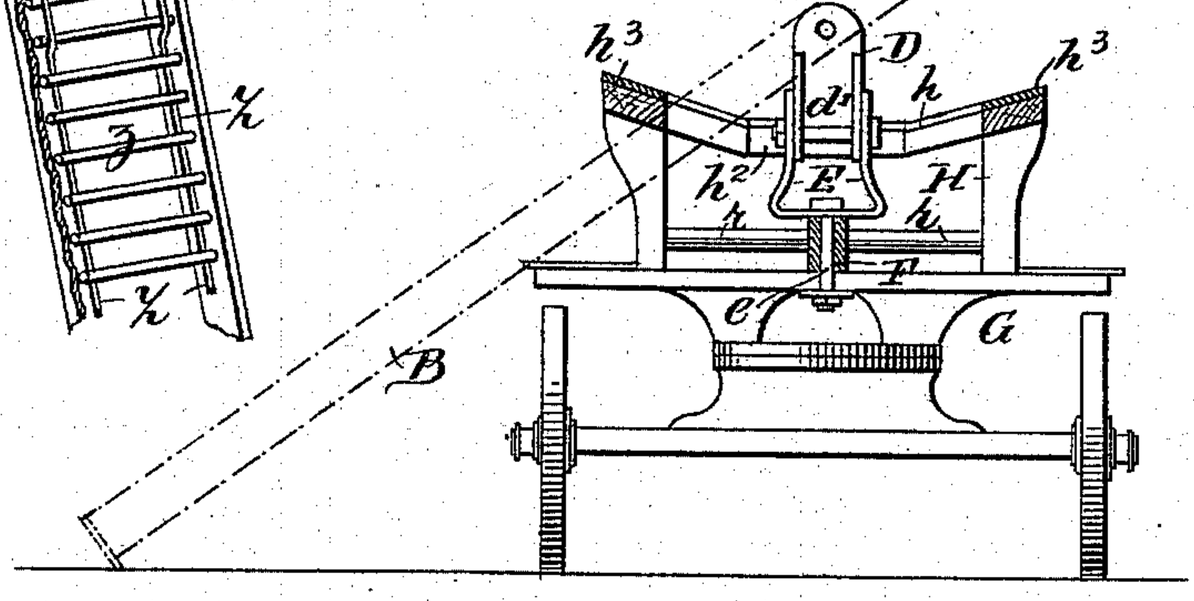
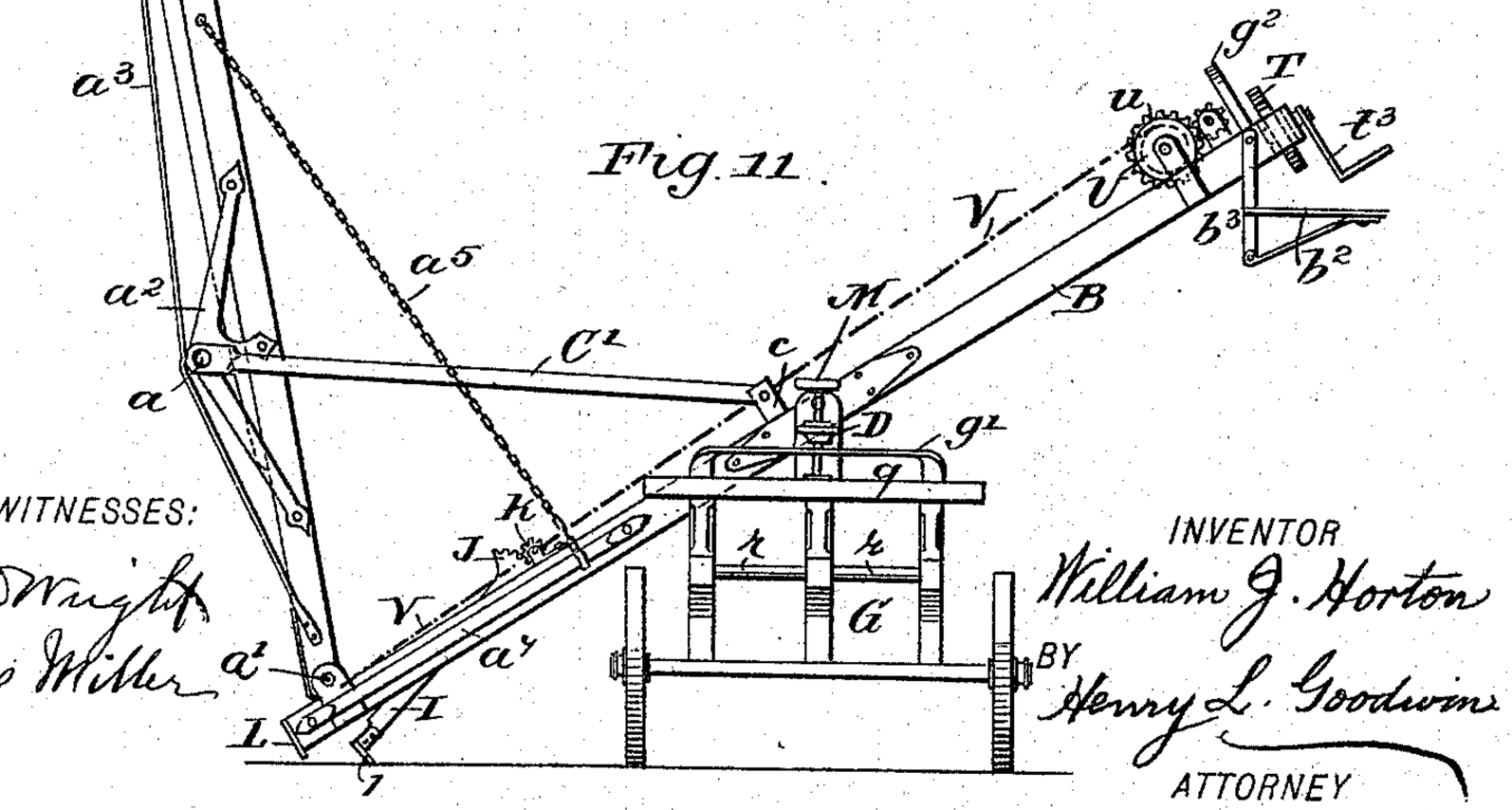


Fig 11.



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UNITED STATES PATENT OFFICE.

WILLIAM JAMES HORTON, OF HALIFAX, CANADA.

FIRE-LADDER APPARATUS.

SPECIFICATION forming part of Letters Patent No. 528,126, dated October 23, 1894.

Application filed September 30, 1892. Serial No. 447,416. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM JAMES HORTON, a subject of the Queen of Great Britain, residing at Halifax, in the Province of Nova Scotia and Dominion of Canada, have invented certain useful Improvements in Fire-Ladder Apparatus, of which the following is a full, clear, and exact description.

My invention has for its object to improve the construction of fire ladder apparatus in such manner as shall make them more efficient in use and so that the apparatus shall in its construction and operation combine the practical advantages of the ordinary hand ladder truck a main extension ladder useful at high buildings, and a substantial water tower.

The invention will first be described and then will be particularly defined in claims hereinafter set forth.

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

Figure 1, is a side elevation of the fire ladder apparatus. Fig. 2, is a general plan view thereof, with some parts omitted. Fig. 3, is a plan view of the main truck frame of the apparatus. Fig. 4, is a detail plan view, drawn to a smaller scale, and illustrating how the downwardly tilted ladder platform is stayed laterally by the truck frame. Fig. 5, is a plan view of the main ladder platform, drawn to a larger scale and with the ladder partly broken away. Fig. 6, is a detail side view showing one of the ladder platform leveling levers. Fig. 7, is a vertical transverse section of the apparatus, taken on the line 7, 7, in Fig. 5. Fig. 8, is a rear end view of the apparatus, with the main extension ladder in cross section. Fig. 9, is a detail sectional perspective view of the ladder platform and ladder adjusting mechanism. Fig. 10, is a detail side view of a modification of one of the ladder platform leveling levers. Fig. 11, is a general view showing the main ladder platform tilted to the ground at one side of the main truck frame and the ladder adjusted for use. Fig. 12, is an enlarged detail vertical cross sectional elevation of some parts shown in Fig. 11. Fig. 13, is a detail perspective view of the upper or extensible section or "fly" of the main ladder illustrating braces and hose supports thereon. Fig. 14, is an enlarged detail perspective view of parts of the tilted ladder platform and ladder; and Fig. 15, is an enlarged view of the clamp used with side braces of the main ladder.

A principal or fundamental feature of my construction consists in providing a fire apparatus with a turn table or revoluble platform or support adapted to tilt to the ground or anything thereon and thereby obtain a most substantial ground support for a ladder which is fulcrumed or pivoted to the platform and is adapted to be raised thereon and to be variably inclined at the will of the operator.

In the prefered construction the ladder platform is connected to the main frame of a wheeled truck by means of a rocking yoke swiveled for horizontal swinging movement, and whereby the platform with its raised or partly raised ladder, may first be turned one-quarter around horizontally, and may then be tilted to the ground at one side, or at either side, of the wheeled truck or carriage of the apparatus and said platform may then be adjusted vertically by means of its side levers, either to level the ground end of the tilted platform or to laterally adjust the upper portion of the main ladder which preferably is an extension or telescoping ladder.

In so far as the fundamental operative principle of my invention is concerned, any approved means or mechanisms may be employed for raising and bracing the main ladder. For instance, it may be raised and stayed by the ordinary "tormenter" poles operated by hand; but as a further improvement, I provide mechanism on the platform for raising and bracing the main ladder, this mechanism consisting preferably of a pair of screws having nuts which are coupled by connecting rods to or at opposite sides of the pivoted ladder; all in a simple, compact, self contained and labor saving arrangement which gives necessary stability to the raised ladder and to the whole apparatus to allow it to be safely used as a water tower. Mechanism for extending the upper or fly ladder is also provided on the tilting platform.

The extension ladder A, has a main lower section A′, and an upper extensible section

or fly ladder A^2, and is pivoted or fulcrumed preferably at or near its butt end to the forward end or part of the tilting platform or support B, and preferably by a transverse shaft a', passed through the main ladder section or suitable boxes thereon. This platform B, as shown, is made with sides each consisting of two timbers or stringers b, b. The screws C, C, are provided with nuts or nut blocks, c, c, which slide between the pairs b, b, of side stringers and also have bearings at the top and bottom thereof, a separable lower plate c', permitting this adjustment and holding the corresponding screws C, in the space between the two stringers where the screws are protected from injury. The bearing of the nuts on the side timbers b, b, relieves the screws of much of the transverse strains to which they otherwise would be subjected.

To these screw nuts c, c, are pivoted the rear ends of connecting rods C', C', which at their forward ends are pivoted to the main ladder section A', and preferably by a transverse shaft a, which is securely held to the opposite side bars of the ladder by angularly disposed metal brace bars or plates a^2. A long truss brace a^3, also is used at each side bar of the main ladder and has an eye or loop engaging the transverse shaft a. A transverse stay rod a^4, is shown connecting the opposite truss rods a^3, a^3, at the outer face of the ladder. Other stays or braces a^5, a^5, are used at opposite sides of the main ladder section a', to which they are secured at their forward ends while at their rear ends said stays have clips or clamps a^6, which are adapted to slip along rods a^7, bolted at opposite ends to the sides of the ladder platform B. These clips shown more clearly in Figs. 14 and 15, of the drawings, are preferably made of a bent piece of elastic metal having an eye which takes the rod a^7, and also having a split or open eye a^8, allowing each clip to be shifted along its rod a^7, and then clamped to it by a screw a^9, in the clip near its eye a^8. These braces or stays a^5, are shown as flexible chains and they are intended chiefly as lateral stays to the raised main ladder.

Before describing the mechanism used for operating the main ladder raising and adjusting screws; or other details of construction of this ladder and its tilting platform B, I will explain the preferred connections of said platform with the main truck frame or carriage of the apparatus and its adjustments relatively thereto, as follows.

The platform B, is pivoted by gudgeons d, d, at its opposite sides b, b, to opposite end parts of a transverse rocking yoke or support D, which itself is pivoted by a short horizontal shaft d', to the upper forked end or part of a standard or base-piece E, which is swiveled for horizontal movement, by a vertical pin e, to a support or bearing F, fixed to the lower central portion of the main truck frame G, of the apparatus and between two upwardly extending end parts g, g, of said frame. These parts g, g, support the ladder platform B, when it is in normal level transit position on the carriage. The gudgeons d, are axially at about right angles with the axis of the horizontal yoke-pivoting shaft d', and the parts D, E, e, form a turn-table device. With this construction, the entire ladder platform may first be turned horizontally one-quarter round toward either side of the truck frame on the pin e, as a center of motion, and then the platform may be tilted downward on the gudgeons d, until its end whereat the fire ladder A, is pivoted, rests upon the ground or upon anything thereon, such as a plank or beam or metal plate. When thus tilted the platform may be adjusted vertically at either side to level it at the ground, by rocking the yoke D, and the platform on the shaft connection d', of the yoke.

To the above named raised end parts g, g, of the truck frame G, are fixed the ends of a support H, which practically is a part of the truck frame. As most clearly shown in Figs. 3 and 7, of the drawings, the central opposite side parts h, h, of the support H, are sustained by uprights rising from the main frame G, and said parts h, h, extend laterally outward and their ends h', h', which are connected to the inner cross bars of the parts g, g, of the frame, are also set apart or separated to provide a space h^2, between them to allow rocking of the yoke D, on its shaft d', after the ladder platform B, is turned one-quarter around and tilted to the ground and at which time the sides b, b, of the platform swing down into the spaces h^4, between the parts h, of the coupling and the adjacent parts g, g, of the frame; and the yoke D, then ranges lengthwise of the main truck frame.

Figs. 1, 7, and 12, of the drawings, show that the extreme lateral or central side parts h^3, h^3, of the portions h, h, of the support H, are at a higher level than any other part of this support and whereby as the platform B, is turned one quarter around from its normal lengthwise position on the carriage, the yoke D, which did normally rest or bind on the higher parts h^3, h^3, of the support H, will then be over the spaces h^2, and the turned yoke then may rock on the shaft d', while the ladder platform is being adjusted vertically at one side or the other to give it the best possible support on uneven ground and to also secure a limited transverse or lateral adjustment of the head or top of the raised ladder. After the platform is raised level again and while it is being turned back to its normal position, the outer parts of the yoke D, will strike and ride up the inclined upper faces of the parts h, h, of the support H, until, as the platform takes its normal position, the yoke will rest or bind upon the highest parts h^3, h^3, of the support and will thereby prevent chattering or lateral unsteadiness of the entire central coupling or connections D, E, e, when the apparatus is in transit.

Figs. 4 and 11, of the drawings, illustrate that when the ladder platform is tilted to the ground at either side of the main truck frame, the opposite sides *b*, *b*, of the platform fit loosely between the raised end parts *g*, *g*, of the frame and thus while not preventing the above named vertical adjustment of either side of the platform, the latter will be braced or stayed laterally at opposite sides by the frame parts *g*, *g*, to relieve the platform coupling D, E, *e*, of undue strains and promote maximum steadiness of the entire apparatus when it is in service as a water tower.

Various devices may be used to vertically adjust the sides of the tilted platform. I show preferred means of mechanism comprising a couple of levers I, I, which are fulcrumed at *i*, to and between the pairs of side bars *b*, *b*, of the platform. As a preferred means of adjusting and locking these levers I, they are each provided at the rear end with a rack J, which is engaged by a pinion K, journaled on the platform and provided with a ratchet *k*, with which a pawl *k'*, engages for locking the lever at any required adjustment. When the pinion K, is turned by a crank k^2, applied to its shaft, the rack J and hence the lever I, may be adjusted to first carry the foot of the lever to the ground and then press it thereon sufficiently to raise the corresponding side of the platform to level it or give a limited lateral adjustment to the top of the raised main ladder in order to reach the window or upper place desired. I prefer to fix to the platform sides *b*, *b*, a metal guard plate L, which is preferably toothed or serrated to give it a better hold on the ground while it at the same time protects the end of the platform. Substantially similar guard plates *l*, are fixed to the outer ends of the platform leveling or adjusting levers I, above mentioned. I have also threaded screws M, M, into the opposite end parts of the platform yoke D. By setting these screws down upon the truck frame or upon metal guard plates *m*, *m*, fixed thereto, greater stiffness or stability is given the platform and ladder when and after the platform is tilted to the ground and adjusted thereat, as the screws, when so turned down to the frame, prevent rocking of the yoke D, and the platform on the pivot shaft *d'*.

Instead of using the rack and pinion devices J, K, *k*, *k'*, for adjusting and locking the levers I, the modified latch arrangement shown in Fig. 10 of the drawings may be adopted. This latch comprises a notched or toothed rack bar N, which is pivoted to the handle end of the lever and is adapted to be set by any one of its notches or teeth *n*, upon a pin *n'*, which crosses the slot or opening within which the adjusting lever is fulcrumed. The dotted lines indicate the locking action of the latch bar.

I have also provided a locking device to hold the ladder platform B, a little clear of the ground when it is desired to shift the apparatus on the truck wheels to a more advantageous position while the raised ladder is in use. The preferred locking device shown in the drawings, consists of a rod brace O, which is connected to the yoke D, of the platform coupling and at its rear end preferably has a slot *o*, through which passes a bolt *o'*, entering a cross bar *b'*, of the platform. To this bolt any suitable wrench bar may be applied to tighten it on the brace O, at any point to which its slotted part *o*, may travel along the bolt when the ladder platform is raised sufficiently clear of the ground. I now prefer to use a long wrench bar P, which extends rearward from the bolt within reach of a man on the rear step b^2, of the platform from which also the main ladder adjusting screws C, C, are operated, as presently explained. After readjustment of the truck the bolt *o'*, will be loosened to allow the platform to again rest upon the ground to sustain the ladder therefrom.

The end frames *g*, *g*, of the truck or carriage are made mainly of wood and they may be high enough to directly sustain the ladder platform when it is in normal transit position, but the drawings show two transverse metal cross bars or plates *g'*, *g'*, fixed to the end frames *g*, *g*, and on which in connection with the bearings of the yoke D, on the support H, the ladder platform is sustained. Ordinary hand ladders R, are carried on the main truck frame below the tilting platform B, and preferably upon rollers *r*, located between uprights of the frame, the ladders being placed in two series or groups, one at each side of the turntable coupling E, *e*, which connects the ladder platform to the frame. These hand ladders are shown only in Fig. 8, of the drawings. The driver's seat S, and foot board *s*, are held to the front of the truck frame, and a box *s'*, for holding hose couplings and other tools or appliances, is hung from the back end of the frame. The usual complement of axes, lanterns, &c., will be carried on the truck.

The ladder raising screws C, C, are shown fitted in front thrust bearings c^2, held to the platform sides *b*, *b*, and also in two rear metal plate bearings c^3, c^4, which form the back end of the ladder platform. In or between these end plates c^3, c^4, are journaled two large gear wheels T, T, which engage pinions *t*, *t*, fixed to the screws. A central pinion *t'*, on a shaft t^2, engages both wheels T, T, to rotate them by a crank t^3, applied to shaft t^2 and operated by firemen on the rear step b^2, of the platform B. This step is preferably hung to the platform by straps b^3, allowing it to take a level position whether the platform be level or tilted. The step b^2 also gives access to the fly ladder operating mechanism next described. This mechanism comprises a drum U, journaled on the platform B, and having a gear wheel *u*, which is engaged by a pinion *u'*, on the shaft u^2, to which an operating crank u^3, is connected. From this

drum extends a chain or wire rope V, which passes forward to and partly around a pulley v, on the lower pivot shaft of the main ladder section A′. From this pulley v, the chain passes to another pulley v', journaled at the outer end of the ladder section A′, and from this pulley v', the chain is returned to the lower end of the fly ladder A^2, and is connected to a bail v^2, on said ladder at or near its foot or lower end. By operating the drum U, the fly ladder may be extended or projected to any desired extent and be safely held and be again lowered after use.

I have fastened sockets or socket plates W, to the upper or outer parts of the side bars of the ladder sections A′, A^2, in order to loosely receive the vertical arm x, of brackets X, the outer ends of which carry a fork x', or it may be a complete ring, as indicated, by the dotted lines in Fig. 13 of the drawings. The fire hose Y, will be placed in the bracket fork or ring to assist or relieve firemen on the ladder who will by turning the hose nozzle y, sidewise and vertically, direct the stream of water from the hose to the best advantage.

The hose may be raised by the bracket as the fly ladder is raised and to any required height. More than one line of hose may be used and each hose will have its own bracket support on the ladder. This simple bracket attachment allows all necessary universality of movement to the hose nozzle it supports and materially adds to the efficiency of the apparatus when in service as a water tower.

In Fig. 13, of the drawings, are shown metal rod braces Z, running longitudially and interlaced with rounds z, of the fly ladder and preferably next the ladder side bars out of the way of the firemen's feet. These light metal braces Z, give increased stiffness to the fly ladder and permit the long truss rods commonly used thereon to be dispensed with.

The operation of the apparatus is briefly summarized as follows:—On arrival at a burning building and when it is necessary to at once use the main extension ladder A, the firemen on the platform step b^2, will first, by operating the crank t^3, partly raise the ladder by the travel of the nuts c, c, on the screws C, C, and the thrust of the connecting rods C′, C′, on the ladder shaft a, and until the platform B, will about balance on its gudgeons d. The platform with the partly raised ladder will then be turned one quarter around to either side of the truck frame and will then be tilted to the ground between the end parts g, g, of the frame which laterally stay or brace the platform. Should the ground be not level, one of the levers I, will be pressed to the ground to level the lower end of the tilted platform, whereupon the crank t^3, will be operated to fully swing the ladder over to and past the vertical position. The screws M, M, now will be set or run down onto the main truck frame to steady the yoke D, and the platform and ladder. The crank u^3, will then be operated to project the fly ladder A^2, which however may thus be adjusted while the whole ladder is being raised. The side braces a^5, will now be adjusted on the rods a^7, and will be tightened, when the braces are taut, by the clip screws a^9, and the ladder is now ready for use of its inner face by the firemen. See Fig. 11 of the drawings. If it is desired to move the raised ladder sidewise, the platform B, will be raised a little clear of the ground and the bolt o', of the brace O, will be clamped or tightened on the brace by the wrench P, and after the apparatus is moved along on its wheels to carry the head of the ladder to the desired place, the wrench will be turned to loosen the nut and allow the platform to again rest on the ground whereat it may again be leveled by one of the levers I, if necessary. When the upper end of the ladder is rested at the desired window sill or opening, the hose Y, while in a bracket arm X, may be operated from the top of the ladder by firemen thereat, or by a line connected to the hose nozzle and extending to firemen on the ground.

It is probably one of the chief advantages resulting from the use of the tilted ladder platform or support sustained directly on or from the ground, and the connections between the platform and ladder, that the main ladder of my improved apparatus is able to safely resist the back thrusts and other peculiar strains of one or more water throwing hose without requiring a wall or other support for the head or top of the ladder. This advantage of stability is increased greatly by the tilting of the ladder platform to the ground at the side of the wheeled truck, as thereby the effective base or ground line practically given the apparatus equals an area bounded by lines which would connect the lower corners of the platform with the farthest side wheels of the truck, and so long as the connections of the ladder and platform remain intact or unbroken, the entire apparatus including the truck would have to be overturned before the ladder would give way or break down under the thrusts or strains of the hose, and any such overturning of the apparatus is quite impossible.

These features of construction which allow safe use of hose on the extension ladder and without requiring wall or other supports for the upper end of the ladder, are of great importance when it is considered that in large cities where this class of apparatus is frequently called out to fires, the main extension ladder is not often raised to save life or to mount a high and isolated building. It is therefore manifest that my apparatus having in itself the capacity for service as a water tower without top supports and without danger to life or limb of the operators or injury to the apparatus itself, must be a far more than ordinarily useful structure, because after such occasional use of the extended ladder to save life or mount a high building, the apparatus may be immediately utilized as an

efficient water tower, and this latter use may be made of it at almost any or every fire where water thrown from a height would be most serviceable. Furthermore, my apparatus provides a substantial water tower at a small cost as compared with apparatus built for water tower service exclusively, while it also combines in itself an extension fire escape ladder and the ordinary hand ladder truck.

After use of the apparatus as above described, the crank u^3, will be operated to lower the fly ladder A^2, and the levers I, if used, will be returned to normal position and the crank t^3, will be operated to partly lower the ladder to about balancing position and after the screws M, M, are turned upward clear of the main frame, the platform will be tilted upward and then will be turned back on the turntable, D, E, *e*, into normal transit position upon the main truck frame or carriage, at which time the overhanging end of the ladder has support on a cross bar g^2, at the rear end of the platform B.

Obviously, the ladder A, and platform B, may be connected by one operating screw and nut, and one rod or equivalent truss bar, but I prefer to use the two screws and corresponding nuts and connecting rods shown as they give greater stability and safety to the raised ladder when in service as a water tower. It is also manifest that the pivot or fulcrum connection of the main ladder and platform may be located to allow the butt end of the ladder to rest on the ground, but ease of adjustment of the ladder to various inclines or angles, and durability of the ladder, are promoted by allowing the platform only to rest on the ground. It will also be apparent, that, as regards the arrangement of the tilting platform, my invention may be utilized to sustain a series of telescoping or extension tubes or frames forming a water tower and fire escape instead of the telescoping ladders herein shown and described, hence, in a general sense, the terms "ladder" and "ladders" herein used include both ladders and tubes or other means of reaching a height and utilizing thereat a fire escape platform or water throwing hose.

I am aware that various improvements are possible in the above described apparatus embodying the fundamental principles of construction and operation of my invention hereinafter specifically claimed, as a number of such improvements are shown and described in the auxiliary application of Henry Lawrence Goodwin, of the city of New York, recently filed in the United States Patent Office and bearing Serial No. 446,662.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent of the United States—

1. A fire ladder apparatus, constructed with a frame, a rocking yoke or support swiveled thereto for horizontal movement, a platform or support pivoted to said rocking yoke and adapted to tilt and thereby obtain a ground support for a ladder, and a ladder pivoted to said platform and adapted to be raised and variably inclined, substantially as described, whereby after the platform and rocking yoke are turned horizontally and the platform is tilted downward, the platform may be vertically adjusted at the sides to level it at the ground or to laterally move the top or head of the ladder, as set forth.

2. A fire ladder apparatus, constructed with a frame, a rocking yoke or support swiveled thereto for horizontal movement, a platform or support pivoted to said rocking yoke and adapted to tilt and thereby obtain a ground support for a ladder, a ladder pivoted to said platform, and mechanism connecting the ladder and platform for raising and variably inclining the ladder, substantially as described.

3. A fire ladder apparatus, constructed with a frame, a rocking yoke or support swiveled thereto for horizontal movement, a platform or support pivoted to said rocking yoke and adapted to tilt and thereby obtain a ground support for a ladder, a ladder pivoted to the platform, and screw, nut and rod connections between the ladder and platform for raising and variably inclining the ladder, substantially as described.

4. A fire ladder apparatus, constructed with a frame, a rocking yoke or support swiveled thereto for horizontal movement, a platform or support pivoted to said rocking yoke and adapted to tilt and thereby obtain a ground support for a ladder, an extension ladder pivoted to said platform, mechanism connecting the ladder and platform for raising and variably inclining the ladder, and mechanism for extending the raised ladder, substantially as described.

5. A fire ladder apparatus, constructed with a frame, a rocking yoke or support swiveled thereto for horizontal movement, a platform or support pivoted to said rocking yoke and adapted to tilt and thereby obtain a ground support for a ladder, an extension ladder pivoted to said platform; screw, nut and rod connections between the ladder and platform for raising and variably inclining the ladder, and windlass connections for extending the raised ladder, substantially as described.

6. A fire ladder apparatus, constructed with a frame, a rocking yoke or support swiveled thereto for horizontal movement, a turntable or platform pivoted to said rocking yoke, and a ladder fulcrumed to the turntable; said frame having inclined faces next the rocking support, substantially as described, whereby the yoke and ladder platform will be free to rock on the yoke fulcrum when the platform is turned at right angles with the frame and the yoke support will be held from rocking when the platform is adjusted to transit position in line with the frame, as set forth.

7. The combination with the frame; the yoke swiveled thereto for horizontal movement and the tilting ladder supporting plat-

form pivoted to the yoke, of leveling devices at the foot of the tilted platform, substantially as described, whereby when the platform is tilted downward to obtain a ground support for the ladder, the platform may be leveled at the ground and the head of the raised ladder may be adjusted transversely, substantially as described.

8. The combination with the frame, the tilting platform adapted when swung downward to obtain a ground support for a ladder, and a ladder pivoted to the platform, of a latch or lock device temporarily holding the tilted platform clear of the ground, substantially as described.

9. The combination with the frame, the rocking yoke swiveled thereto for horizontal movement, and the ladder sustaining platform pivoted to the yoke, of steadying screws in said yoke adapted to be turned down onto the frame when the ladder platform is tilted and gives a ground support to the raised ladder, substantially as described.

10. A fire apparatus, constructed with a wheeled truck frame, a turntable device E, *e*, thereon, a yoke or support D, journaled at *d'*, to said turntable, a tilting platform or support fulcrumed at *d*, to said yoke, a main ladder pivoted to the platform, screws C, C, on the platform, nuts on the screws, and rods C', C', connecting said nuts with the ladder, substantially as shown and described.

11. The ladder adjusting screws C, arranged between pairs of side timbers *b*, *b*, of the ladder platform, combined with the nuts *c*, on the screws having bearings on the parts *b*, *b*, substantially as described, whereby the screws are protected and are also relieved of transverse strains, as set forth.

12. The combination, with the tilting platform and the ladder pivoted thereto, of side rods or bars a^7, on the platform and lateral braces a^5, connected to the ladder, said braces having clips or clamps adapted to slip along the rods a^7, and to be tightened thereon, substantially as described.

13. The combination, with the truck frame having a portion H, provided with curved side parts connected at *h'*, to the main frame and inclined toward higher portions h^3; of a turntable E, *e*, on the main frame, a yoke D, fulcrumed at *d'*, to the part E, and a ladder sustaining platform fulcrumed at *d'*, to the yoke, substantially as described.

14. The combination, with the tilting ladder platform, of levers I, fulcrumed thereto, racks J, on the levers, pinions K, engaging the racks, and detents for the pinions and levers, substantially as described.

15. The combination, with the tilting platform, the ladder pivoted at one end thereof, and the operating screws, nuts and connecting rods on or at said platform and ladder, of the screw operating gearing *t*, *t*, T, T, *t'*, t^3, at the other end of the platform, and a step thereat for the operators, substantially as described.

16. The combination, with the tilting ladder platform and the ladder operating gearing at its rear end, of a swinging self-leveling step b^2, hung to the platform near said gearing, substantially as described.

17. The combination, with the tilting ladder platform, of a brace O, coupled to the yoke below the axis of the platform, and a bolt *o'*, clamping the brace to a bar of the platform, substantially as described.

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Witnesses:
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