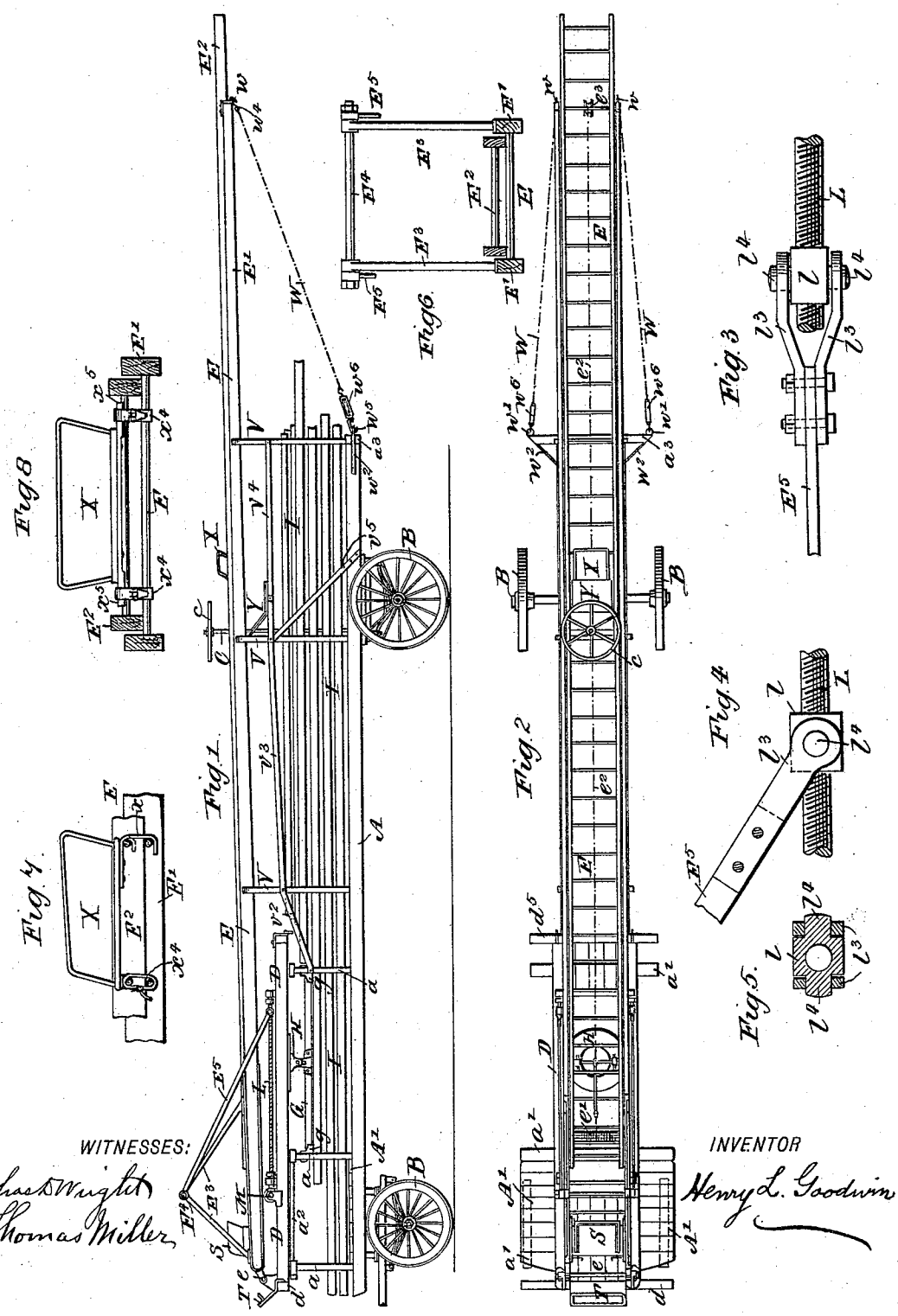
(No Model.) 6 Sheets—Sheet 1.

H. L. GOODWIN.

FIRE LADDER APPARATUS.

No. 528,938. Patented Nov. 13, 1894.



WITNESSES:
Chas. S. Wright
Thomas Miller

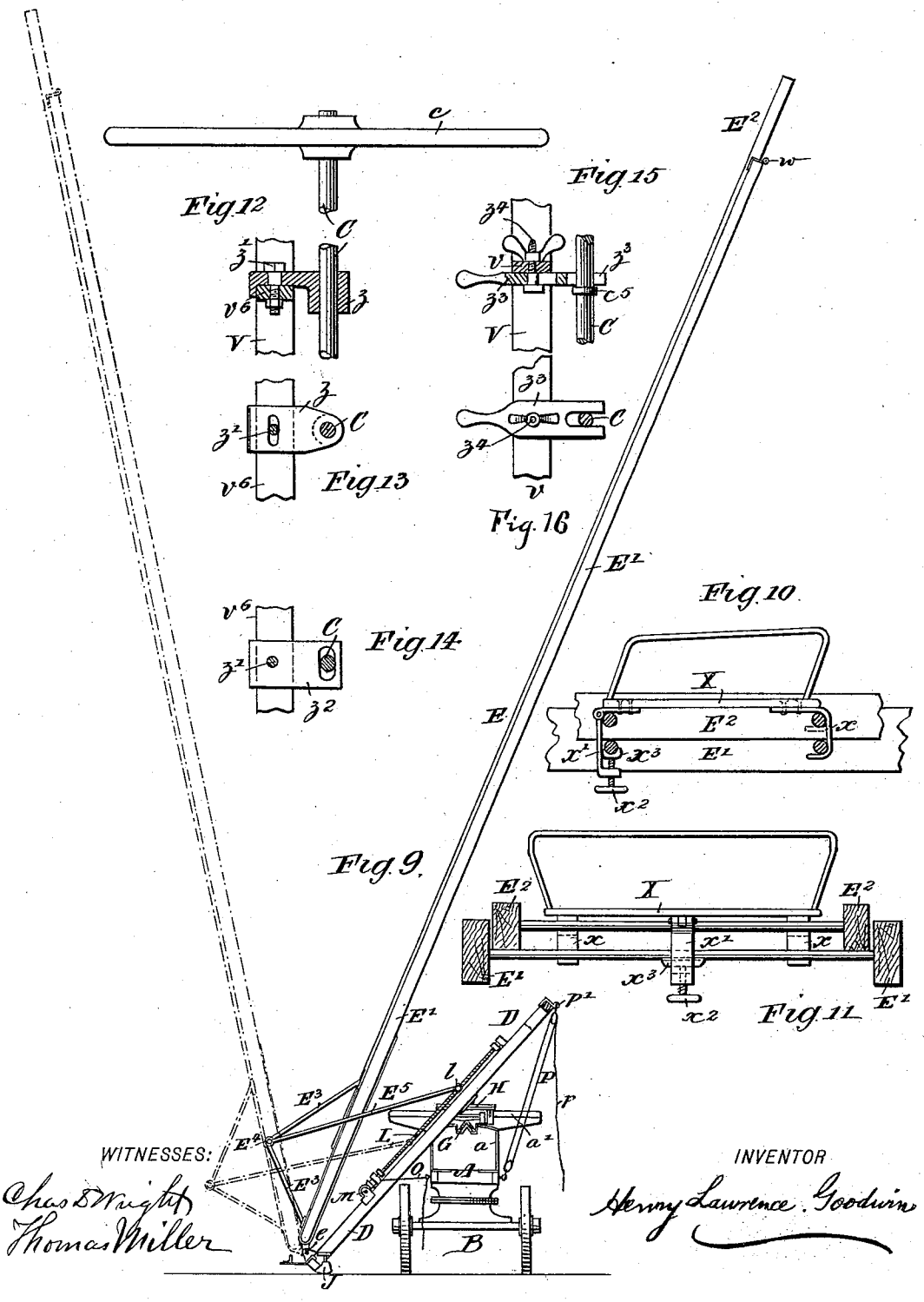
INVENTOR
Henry L. Goodwin

(No Model.) 6 Sheets—Sheet 2.

H. L. GOODWIN.

FIRE LADDER APPARATUS.

No. 528,938. Patented Nov. 13, 1894.



(No Model.) 6 Sheets—Sheet 3.

H. L. GOODWIN.

FIRE LADDER APPARATUS.

No. 528,938. Patented Nov. 13, 1894.

Fig. 17.

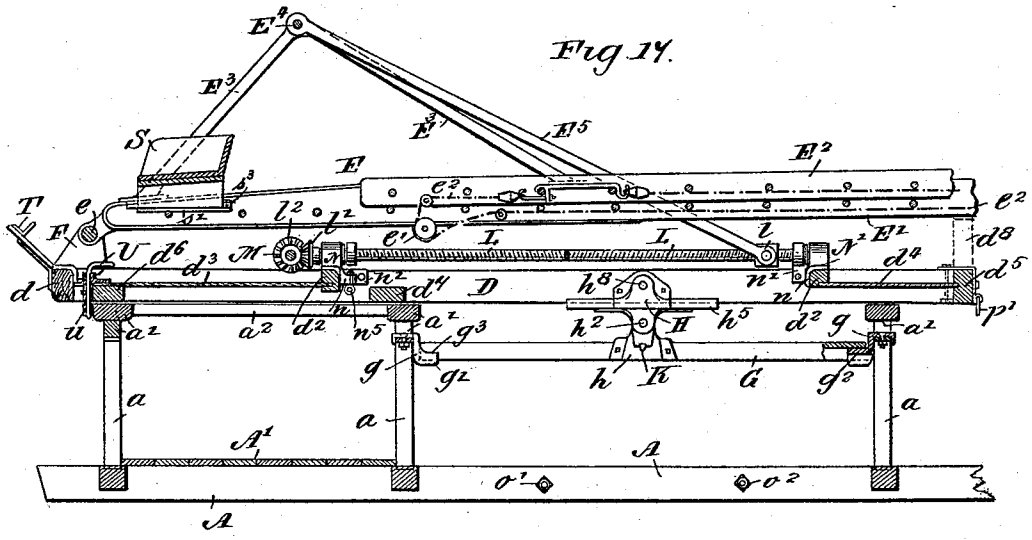


Fig. 18.

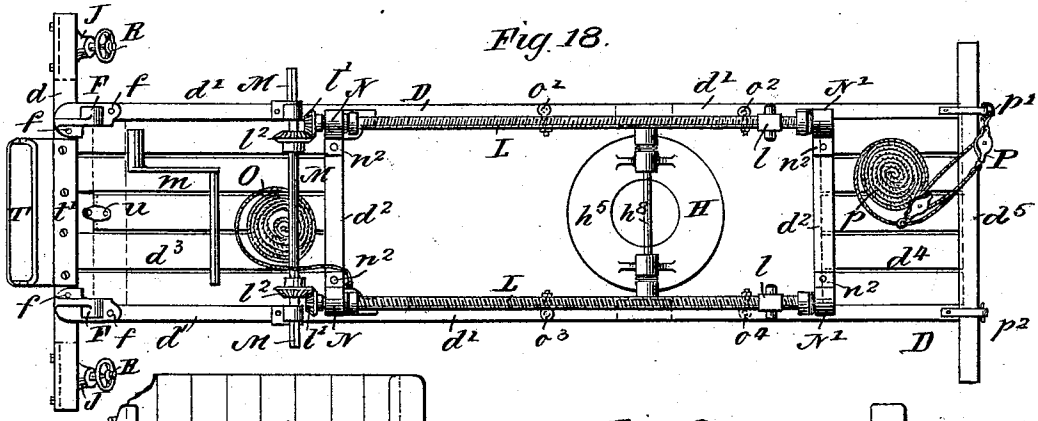


Fig. 19.

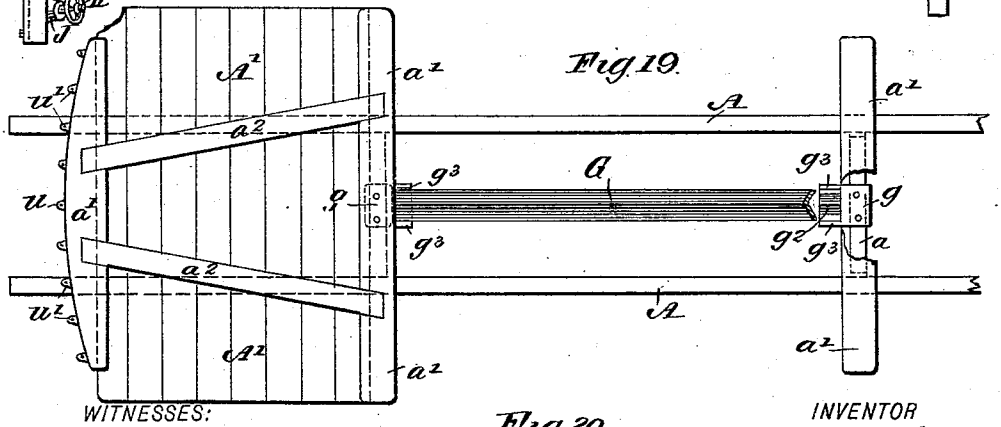
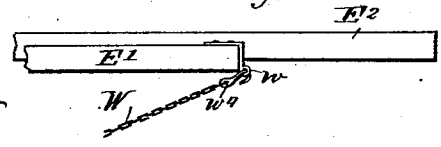


Fig. 20.



WITNESSES:

Chas. D. Wright

Thomas Miller

INVENTOR

Henry L. Goodwin

(No Model.)

6 Sheets—Sheet 4.

H. L. GOODWIN.

FIRE LADDER APPARATUS.

No. 528,938. Patented Nov. 13, 1894.

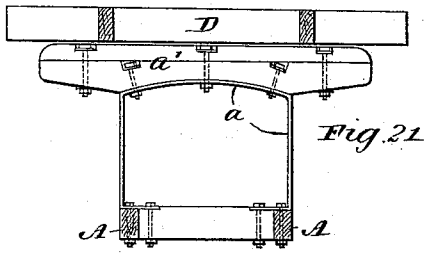


Fig. 21

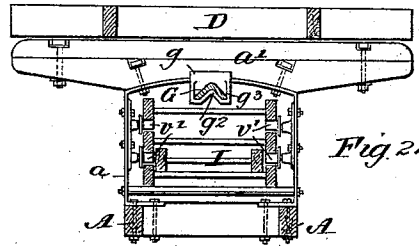


Fig. 22.

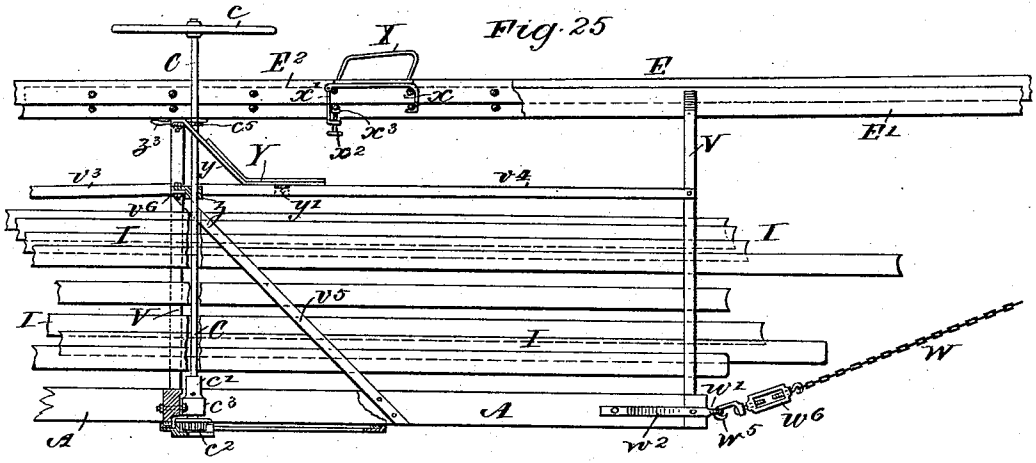


Fig. 25

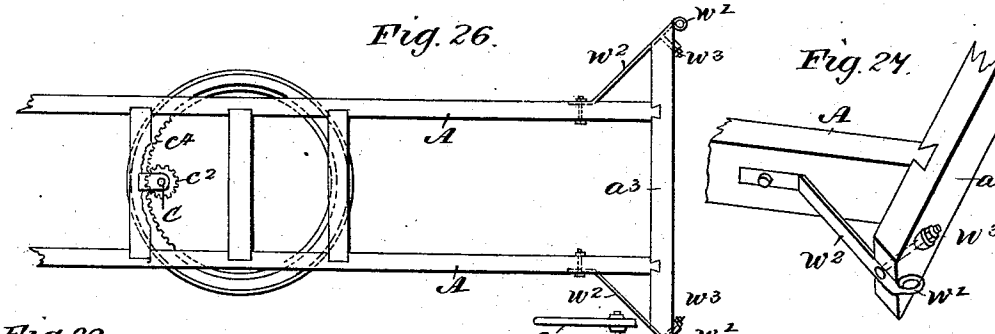


Fig. 26.

Fig. 24.

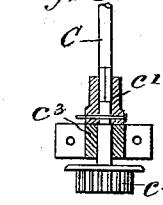


Fig. 28.

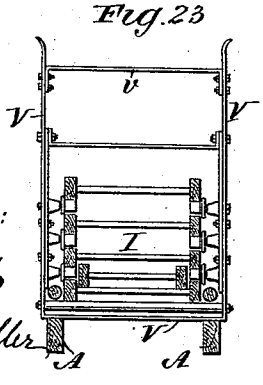


Fig. 23

Fig 24

WITNESSES:

Chas. D. Wright

Thomas Miller

INVENTOR

Henry L. Goodwin

(No Model.) 6 Sheets—Sheet 5.

H. L. GOODWIN.

FIRE LADDER APPARATUS.

No. 528,938. Patented Nov. 13, 1894.

Fig. 30

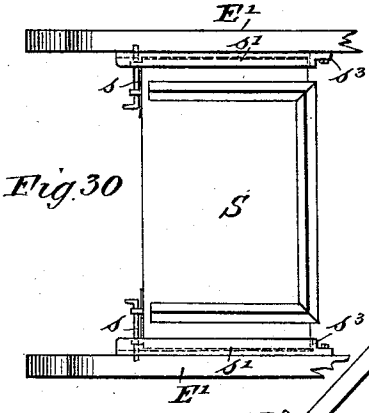


Fig. 31

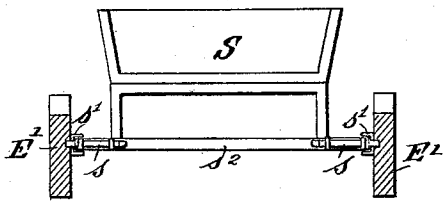


Fig. 29.

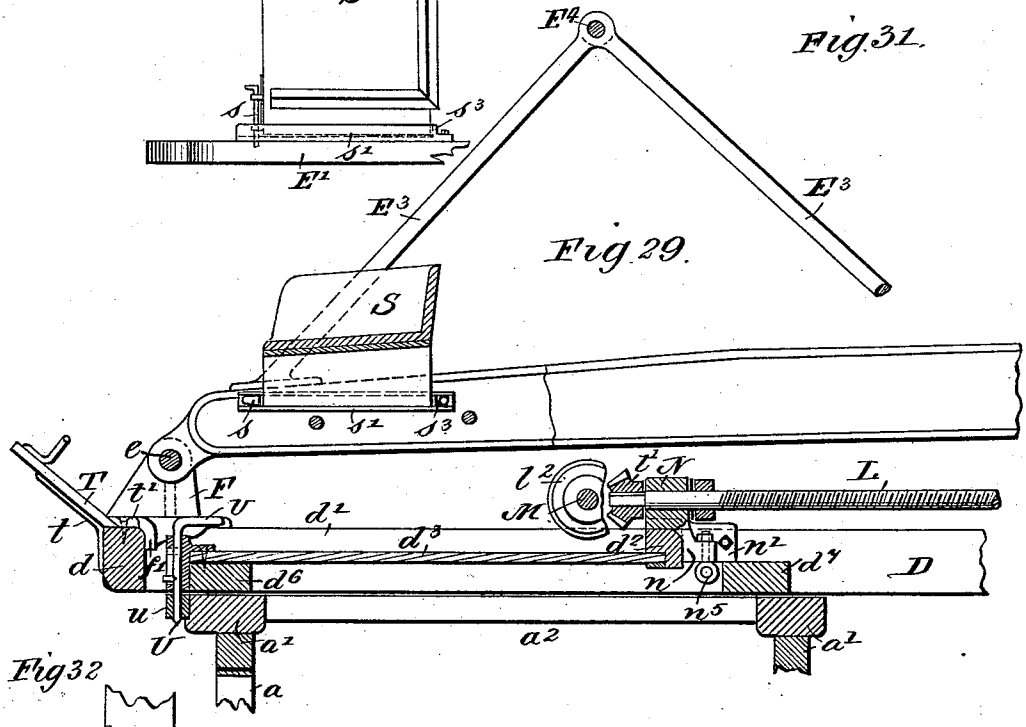


Fig. 32

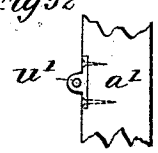


Fig. 33

Fig. 35.

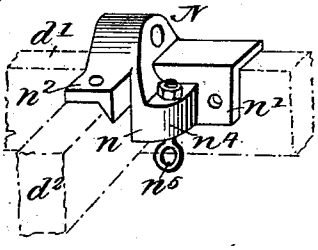
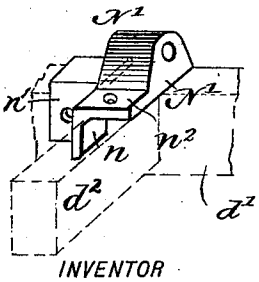


Fig. 36.

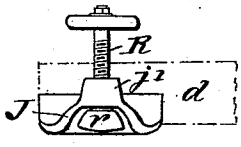


WITNESSES:

Chas. D. Wright

Thomas Miller

Fig. 34



INVENTOR

Henry Laurence Goodwin

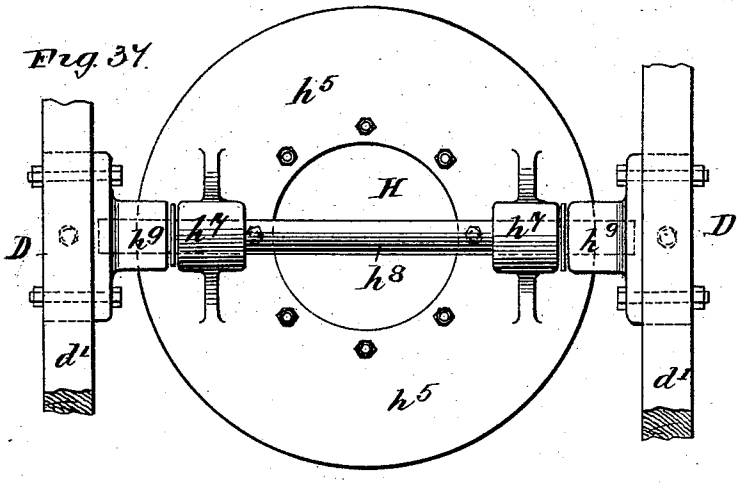
(No Model.) 6 Sheets—Sheet 6.

H. L. GOODWIN.

FIRE LADDER APPARATUS.

No. 528,938. Patented Nov. 13, 1894.

Fig. 37.



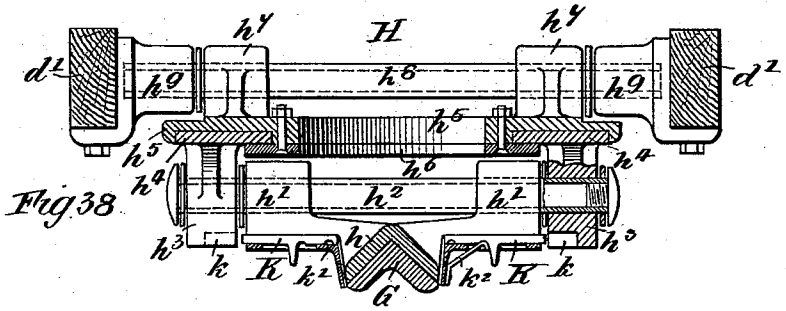
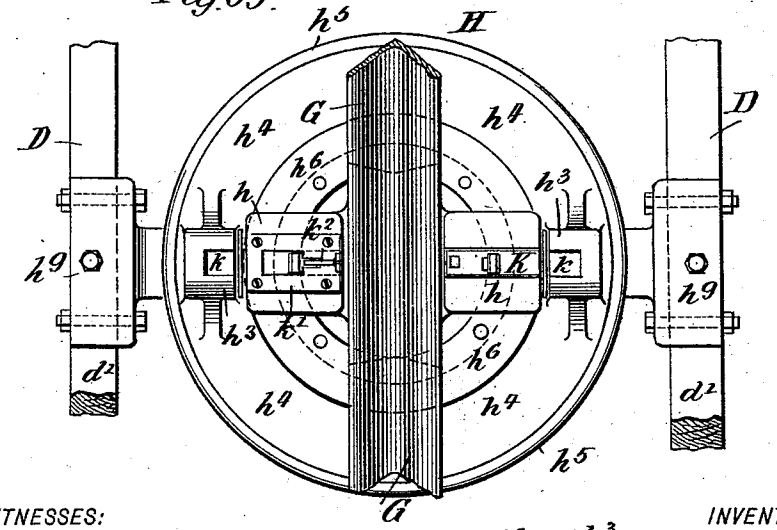


Fig. 38.

Fig. 39.

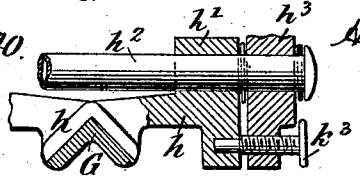


WITNESSES:

Chas. D. Wright

Thomas Miller

Fig. 40.



INVENTOR

Henry L. Goodwin

UNITED STATES PATENT OFFICE.

HENRY LAWRENCE GOODWIN, OF NEW YORK, N. Y., ASSIGNOR TO JOHN STARR, OF HALIFAX, CANADA.

FIRE-LADDER APPARATUS.

SPECIFICATION forming part of Letters Patent No. 528,938, dated November 13, 1894.

Application filed September 23, 1892. Serial No. 446,662. (No model.)

To all whom it may concern:

Be it known that I, HENRY LAWRENCE GOODWIN, a citizen of the United States of America, residing at the city of New York, county and State of New York, have invented certain useful Improvements in Fire-Ladder Apparatus, of which the following is a full, clear, and exact description.

My invention relates more particularly to certain additional improvements in the fire ladder apparatus shown and described in the application for a patent made by William James Horton, of Halifax, Nova Scotia, Canada, and now filed in the United States Patent Office and bearing Serial No. 447,416.

The improvements I herein describe have for their object to produce a more simple, compact, light and efficient machine than is disclosed in the aforesaid application of Mr. Horton, which however, embodies most important fundamental constructive and operative principles of the complete apparatus.

My improvements comprise means and mechanism whereby the raised and ground supported main ladder is allowed a wider range of lateral adjustment, and whereby also either face of the main ladder may be used. They also comprise means and mechanism for adjusting the main extension ladder from the wheeled truck or carriage to operative position and back again to normal transit position on the truck.

The invention relates further to the special construction of the apparatus whereby most convenient operation of the main extension ladder is permitted by firemen standing either on the main truck frame or on the ground: and the invention relates finally to various details of construction and arrangement of parts whereby a full complement of ordinary hand ladders is carried on the truck, and whereby the safe travel on the road and the most efficient operation of the entire apparatus is insured.

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, not including all details, but giving a general idea of the construction and proportions of parts. Fig. 2, is a plan view thereof. Figs. 3, 4, and 5, are enlarged detail views showing the connections of the ladder raising bars or rods with their screws. Fig. 6, is a detail cross section illustrating the main extension ladder and its transverse shaft to which the connecting rods are held. Figs. 7 and 8, are detail sectional side and end views respectively, of a modified arrangement of the steersman's seat on the main extension ladder. Fig. 9, is a general view showing the apparatus adjusted as when in use. Figs. 10 and 11, are enlarged detail sectional side and front views showing the preferred arrangement of steersman's seat. Figs. 12, 13 and 14, are detail views illustrating the "free play" bearings for the steering wheel shaft. Figs. 15 and 16, are detail views of the latch which holds the steering wheel shaft down to place. Fig. 17, is a detail longitudinal vertical sectional elevation of the forward part of the apparatus, drawn to a larger scale than in Fig. 1. Fig. 18, is a plan view of the main ladder platform and its coupling, removed from the truck frame and drawn to the same scale as Fig. 17. Fig. 19, is a broken plan view of that portion of the truck frame shown in Fig. 17. Fig. 20, is a detail side view of the back end of the main extension ladder and portions of the braces which stay the ladder from the truck frame. Figs. 21, 22, 23, and 24, are transverse sections taken at different vertical planes through parts of the apparatus at and above the main frame bed. Fig. 25, is a partly broken sectional side view of rear portions of the apparatus. Fig. 26, is a detail plan view of the rear portion of the main frame bed. Fig. 27, is an enlarged detail perspective view of one rear corner of the frame bed. Fig. 28, is a rear detail vertical sectional view of the steering wheel shaft pinion and its bearings. Fig. 29, is a vertical sectional side view of front portions of the main ladder and truck frame, drawn to a larger scale than like parts in Fig. 17. Figs. 30 and 31, are detail plan and front views specially showing the driver's seat on the main ladder. Fig. 32 is a detail

plan view of one of the platform bolt sockets. Fig. 33, is a detail vertical sectional view of the lower or ground end of the ladder platform as it appears when tilted and ready for vertical adjustment by its leveling screw. Fig. 34, is a detail rear view of the platform shoe and leveling screw. Figs. 35 and 36, are perspective views of bearings of the ladder raising screws. Fig. 37, is an enlarged plan view showing the preferred form of coupling which connects the main ladder platform with the truck frame. Fig. 38, is a transverse vertical section thereof with one latch bolt spring removed. Fig. 39, is a bottom plan view thereof with one latch bolt retaining plate and spring removed; and Fig. 40, illustrates a modified form of coupling latch or locking device.

The main frame of the apparatus is built with a lower bed or sill consisting preferably of two longitudinal side rails or bars, A, A, connected by cross pieces and mounted upon suitable front and rear two wheeled trucks, B, B, which are preferably made with platform springs and are adjusted to king bolts allowing the forward truck to be turned by the pole or draft connections while the rear truck is adapted to be swung around for steering purposes by a shaft C, and gearing hereinafter described.

Preferably on the forward part of the bed A, is built an upper frame which supports the platform D, to which the main extension ladder E, is pivoted or fulcrumed, and preferably by a transverse shaft *e*, which has bearings in peculiarly formed castings fastened to the platform.

The raised forward part of the frame may be built entirely of timbers, but I prefer to make it with three metal standards *a*, *a*, *a*, which, as shown in the cross sectional views, Figs. 21 and 22 of the drawings, are arched for strength at their upper central parts and at the lower ends of their vertical side parts are bolted to the frame bed rails A.

To the arched tops of the standards *a*, *a*, *a*, are fastened suitable transverse timbers *a'*, *a'*, *a'*, preferably comprising a lower piece of equal width with the standards and an upper wider piece bolted to it and giving broad and substantial support to the main ladder platform D. The upper transverse timbers on the two forward standards *a*, *a*, are connected by brace bars or timbers, a^2, a^2, which also give better support to the partially turned platform D, in certain uses of the ladder E, hereinafter described.

The two rear standards *a*, *a*, sustain an elastic or resilient longitudinal bar G, and preferably by means of preculiarly formed hanger castings *g*, *g*, which are bolted to the arched tops of the standards and receive the opposite ends of said bar G, which preferably is a piece of angle steel set apex or angle uppermost. This elastic support G, sustains at its center the peculiarly constructed turn table coupling H, presently described and by which the ladder platform D, is connected to the truck frame.

The detailed construction of the main truck frame relatively to the other parts of the apparatus, while apparently simple, has been the result of much study and involves important features of my invention. While providing for the various turning, tilting, and rocking movements of the main ladder permitted in the preferred construction, special provision also must be made for the carriage of a full complement of ordinary long and short hand ladders I, on the truck of the apparatus. To do this it is quite necessary that one, two or three hand ladders should be carried directly above the main frame bed A, of the truck, while other provision must be made for carriage of the shorter hand ladders. It is a comparatively simple matter to provide for carriage of a full complement of hand ladders when, as in the well known Hayes apparatus, the main ladder is supported by a turn table which is directly over the front wheeled truck and requires comparatively little of the length of the truck frame, but when, as in this invention, the main ladder is sustained by a tilting platform about fifteen feet long and carried on the truck frame, the problem of providing for carriage for a full complement of long and short hand ladders without requiring the truck to be made entirely too long or much too wide and far too heavy to allow quick and easy travel in crowded thoroughfares becomes quite difficult and very much therefore depends upon the special relative location or arrangement of parts of the truck frame and the tilting main ladder carrying platform and their connections and the disposal of the hand ladders relatively therewith. While thus arranging for disposal of the hand ladders, the main extension ladder should not be too high in order to avoid top heaviness of the apparatus, and also to promote most easy handling of the tilting turn table ladder platform, and to give said platform when tilted a suitable angle to allow proper manipulation of it and the ladder by firemen on the ground.

To assure the necessary compactness and minimum weight of the larger size of the apparatus carrying, besides the full complement of hand ladders, an extension ladder reaching to a height of about one hundred feet; to allow easy draft of the whole by two or three horses and the most convenient handling of it by the fewest men, also required much study in determining the relative construction and location of parts of the frame, and the main ladder and hand ladder supports.

It will be noticed that the bearings *g*, *g*, for the elastic coupling support G, are at their outer parts laid upon the tops of the arched frames or standards, *a*, to which the bearings are bolted. The inner portion of each bearing *g*, is formed with a vertical part sustaining the inner horizontal part *g'*, upon which the end of the coupling support G, rests. When

this support has the preferred angular cross sectional form set apex uppermost as shown in the drawings, the part g', is provided with an upwardly projecting central angular portion g^2, which fits within the inner angle of the support G, and to which the support is fastened preferably by two bolts. I also prefer, and as an additional improvement, to provide the bearing g, with flanges g^3, g^3, which project upward at each side or edge of the angle iron support G, and prevent spreading or flattening of it by the superimposed weight of the platform G, and main extension ladder E, when the platform is swung around clear of its truck frame supports a, a'. These side flanges g^3, also relieve the bolt fastenings of excessive lateral strains. The elasticity or resiliency of the metal support G, allows it to take up within itself all excessive jars or shocks when the apparatus is traveling over a rough road. Hence the support prevents too sudden or excessive strains on the coupling H, thereby preventing breaking of it or of other upper mechanism of the apparatus.

Another special object attained by the angular form of the coupling support G, is that it allows a further inward sidewise movement of the downwardly tilted ladder platform than a sufficiently strong flat metal bar or wooden support would permit, if placed at the level of the top or apex of the angular support, and a sufficiently strong wooden beam would of necessity be so deep that the stowage of the hand ladders I, beneath it would unduly raise the height of the entire apparatus and thereby objectionably increase its weight by requiring longer and heavier supports on the main truck frame for the platform D, and the main extension ladder.

By reference to the enlarged detail views, Figs. 37 to 40 inclusive, of the drawings, it will be seen that the preferred main ladder platform coupling H, is made with a lower saddle piece or plate h, which fits upon and is bolted or otherwise fastened to the bar support G, and has upwardly projecting bearings h', which loosely receive a shaft h^2, which also passes loosely through bearings h^3, pendent from the lower ring plate or portion h^4, of the coupling. This ring or plate h^4, rests below or within the upper ring plate or portion h^5, and an annular plate h^6, fastened to the upper plate h^5, and overlapping the loose lower plate h^4, completes the turn table portion of the coupling. At the top of the upper turn table plate or part h^5, are suitable bearings h^7, which loosely receive another lateral shaft h^8, which is journaled at opposite ends in boxes h^9, h^9, bolted to opposite sides d', d', of the ladder sustaining platform D, of the apparatus. The coupling shaft h^8, is the pivot or fulcrum on which the entire platform D, with attached ladder E, tilts downward until the forward end d, of the platform rests either directly, or by its protecting and adjusting shoes J, upon the ground or anything thereon, and the shaft h^2, below the turn table device, conjointly with the movement of the turn table plates or parts h^4, h^5, upon each other, permits the vertical rocking movements of the sides of the tilted platform and the extended main ladder thereon, all as hereinafter more fully explained.

One very important feature of this part of my invention, consists in the use with or in the coupling which connects the ladder platform and truck frame, of a suitable latch or locking device which at proper times practically limits the movements of the coupling (or any mechanical equivalent thereof for the purposes herein described) to substantially two motions: first, a vertical rocking movement of the platform D, allowing it to be tilted to the ground for use of the ladder, and permitting it after use to be tilted back to level or horizontal position; and, second, a turning movement allowing the platform, when thus raised level after the use of the ladder, to be turned around and easily and safely lodged on the truck frame so that the main extension ladder when fully lowered will range centrally along or above the truck frame in normal position for traveling along the road, and ready for the platform to be again turned one-quarter around to either side and again tilted to the ground the next time the ladder is to be used. The importance of this latch device is manifest when the heavy weight of the main extension ladder is considered. If this ladder or its tilted platform were sustained from the truck by any kind of a coupling or joint which would allow the raised or partly raised ladder, while being adjusted relatively to the truck frame, to wabble about and to pass partly or wholly beyond the control of the attendants, this wabbling motion would bring such strains upon the coupling between the tilting ladder platform and frame and other mechanisms of the apparatus, as might or would break them and impair the immediate usefulness of the entire apparatus. Furthermore, this latch device greatly facilitates the tilting of the platform to the ground when the ladder is to be used, and also facilitates lodgement of the platform and ladder upon the truck frame in normal transit positions after use, all as hereinafter more fully explained. To make this more clear, I state that without a latch operating in the manner above stated, the preferred coupling H, therein shown or any mechanical equivalent of it, and also the coupling connecting the tilting ladder platform with the main truck frame in Mr. Horton's application above named, are or would be open to this objection, that is to say, they would permit this dangerous wabbling of the main ladder and its tilting support during their adjustment to the ground and their return to normal position on the truck and also at times during use of the main ladder. This latch device may have various forms and when the preferred universally jointed turntable coupling H, is employed, the latch may consist of any device or devices

which will lock the lower section h^4, of the turntable to the relatively stationary bottom saddle h, which rests upon the bar support G. I prefer however to use a couple of quick acting sliding bolts K, K, which are preferably seated in recesses cast within the saddle h, and are adapted to enter recesses k, k, cast or formed in the bearings h^3, h^3, of the turntable section of the coupling. A cap plate k', which holds each bolt K, in place also preferably supports a spring k^2, which is adapted by its free end to enter either one of two notches in the bolt to hold it either projected into the recess k, to prevent independent motion of the parts of the coupling on the lower shaft h^2, or to hold the bolt back and clear of said recess to allow such independent movement on or at this shaft.

The detail view Fig. 40, of the drawings shows how a screw k^3, may be substituted for the bolt K, by threading it into a projection on the bearing h^3, and adapting it to enter a socket formed in the saddle h, or a projection thereof. The bolts are however at present preferred because of their more quick and convenient operation.

In the coupling H, herein described, it will be noticed that the yoke employed in the Horton coupling is dispensed with and the turntable is arranged between the pivotal connections of the coupling with the ladder carrying platform and the main truck frame, and the turntable has moving parts or plates which have broad or large bearing surfaces making it very strong and not heavy and fully capable of safely sustaining the ladder platform at all adjustments thereof during use of the main ladder. Furthermore, the coupling H, is very compact and particularly so in vertical dimensions or height, whereby ample room is allowed between its bar support G, and the main frame bed for one or more hand ladders. Furthermore, it is necessary to make the main truck frame only wide enough to accommodate between the side uprights of its standards a single ordinary hand ladder laid flatwise, and this construction consequently leaves the gage of the truck wheels quite narrow to adapt them for easy travel at street car tracks or along crowded thoroughfares, and all without unduly raising the height of the apparatus or making it too heavy or unwieldy for prompt and effective service.

The main extension ladder E may not and as shown does not differ materially from other ladders of its class. It is composed of two or more telescoping sections, two sections E′, E², being shown, the extensible section of fly ladder E², being operative on the main section E′, by the ordinary devices of a drum and an endless wire cable or chain e^2, winding thereon in reverse directions and passing over a pulley e^3, at the outer end of the main section e', and connected by suitable clamps or clips to the lower part of the fly ladder.

To the forward end or foot of the main ladder section E′, are connected angularly disposed brace bars, E³, E³, and a cross shaft E⁴, passes through bearings at the angles of these braces. To this cross shaft E⁴, are coupled the connecting rods or bars E⁵, E⁵, which engage the nuts l, l, on the main ladder raising screws L, L, which, as the gearing is now arranged, have right and left hand threads and are journaled on the platform D. The screws carry bevel pinions l', l', which are engaged by bevel gears l^2, l^2, on a transverse shaft M, which is journaled on the platform and receives a crank m, at one or both of its ends. These cranks m, may be operated by firemen standing upon floors or platforms A′, A′ specially provided for this purpose upon the main bed frame rails A, A. These floors are preferably made of tongued and grooved planks extending clear across the bed frame to also form a substantial lateral bracing thereto. Figs. 3, 4, and 5, of the drawings, show that each connecting rod E⁵, has bolted to its rear end a couple of steel eye bars l^3, l^3, which fit upon studs l^4, l^4, cast with or fixed to the opposite sides of the nuts at their centers and whereby a two-part construction of the nuts is avoided and the full power of the screws is most directly and safely applied through the nuts to the rods E⁵, for raising or lowering the main ladder.

An important feature of this part of my invention, is the location of the shaft M, at or toward the forward end of the platform D, which tilts to the ground and whereby the screws may be first operated to partially or wholly raise the main ladder E, by men standing on the main frame floors A′, and before the platform D, is swung or turned one-quarter around prior to tilting it to the ground; and whereby also the shaft M, may be most conveniently operated after the platform D, is tilted to the ground and by firemen standing on the ground who will make all necessary and final lowering and raising adjustments of the upper end of the ladder by the screw gearing either prior to or after the fly ladder E², has been adjusted by means of a crank applied to the shaft of the drum e', which also may be conveniently operated from either the frame floors A′, or from the ground. I also specially mention the location of the transverse brace shaft E⁴, at such distance from the rounds of the main ladder (say two and a half or three feet) as shall allow firemen to walk up or down that side or face of the ladder under or inside of the brace E⁴, thus allowing both faces of the ladder to be used without obstruction by the raising gearing of the ladder. This arrangement of the transverse shaft E⁴, is a specially important feature when adjustment of the main ladder to various angles of inclination is effected by the screw gearing arranged on the platform as herein shown and described, because high windows of builings at opposite sides of the street or road may be reached easily without requiring re-adjust-

ment of the tilted ladder platform D, from one side of the truck to the other side thereof, as would be necessary did the transverse shaft or brace range so closely to the adjacent outer face of the ladder as to prevent use of said ladder face by the firemen. Another advantage arising from this location of the ladder shaft E^4, at a considerable distance from the ladder rounds or face, is that it assures an excellent leverage for the connecting rods E^5, to raise the ladder with the least expenditure of force at the cranks m, of the screw operating shaft M.

The castings or bearings F, hereinbefore mentioned and which with the transverse shaft e, provide means for pivoting the forward end or butt of the main ladder E, to the platform D, are peculiarly formed to resist strains brought upon them and to distribute these strains to the platform. Said bearings F, have holding bolts f, f, which enter both the platform side timbers d', d', and the front heavy cross timber d, which timbers are preferably dovetailed together. The bearings also have an inner pendent lug f', which bears on the inner face of the end timber d, while the base plate of the bearing rests on top of said timber as well as on top of the side timber d'. With this construction, no matter what may be the incline of the raised main ladder E, relatively to the tilted and ground supported platform D, the bearings F, present a continuous cross section of metal in the lines of the greatest strains resulting from the thrusts of the screws in raising the ladder and the weight of the raised ladder, and distribute said strains to the ladder platform in a manner promoting the safety and durability of the entire structure and so as to relieve the fastening bolts, f, f, of strains to which otherwise they would be subjected, and also to allow the platform to be made lighter than would otherwise be necessary to safely support the main ladder.

Special attention also is called to the form and arrangement of the bearings N, N', in which are journaled the ends of the ladder raising screws L, L. These bearings have resistance by their vertical pendent flanges n, directly against intermediate cross timbers or pieces d^2, which are preferably dovetailed into the side timbers d', of the ladder platform. Each bearing also has two flanges n', n^2, through which bolts or screws are passed into both the side and cross timbers d', d^2, of the platform. The endwise strains of the screws in raising or lowering the ladder are thus distributed to the platform in a manner promoting durability of it without requiring it to be made too heavy.

A further improvement in the construction of the platform, consists in fitting floors d^3, d^4, endwise between the cross timbers d^2, d^2, and the front and rear cross timbers d, d^5, of the platform. These floors d^3, d^4, are preferably formed of planks set a little apart at the edges to allow water or dust to drop readily through the spaces between them. Said floors distribute the strains imparted by the thrust of the ladder raising screws to all four cross timbers and also to the side timbers of the platform; the strains upon the front bearings, thus being borne by the forward cross timber d^2, and through the floor d^3, to the front cross timber d, and through both parts d^2, d, to the side timbers d', d', by the bolt connections of these bearings therewith; and the strains of the screws upon the rear bearings N', are in substantially like manner distributed from the rearward cross timber d^2, through the floor d^4, to the rear cross timber d^5, of the platform and through the bolts holding the bearings, to the sides d', d', of the platform. The front floor d^3, also is intended to support or carry the cranks m, by which the shaft m, is operated for raising and extending the main ladder, and also the crank for operating the drum e'. This floor also provides a place for convenient carriage of a tackle or rope O, used in adjusting the ladder platform while the rear floor d^4, provides a place for carrying the tackle block P, also used in adjusting the platform, as hereinafter explained.

Suitable eye bolts o', o^2, o^3, o^4, which are fixed in the frame rails A, A, at opposite sides of the center or axis of the platform coupling H, and links or eyes p', p^2, held to the two rear corners or side parts of the platform are provided in these special locations to facilitate easy handling of the ladder platform when adjusting it to the ground and restoring it again to normal transit position on the truck frame. The above named eye bolts may be substituted by suitable swivel pulleys or chock blocks or other equivalent devices permitting convenient and strong connection of the platform adjusting tackle; the eye bolts being simply one preferred means for connecting the tackle and for purposes herein described.

The two forward bearings N, N, are each specially provided with a projection or enlargement n^4, which is bored to receive an eye bolt or link n^5, with which eye bolts and the aforesaid frame eye bolts, the tackle or rope O, is or may be used in connection with the block tackle P, p, to adjust the ladder platform, as hereinafter explained.

Figs. 35 and 36 of the drawings, represent the two bearings N, N', for the screw at the right hand side of the platform D. By fitting the eye bolts or tackle connections n^5, directly in the screw bearings N, a very strong connection of the tackle is assured and the platform is not weakened by boring it as would be required were the connections n^5, fixed to the platform timbers.

To protect the tilted ladder platform D, from injury with contact with the ground I cover the lower forward corner of its front cross bar d, with an iron plate or strip, but for this purpose reliance is placed mainly on the shoes or guards J, hereinbefore mentioned.

The more special improvement in this part of my invention consists in placing the screws R, by which the tilted platform is leveled or adjusted vertically at either side, in such relation to the shoes as shall cause the latter to protect the screws from injury, while securing a compact, strong, and comparatively light construction. The shoes are each made of metal and are formed with a right angle flange j, overlapping the front and lower faces of the platform end timber d, and allowing fastening bolts or screws to be passed both ways or at right angles with each other into or through the shoe flange and timber to effect a most secure fastening of the shoe to the platform. The boss or projection j', of the shoe through which the adjusting screw R, is threaded, lies preferably at the rear of the shoe and is directly above the shoe recess j^2, and said boss stands so that when the ladder platform D, is tilted to the ground, the screw R, takes about a vertical position giving it the best effect in raising the corner of the platform to obtain necessary leveling thereof, or such lateral adjustment of the head of the raised ladder as may be required.

The outer edges of the preferably rounded base of the shoe are curved upward to allow the shoe to slip readily over the ground surface as the platform may be pushed to one side or the other and without requiring the platform to be swung upward from the ground on the coupling H. During these lateral pushing or sliding adjustments of the platform on or over the ground, the screw heads r, will usually be clear of the ground, but said heads are purposely made large and are rounded underneath to allow them to safely slide over the ground, or over a plank or metal plate thereon, should one of the screw heads at any time be projected beyond the bearing face of the shoe to get proper leveling or adjustment of the platform and ladder.

I have placed the driver's seat S, directly at the front or butt end of the main ladder and have fitted it to guides or slide-ways s', s', fastened to the inner faces of the ladder side bars above the rounds. Slide bolts s, s, are fixed to the seat or to its base board s^2, and are adapted for projection into holes or sockets in the ladder to secure the seat in place after the board or plate s^2, is pushed back to stops s^3, provided at the back ends of the guides. It requires but a few moments to withdraw the bolts and slide the seat out of the guides and thereby leave the outer face of the main ladder unobstructed and ready for immediate use.

The pivot shaft e, of the ladder E, or the front cross timber d, of its platform D, may serve as a foot rest for the driver, but his safety and comfort are promoted by means of the independent footboard T, which I fasten to the platform timber d. The footboard fastenings comprise bent or angle irons t, fastened to it and to the timber d, and a cleat t', beveled to fit or lap over the top or the inner part of the foot board and screwed to the top of the timber. The foot board also serves as a step by which to mount the raised main ladder.

Fig. 19, of the drawings, shows that the front face of the upper forward main frame timber or support a', of the ladder platform, is curved on a radius having the axis of the platform coupling H, as a center. This curved face is given the support or standard in order to furnish the ladder platform D, a bearing as far forward as possible on the main frame while giving clearance to the platform adjusting shoes J, as the platform is turned to one side or the other prior to tilting it to the ground. This forward frame timber a', gives a substantial and continuous bearing to a cross timber d^6, of the platform and the intermediate frame timber a', gives like bearing to another cross timber d^7, of the platform. These timbers d^6, d^7, are useful or necessary only when it is desired to have the extra support they give to the platform when the latter is simply to be turned around a little to either side without tilting it to the ground and the main ladder is to be raised and operated when the main platform is thus adjusted, but usually the main ladder will be operated when its platform is tilted to the ground, as a much more substantial support is thus given the ladder than it has if operated from the untilted or level platform supported wholly by the main truck frame of the apparatus.

To provide for safe carriage of the main ladder on the truck and to also provide for operating the ladder from the untilted platform, I employ a latch device preferably in the form of a heavy bolt U, which when the timber d^6, is used I prefer to fasten to it, but when said timber is dispensed with I will fasten the bolt to the front timber d, of the platform. This bolt is adapted to enter a central socket on the front main frame cross bar a', to prevent lateral swinging of the platform and ladder when the apparatus is traveling on the road or is out of use.

When it is desired to use the extension ladder without tilting the platform to the ground, the bolt will be shot into any one of a series of sockets u', which are fastened to the bar a', at either side of the socket u, and accordingly as the platform may be turned around more or less to the right or left hand.

When the main extension ladder is not in use its forward end or butt is sustained from the platform by the bearings F, and pivot shaft e, and I may also provide a bearing for the main ladder at the rear timber d^5, of the platform and as indicated by dotted lines at d^8, in Fig. 17 of the drawings. I sustain the rear portion of the lowered main ladder directly from the main truck frame rails A, A, by a series of standards or supports V, preferably three in the largest size apparatus shown in the drawings. These standards are of the usual pattern and are bolted to the

truck frame and have upper cross parts or bars v, on which the main ladder rests, and they also provide support for a series of rollers v', on to which the ordinary hand ladders I, rest to allow easy removal of these ladders from the truck and their replacement thereon. Rollers v', are also provided for the ladders I, at the front standards a, of the raised part of the truck frame. Side brace bars v^2, connect the front standard V, to the rear main truck frame standard a. Other braces v^3, connect the front and intermediate standards V, and other side braces v^4, connect the intermediate and rear standards. The intermediate standard which sustains the steering wheel shaft is also braced directly to the main truck rails A, A, by bars v^5, one at each side of the apparatus.

Extension ladders of this class are liable to severe vertical and lateral strains while the apparatus is traveling over rough roads or while turning corners quickly. I prevent injury from said strains to the main extension ladder, its standards V, and other parts of the apparatus, by employing stays or braces preferably flexible connections between the overhanging back end of the main ladder and the rear part of the truck frame.

In the preferred arrangement I use two chains or wire ropes W, W, which are or may be crossed over each other and are connected at their upper or rear ends with eyes or loops w, w, fastened to the ladder and at their lower forward ends are connected with eyes or loops w', w', secured at opposite ends of the rear cross timber a^3, of the main frame bed, and preferably formed on the ends of diagonally disposed brace bars w^2, w^2, held to said cross timber. These brace bars w^2, are bolted at their forward ends to the side rails A, A, of the frame and at their outer rear ends said braces are preferably let flush into the ends of the rear cross bar or timber a^3, of the truck frame, which ends are preferably cut or chamfered off diagonally in a line with the braces. This special form and connection of the brace bars w^2, is designed for two purposes: First, the diagonal or angularly disposed braces act as efficient fenders or guards to prevent wrenching off or injury to the rear frame timber a^3, should the main truck accidentally swing or strike against the side of a doorway or other obstruction while at the same time allowing the timber to be much longer than the width of the truck frame bed in order to most widely separate the two stay chains W, W, at the truck frame and give them the best effect in bracing the extension ladder and its supports; and second, by letting the rear ends of the brace bars w^2, to which the eyes w', w', are fixed, into the ends of the cross timber, the upper walls of the recesses in which the braces lie, relieve the bolts w^3, which hold the braces to the timber a^3, of the greater part of the upward strain resulting from the pull or draw of the ladder stay chains on the main frame.

The stay chains, cables or ropes W, are each preferably provided with a hook w^4, which engages the ladder eye or loop w, and allows instant disconnection of the brace from the ladder when the latter is to be raised for use. The other or lower end of the stays is preferably provided with a hook w^5, permitting disconnection of the stay from the truck frame or its eye w'. Another feature of these ladder stays W, is the connection or employment in them of turnbuckle devices w^6, of any preferred form and located preferably near the truck frame in convenient reach of the firemen who thus may quickly turn the devices w^6, to slacken the stays and to allow them to be unhooked first from the truck frame eyes w', to give the freest possible access to the hand ladders I, at or from the rear end of the truck.

I locate the seat X, for the steersman on top of the extensible section of the main ladder and I arrange the seat fastenings so that they form also a clamp to bind the fly ladder to the main ladder section and thereby make the seat safe for the steereman while giving the fly ladder the benefit of a bracing or stay by means of the chains W, W.

In the preferred construction shown in Figs. 10, 11 and 25 of the drawings, I use hooks x, x, fastened to the seat board and engaging beneath the round of the lower or main ladder E', next the rear edge of the seat, but the hooks may engage under the adjacent round of the fly ladder E^2, as indicated by the dotted line. At the front of the seat I use a clamp which holds the seat to the fly ladder and also holds both ladders E', E^2, snugly together. This clamp is preferably a metal bar or plate x', which is hinged to the front edge of the seat board and its lower inbent end carries a screw x^2, which is adapted, and preferably by means of a concave metal head plate x^3, to clamp the under side of the round of the main ladder E', which lies nearest the front of the seat, and preferably the round next in front of that one engaged by the hooks x, x.

The hinged clamp bar may quickly be swung upward after the screw x^3, is turned back, to allow the seat to be removed when the main extension ladder is to be used.

Clamp bars x', with screws x^2, may be used at both the back and front of the seat, but the hooks are preferably used at one edge of the seat.

Instead of using the clamp screw bars x^2, x^3, at one or both edges of the seat, I may employ with the hooks x, x, ordinary leather straps x^4, which are fastened to laterally projecting studs or arms x^5, on the seat board, and as shown in Figs. 7 and 8 of the drawings. The straps are passed under the adjacent round of the lower ladder section E', and are buckled to secure the seat while holding both ladders E', E^2, together.

It is manifest that by using seat clamping devices operating substantially in the man-

ner last above described, I not only obtain a most secure fastening of the steersman's seat on the main extension ladder, but I also clamp the fly ladder E^2, to the main ladder E', in a manner preventing jumping of the fly ladder and making the steersman safe while the apparatus is traveling over rough roads and I thus also cause the brace chains or rope W, W, to transmit their bracing effect to the fly ladder and thus stay the entire extension ladder from the bed frame of the wheeled truck of the apparatus. I also locate a foot-board Y for the steersman below the main extension ladder E', and above the shorter hand ladders I. This foot-board is bolted at the upper forward ends of its longitudinal brace irons y, y, to the upper cross bar v, of the intermediate extension ladder standard V, and by the use of a lateral bottom stay bar y', which crosses beneath the foot-board and is bolted to the two opposite side braces v^4, v^4.

The hand wheel c, of the steering shaft C, is in convenient reach of the steersman on the seat X, and the shaft extends downward between rounds of the hand ladders I, to a head or socket c', in which the shaft fits loosely so as to be withdrawn readily and also to cause the steering pinion c^2, to be turned by and with it. This pinion c^2, is journaled in a heavy box or bearing c^3, bolted to the main truck frame. The pinion engages a curved rack c^4, fixed to one-half of the fifth wheel irons of the truck spring frame.

The special feature of the steering gearing is the arrangement of the upper bearing z, of the steering wheel shaft C, to allow free play of said shaft. This free play especially free lateral play, of the shaft in or at its upper bearing serves two purposes. First, it prevents the swaying of the upper part of the main ladder standard V, from causing the upper and lower bearings z, c', to bind or pinch the shaft and prevent free operation of it by the steersman, and second, it allows ample lateral support of the shaft by the upper bearing to assure proper working of it by the steersman while preventing the loosening of the lower steering wheel bearing c^3, from the frame. In other words, if the steering wheel shaft were held by an upper bearing z, which would not play loosely on its support or which would not allow play of the shaft in it, every lateral sway or lurch of the ladder standard V, to which the shaft is necessarily connected would cause the shaft to act as a powerful lever on the lower steering wheel bearing c^3, and either loosen or break it or otherwise injuriously affect the steering gearing.

Figs. 12, and 13, of the drawings, show an upper bearing z, which is preferably bored to fit the steering wheel shaft C, but is slotted where the bolt z', passes through it to hold it to a cross bar v^6, of the standard V.

In the modification shown in Fig. 14, of the drawings, the bearing z^2, is rigidly bolted to the cross bar v^6, and is slotted or bored to give sufficient play to the shaft where it passes through it.

Other modifications may be made, the essential feature being to provide an upper bearing or bearings for the steering wheel shaft which allows play of the upper part of the shaft or play of the bearings thereon, in order to avoid pinching or binding the shaft and to prevent straining or wrenching the lower steering wheel bearings or the steering wheel itself or other parts of the steering gear.

A suitable slotted latch or stop z^3, shown in Figs. 15, and 16, of the drawings, is provided on the uppermost cross bar v, of the standard V, and is adapted by its forked end to act above a collar c^5, on the shaft C, to prevent accidental lifting of the shaft from the socket c', at the steering wheel, while allowing free play of the shaft or its bearings for purposes last above described. A suitable thumb screw, z^4, passing through the slot of the latch into the cross bar v, holds the latch yieldingly to the standard.

Figs. 1 and 24, of the drawings, show three long hand ladders I, extending practically the whole length of the truck frame and comprising a sixty or seventy feet extension ladder, a thirty-five feet ladder above it, and a thirty feet ladder above that; all sustained on independent anti-friction rollers to assure easy handling of them. These three ladders range beneath the main extension ladder support G, and coupling H, as hereinbefore stated. The upper series of shorter hand ladders I, comprises ladders of twenty-four, twenty, sixteen and twelve feet in length respectively, and all nested together or piled directly upon each other and behind the main extension ladder platform B, and its supports. The lower twenty-four feet ladder is intentionally sustained clear above the uppermost long lower ladder and preferably on anti-friction rollers v'. Stowage for a full complement of ordinary hand ladders is thus provided on the truck and without hanging ladders at the sides of the truck frame, which extra side hanging ladders may be carried if desired.

In a fire ladder truck having the tilting turn table platform D, sustaining the main extension ladder and adapted to give it a ground support as above described, the support of the upper shorter series of hand ladders I, independently of the longer series of hand ladders which run forward beneath the main ladder platform, is a special feature of construction because in working the main ladder E, immediately a fire is reached, it may be necessary to lower or slide back one or more of the longer ladders I, from beneath the platform D, or its upper supports G, H, and the independent stowage of the upper shorter hand ladders I, allows this quickly to be done without disturbing said upper shorter ladders, thus saving both time and labor.

The operation is as follows: If after reach-

ing a fire, the main extension ladder E, is at once to be used in the preferred manner or with a ground support, the rear stay chains W, will be slackened at their turn buckles w^6, and will then be disconnected from the ladder and the steering wheel c, and its shaft C, and also the ladder clamping steersman's seat will be removed. The latch bolts K, of the coupling H, being in the recesses k, to prevent movement of the lower pivotal connection of the coupling at the shaft h^2, the cranks m, now will be applied to the screw shaft M, and turned by firemen on the truck floors A', in proper direction to partly raise the ladder on its fulcrum e, through the medium of the gearing l', l^2 the screws L, their nuts l, and the connecting rods E^5. The ladder is thus raised to an incline which will so adjust its center of gravity relatively to the platform D, and its coupling H, as will promote the most gradual or easy tilting of the platform and ladder with the aid of the pulley blocks and tackle P, O. The ladder platform bolt U, is now withdrawn from its socket u, and the platform is then partially turned around by hand as the turn table device h^5, h^4, h^6, of the coupling H, will permit, say for instance with its end d, to the left hand prior to tilting the platform to the ground at the left hand side of the truck. The rear tackle block P, having been connected to the nearest or right hand eye bolt or loop p', of the platform D, another hook or eye on the block tackle will then be connected to the main frame eye bolt o', forward of the axis of the coupling H, and at the right hand side of the truck where the rear end of the platform tilts upward. A pull on the rope p, of the block P, will then complete the quarter turning movement of the platform and partly raised ladder E, moving it clear of the frame supports a', and the platform will then swing down to the ground on the coupling shaft h^8, as a center of motion, and this shaft will then range axially about at right angles with the lower shaft h^2, of the coupling. The platform is easily controlled in its tilting movement by the block and tackle P, p. To assure greater smoothness of action during this downward tilting movement of the platform D, the rope or tackle O, being already connected to the eye bolt n^5, in the screw bearing end N, at the left hand side toward which the platform falls, will also be slip-hitched to either left hand eye bolt of the main frame bed and will be used as a back stay. After the platform is thus tilted to the ground the shaft M, will again be operated by firemen standing on the ground to swing the outer part of the main ladder E, either closer to or farther from the platform accordingly as the ladder is to be used at a building at one or the other side of the street. Simultaneously with this adjustment of the whole ladder its extensible section E^2, may be moved upward and forward by operating the drum e', and chain or cable e^3, to quickly bring the upper end of the fly ladder to the desired window or place. If the platform be adjusted to the ground at that side of the truck farthest from the burning building it is desired to reach by the ladder, the least angular adjustment or movement of the ladder by the screw gearing will be required and the outer face of the ladder then will be used or traveled over by the firemen; but if the platform be adjusted to the ground at that side of the truck nearest to the burning building, the ladder must be swung farther by the screw gearing and its inner face then will be used by the firemen. No matter to which side of the truck the platform D may be dropped to the ground, the ladder may be swung over by operating the screw gearing cranks m, so as to reach buildings on both sides of a street of ordinary width, and without moving the apparatus on its truck wheels. Fig. 9, of the drawings, illustrates the two inclined positions of the ladder.

It will be remembered that prior to and during the last above described quarter turning and downwardly tilting movement of the platform and ladder D, E, the coupling latch devices or bolts K, are projected into the recesses k, thereby preventing independent motion of the parts of the turntable coupling on its lower shaft h^2, and consequently preventing lateral wabbling motion of the platform by the overhanging weight of the partly raised ladder and allowing the block and tackle devices P, O, to be safely used as above described in turning and lowering the platform. Obviously, without this latch device this convenient, light and strong tackle could not be used for the purposes described.

After the ladder platform is tilted to the ground it is preferable to at once withdraw the coupling latch bolts K, from the recesses k, to allow independent action of the lower parts of the coupling H, and thereby permit independent vertical adjustment by either one of the screws R, at or in its shoe J, in order to level the end d, of the platform D, on uneven ground, or to throw the top of the raised ladder E, laterally either way to give it a quick adjustment while properly setting it at an upper window or place, and without moving the apparatus on its wheeled trucks. While this vertical adjustment of the platform and ladder is being effected by either screw R, the coupling has a peculiar compound motion, in other words, the bearings h', h^3, have limited independent rocking motion on the shaft h^2, and simultaneously the coupling turntable device h^4, h^5, h^6, has a partial rotary movement. This compound movement of the coupling is very noticeable when vertical adjustment of the platform is made by either screw R, after the end d, of the platform is pushed around on the ground considerably to the right or left hand toward the truck frame in giving full range of lateral movement to the top of the extended ladder. This wide lateral sweep or range of the upper

end of the extended ladder while the ladder platform rests upon the ground is permitted by the space provided between the intermediate and rear standards a, a, on the truck frame which sustain the bar support G, and the coupling H, and this feature is important, as with this construction the top of the extended and ground supported ladder has sufficient range of lateral movement to allow it to be swept across the entire front of a high building and quickly adjusted to any window or opening at any floor thereof not accessible by ordinary hand ladders.

The apparatus herein described has all the advantages of stability possessed by the Horton apparatus above named, and may with equal safety be used efficiently as a water tower, that is to say, the main ladder E, has sufficient stiffness to assure safe use upon it of one or more lines of hose discharging water from nozzles at a height of fifty or more feet upon a fire, and all without requiring support of the top of the ladder at the window or wall of a building. This stability of the apparatus is due to the screw and rod connections of the main ladder E, with the platform; the coupling of the platform to the main truck frame; and the support of the tilted platform and ladder directly on or from the ground.

The apparatus thus combines the advantages of the ordinary hand ladder truck, a main extension ladder for use at high buildings not accessible by hand ladders, and a water tower which may be safely operated without supports for the main ladder other than are provided in or by the apparatus itself.

After use of the main extension ladder in the manner above described, it is restored to normal position on the main truck frame in the following manner: The coupling bolts K, will first be shot into their recesses k, to prevent independent movement of parts of the coupling on its shaft or pivot connections at h^2, and the ladder section E^2, if extended will be fully lowered by operating the drum e', and the shaft M, will then be operated by the cranks m, to lower the entire ladder toward the platform D, to a nearly balanced position, thus allowing the platform to easily be hauled up level by means of the block and tackle P, p, while the rope or tackle O, is used as a back stay to prevent too rapid swing of the platform to horizontal position. To effect this movement the block P, which already is connected to the right hand platform eye p', will be connected also to the rear right hand truck frame eye bolt o^2, and whereby as the tackle rope p, is hauled upon the platform will be raised to level position and will also be turned around sufficiently on the coupling turntable to lodge the platform partly upon the supports a', of the main truck frame, whereupon the platform may easily be turned by hand fully into line with the main truck and will then be locked to the frame by its bolt U, and in transit position. Shown in Figs. 1, and 2, of the drawings. It will be understood that during this replacement of the platform on the truck by the tackle P, p, the back stay O, is preferably connected to the left hand eye bolt n^5, of the corresponding screw shaft bearing N, and is also slip-hitched to the front left hand truck frame eye bolt o^3, and whereby as the platform rises to level position the back stay O, will assist the tackle P, p, to turn the platform partly around upon the truck frame supports a'. The action of the coupling latches K, in preventing wabbling about of the platform and ladder is fully as important during restoration of the platform to transit position on the truck as during the lowering of the platform, possibly more important, as the strains on the tackle P, p, are perhaps greater in raising the platform up level than in lowering it to operative position on the ground.

The back stay tackle may consist of a simple rope O, or such a rope rove through suitable blocks and substantially like the tackle P, p. When the ladder platform is lowered to and raised from the ground at the right hand side of the main truck, the tackle P, p, will be engaged with the platform and frame eye bolts p^2, o^3, o^4, at the left hand side of the apparatus and the tackle O, will be engaged with the eye bolts, n^5, o', o^2, at the right hand side, as will readily be understood. In view of the comparative ease with which the platform may be operated by the tackle and connections therefor on the main frame at opposite sides of the axis or center of the platform coupling H, and at opposite sides of the platform itself, these arrangements of the eye bolts relatively with the frame and platform are considered important features, as labor is thereby economized in safely adjusting the tilting platform and main ladder which would be operated with difficulty by hand power alone. After the platform D, is thus lodged on the main truck and locked thereto by the bolt U, the screw shaft M, will again be operated by men on the truck floors to fully lower the main ladder E, to its rear supports V, and the hand ladders I, if removed, will be replaced on the truck, and the stay chains or ropes W, are then connected to the ladder and truck frame and are tightened by the turn-buckles w^6. The seats S, X, for the driver and steersman are now adjusted to the ladder and the steering wheel shaft C, is slipped into its upper bearing z, and into the steering pinion socket c', and is secured by the latch z^3, and the apparatus is ready for its return trip to the truck house.

In using the main ladder E, of the apparatus without swinging the ladder platform D, to the ground, said platform will simply be turned around horizontally more or less on the coupling turntable to one side or the other and will be locked to hold the ladder in required position by the bolt U entering any one of the side sockets, u', on the front

support a', of the main frame. It is in this use of the ladder that the front frame brace bars a^2, a^2, are useful in giving a large bearing surface to the partially turned and untilted main ladder platform D.

The usual complement of axes, forks, hose couplings, lanterns, and other fire appliances will be carried by the truck. As these form no part of my invention they are not shown or described.

I wish it to be understood that in so far as concerns certain features of my invention relating to the construction of the main truck frame and also to the combination therewith of the tilting main ladder carrying platform adapted to obtain a ground support for its ladder which is pivoted to the platform, it is immaterial whether the ladder platform be arranged to tilt downward only and at either side or the end of the truck frame; or be arranged to first turn horizontally and then tilt downward; or be arranged to first turn horizontally and then tilt downward and subsequently have a vertical rocking movement at the sides to level it and properly adjust the top of the raised ladder. This is evident when it is stated that the last above named constructive and operative principles embody what I deem the ultimate of practical results in a simple, compact, comparatively light and efficient apparatus constructed with a tilting ladder carrying platform adapted to give a ground support to its raised main ladder.

In this specification the term "ladder" or "ladders" is used in a general sense and includes both ladders and tubes or other means of reaching a height and utilizing thereat a fire escape device or water throwing hose.

Having thus 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 supporting frame, a tilting main ladder carrying platform, a longitudinal bar sustained by the frame, and made of angle iron or steel set apex uppermost, and a coupling connecting the ladder platform and said bar; room being provided between the frame bed and bar for one or more hand ladders, substantially as described.

2. A fire ladder apparatus, constructed with a supporting frame, a main ladder carrying platform, and a coupling connecting the frame and platform and giving turning, tilting and then vertically rocking movements to the platform and its ladder, and also giving room between the frame bed and coupling for one or more hand ladders, substantially as described.

3. A fire ladder apparatus, comprising a supporting frame, having a longitudinal bar, a main ladder carrying platform, and a coupling connecting the ladder platform and said bar and giving turning, tilting and then vertically rocking movements to the platform and its ladder, room being provided between the frame bed and bar for one or more hand ladders, substantially as described.

4. A fire ladder apparatus, constructed with a supporting frame, a main ladder carrying platform, and a coupling connecting the frame and platform and comprising a turntable device interposed between pivotal connections of the coupling with the ladder platform and the frame, said coupling having an elastic or resilient support, substantially as described.

5. A fire ladder apparatus, constructed with a supporting frame having a raised portion, a main ladder carrying platform adapted to rest on or above said raised part of the frame, an elastic or resilient bar support held by said raised portion of the frame and above the frame bed, and a coupling connecting this bar and the ladder platform and giving horizontal turning and vertical tilting movements to the platform and its ladder, substantially as described.

6. A fire ladder apparatus, constructed with a supporting frame having a raised portion, a main ladder carrying platform adapted to rest on or above said raised part of the frame, a bar support held by said raised portion of the frame and above the frame bed, and a coupling connecting said bar support and ladder platform and giving turning, tilting and then vertically rocking movements to the platform and its ladder, substantially as described.

7. A fire ladder apparatus, constructed with a supporting frame, a main ladder carrying platform, a coupling connecting the platform and frame, and giving turning, tilting and then vertically rocking movements to the platform and its ladder, and a latch device at times limiting the adjustments of the ladder platform to horizontal turning and vertical tilting movements, substantially as described.

8. A fire ladder apparatus, constructed with a supporting frame, a horizontally turning and vertically tilting main ladder carrying platform, coupled to said frame and adapted to obtain a ground support for the raised ladder, one or more screws on said ladder platform, nuts on said screws, rods connecting the nuts to the main ladder which is pivoted to the platform, a transverse shaft located on the platform nearer its ground end when tilted, and operating gearing connecting this transverse shaft with the screws, substantially as described.

9. A fire ladder apparatus, constructed with a supporting frame, a horizontally turning and vertically tilting main ladder carrying platform coupled to said frame and adapted to obtain a ground support for the raised ladder, one or more screws on said ladder platform, nuts on said screws, rods connecting the nuts to the main ladder which is pivoted to the platform, a transverse operating shaft located on the platform nearer its ground end when tilted, operators' floors at the main frame bed beneath the shaft, and gearing connecting said shaft with the screws, substantially as described, whereby the screws

may be operated by or from the transverse shaft to raise and adjust the main ladder both from the frame bed floors and from the ground, as herein set forth.

10. In a fire ladder apparatus, the combination, with the main ladder pivoted to a platform coupled to the supporting frame, of guides or slideways on the ladder, a driver's seat fitting said slideways, and detents holding said seat to the slideways and allowing its removal from the ladder, substantially as described.

11. In fire ladder apparatus, the main ladder carrying platform having opposite side and end timbers, and intermediate cross timbers, operating screws having bearings at said intermediate timbers which distribute thereto the thrust strains of the screws, floors or plates between the intermediate cross timbers and end timbers of the platform and distributing the thrust strains of the screws to all four transverse timbers of the platform, and nut and rod connections from the screws to the main ladder which is pivoted to the platform, substantially as described.

12. In fire ladder apparatus, the combination, with the supporting frame, the main ladder carrying platform coupled thereto and having horizontal turning, and then tilting, and then vertical rocking movements, of leveling or adjusting screws at the ground end of the tilted platform, substantially as described.

13. In fire ladder apparatus, the combination, with the supporting frame, the main ladder carrying platform coupled thereto and having tilting and subsequent vertical rocking movements, of guard shoes held to the ground end of the tilted platform, and leveling or adjusting screws fitted in said shoes and protected thereby, substantially as described.

14. In fire ladder apparatus, the main frame having a rear end cross beam projecting beyond the side rails, combined with diagonally ranging braces connecting the rails and cross beam and forming a guard or fender to the latter, substantially as described.

15. In fire ladder apparatus, the main frame having a rear end cross beam projecting beyond the side rails, combined with diagonally ranging braces connecting the rails and cross beam, and stays or braces connecting the ends of the cross beam or its diagonal braces with the rear end or part of the main ladder, substantially as described.

16. In fire ladder apparatus, the combination, with the main frame rails A, having front standards a, a', and rear standards V, of an angle iron or steel bar G, a platform D, adapted to the frame standards a, a', a coupling H, connecting the parts G, D, the main ladder pivoted to the platform and sustained thereby and by the frame standards V, screws L, on the platform, and rods E^5, connecting said screws to the main ladder, substantially as described.

17. The combination, with the frame and standards a, thereon, of bearings g, on the frame hooked over the top of the standards a, and provided with a part g', having projection g^2, and side flanges g^3, g^3, and an angle iron or steel bar G, sustained by said bearings and supporting the main ladder carrying platform, substantially as described.

18. In fire ladder apparatus, the coupling H, connecting the main tilting ladder platform with the frame and comprising a saddle or base piece h, having bearings h', h', a turntable h^4, h^5, h^6, said part h^4, having bearings h^3 h^3, a shaft h^2, loose in the bearings h', h^3, and said part h^5, having bearings h^7, h^7—bearings h^9, h^9, on the ladder platform, and a shaft h^8, loose in the bearings h^7, h^9, substantially as described.

19. In fire ladder apparatus, the coupling H, connecting the main tilting ladder platform with the frame and comprising a saddle or base piece h, having bearings h', h', a turntable h^4, h^5, h^6, said part h^4, having bearings h^3, h^3, provided with recesses k; a shaft h^2, loose in the bearings h', h^3, and said part h^5, having bearings h^7, h^7; bearings h^9, h^9, on the ladder platform, a shaft h^8, loose in the bearings h^7, h^9, and bolts K, on the saddle h, adapted to the recesses k, substantially as described.

20. The combination, with the main ladder pivoted to a tilting platform, substantially as described, of a detachable driver's seat S, fitted to slideways s', on the ladder and having back stops s^3, and bolts s, on the seat adapted to engage sockets in the ladder, as set forth.

21. The combination, with the frame bed A, having a rear timber a^3, of braces w^2, thereat, and stays W, having hooks at opposite ends adapted to engage eyes on the braces w^2, and on the rear end of the main ladder, substantially as described.

22. The combination, with the frame bed A, having a rear timber a^3, of braces w^2, thereat, and stays W, having hooks at opposite ends adapted to engage eyes on the braces w^2, and on the rear end of the main ladder, said stays W, having turnbuckles w^6, substantially as described.

23. The combination, with the steering wheel shaft C, and the adjacent ladder standard V, of a yielding bearing z, for the shaft, provided with a lateral slot receiving the bolt z', which holds it to the standard, substantially as described.

24. The combination, with the steering wheel shaft C, having a collar or stop c^5, and the adjacent ladder standard V, of a slotted latch z^3, held yieldingly to the standard and adapted to receive the shaft above its collar or stop, substantially as described.

HENRY LAWRENCE GOODWIN.

Witnesses:
WILLIAM C. DAVIS,
WILLIAM J. MILLER.