

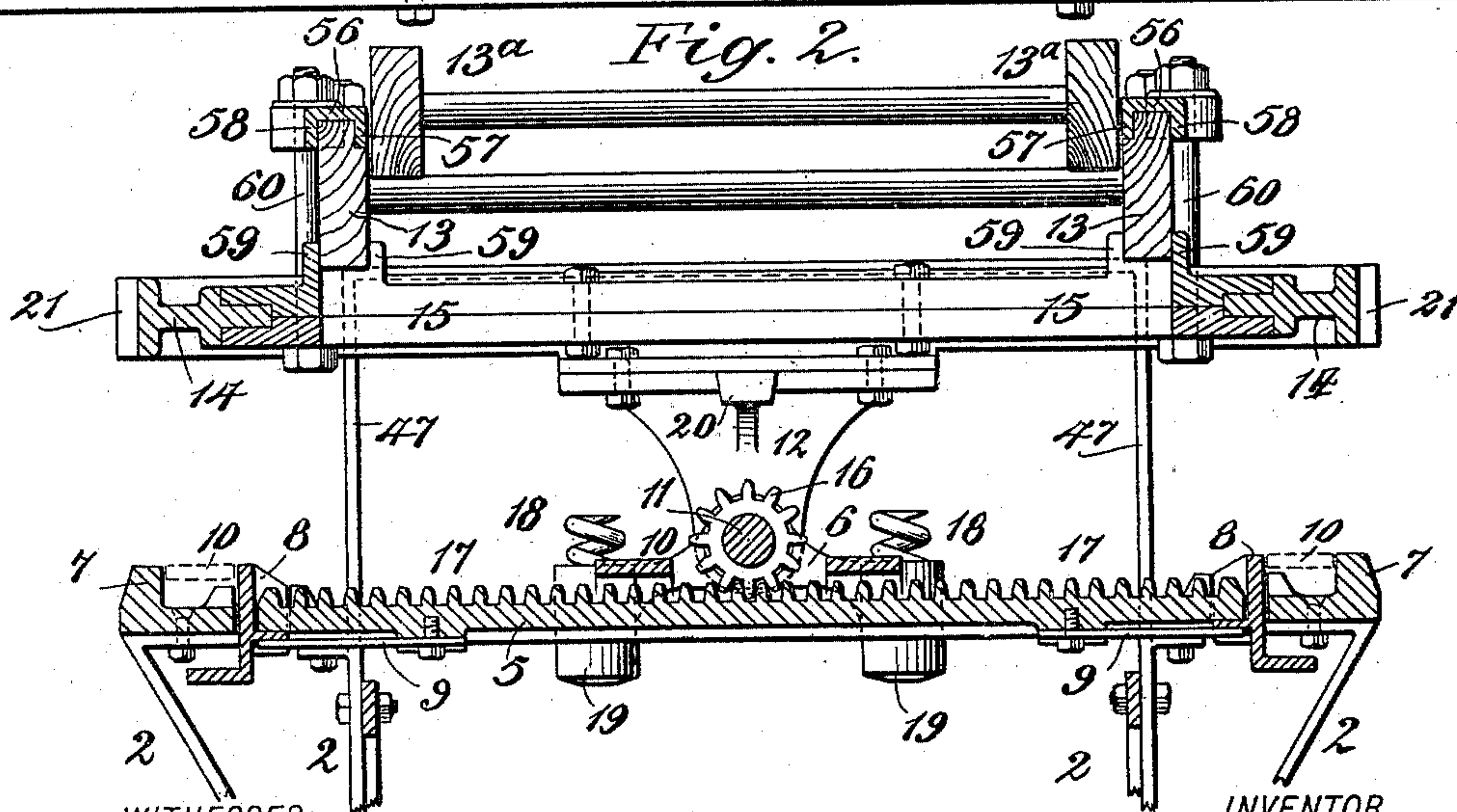
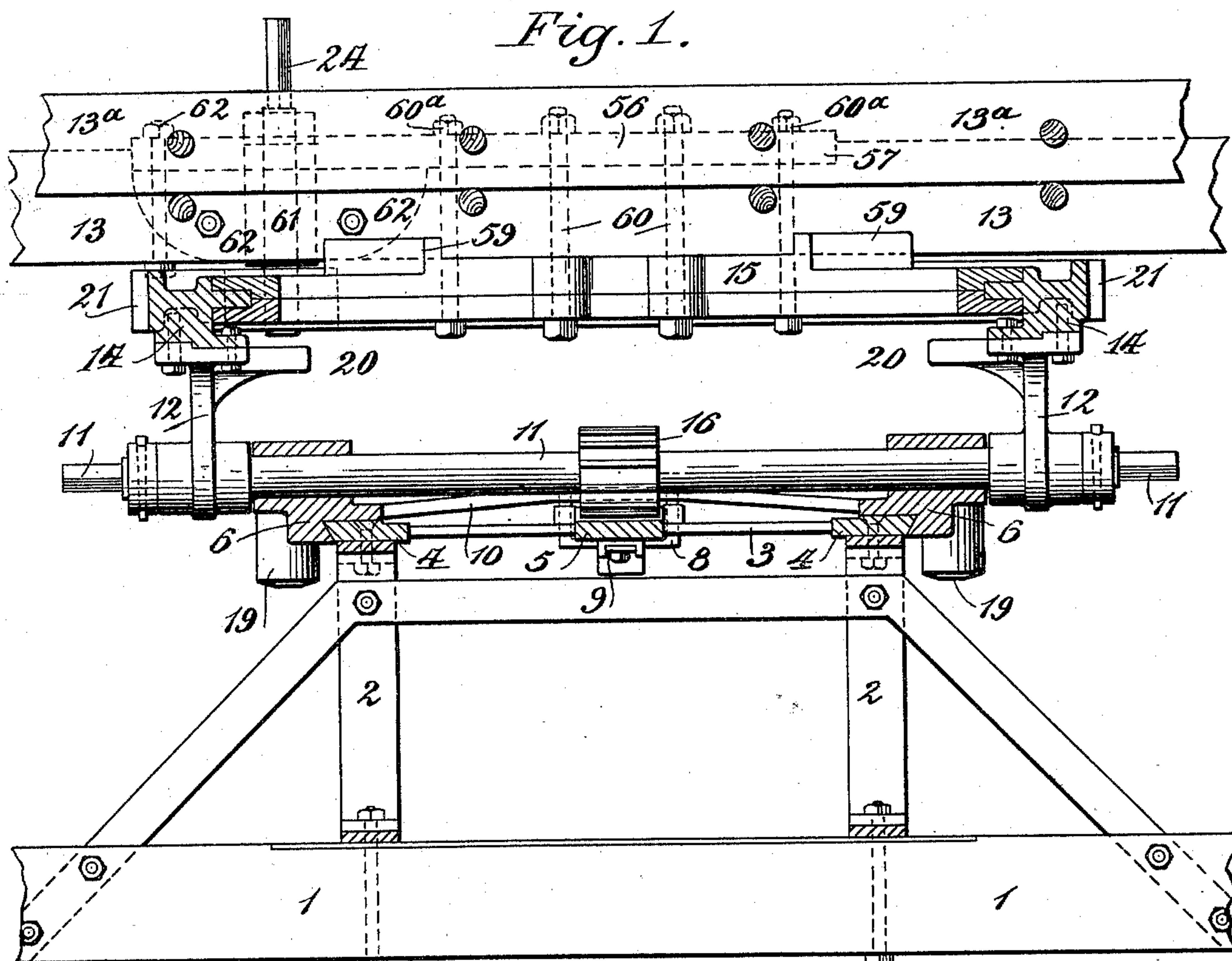
(No Model.)

4 Sheets—Sheet 1.

A. K. GOODWIN.
LADDER APPARATUS.

No. 509,598.

Patented Nov. 28, 1893.



WITNESSES:

John B. Deemer
Charles O. Wright

INVENTOR

Alvin Kirby Goodwin

(No Model.)

4 Sheets—Sheet 2.

A. K. GOODWIN.
LADDER APPARATUS.

No. 509,598.

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Fig. 3.

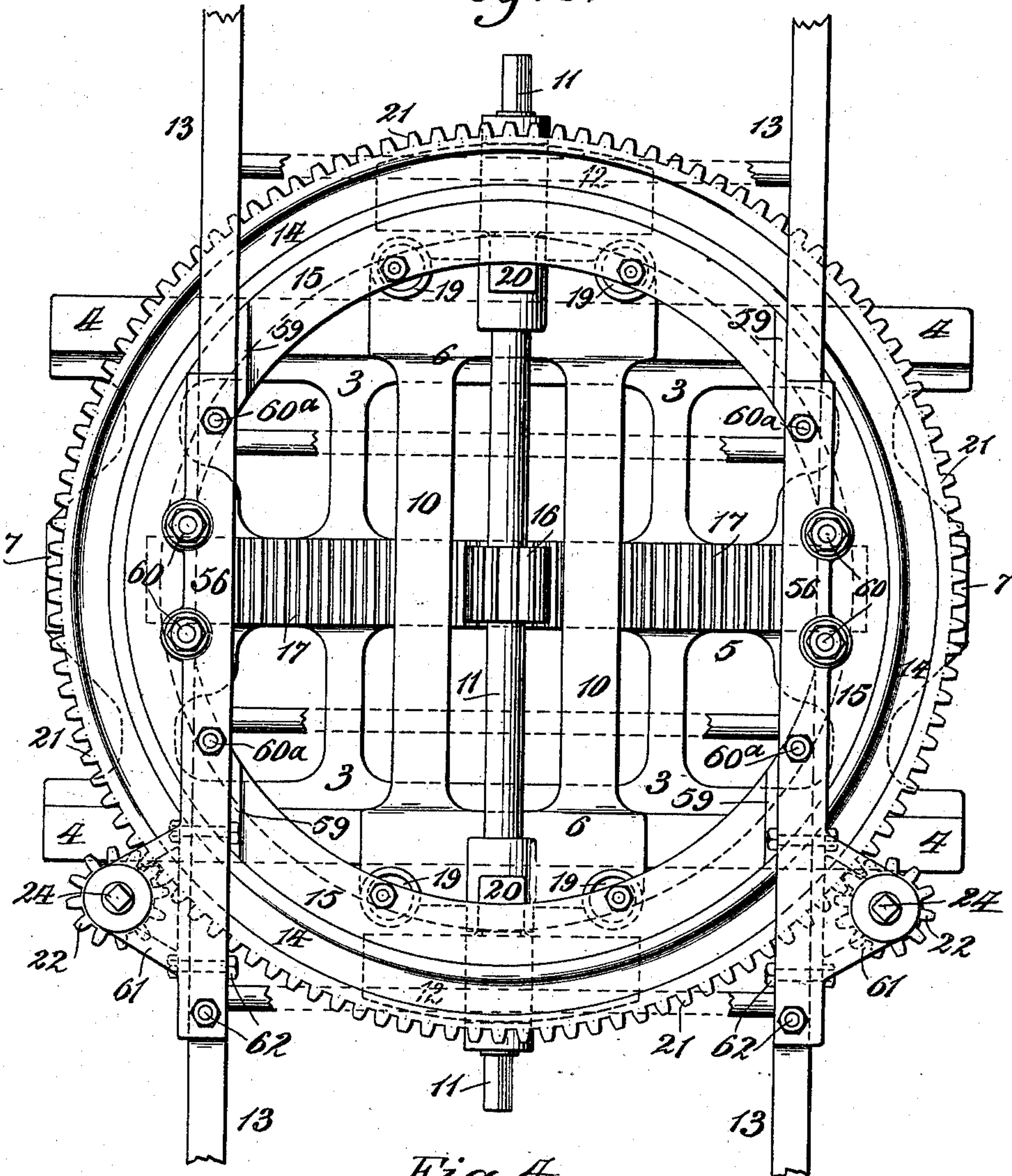
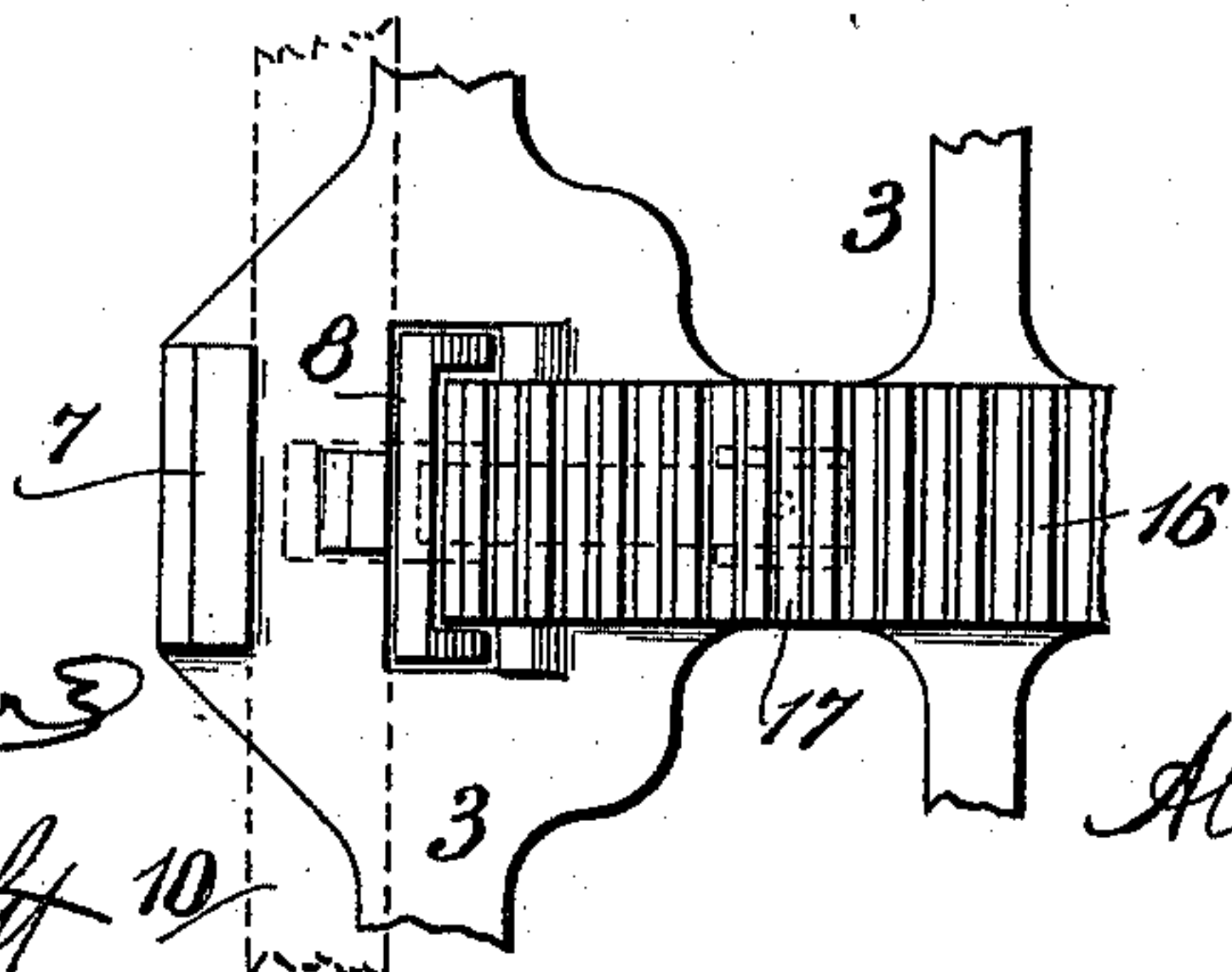


Fig. 4.



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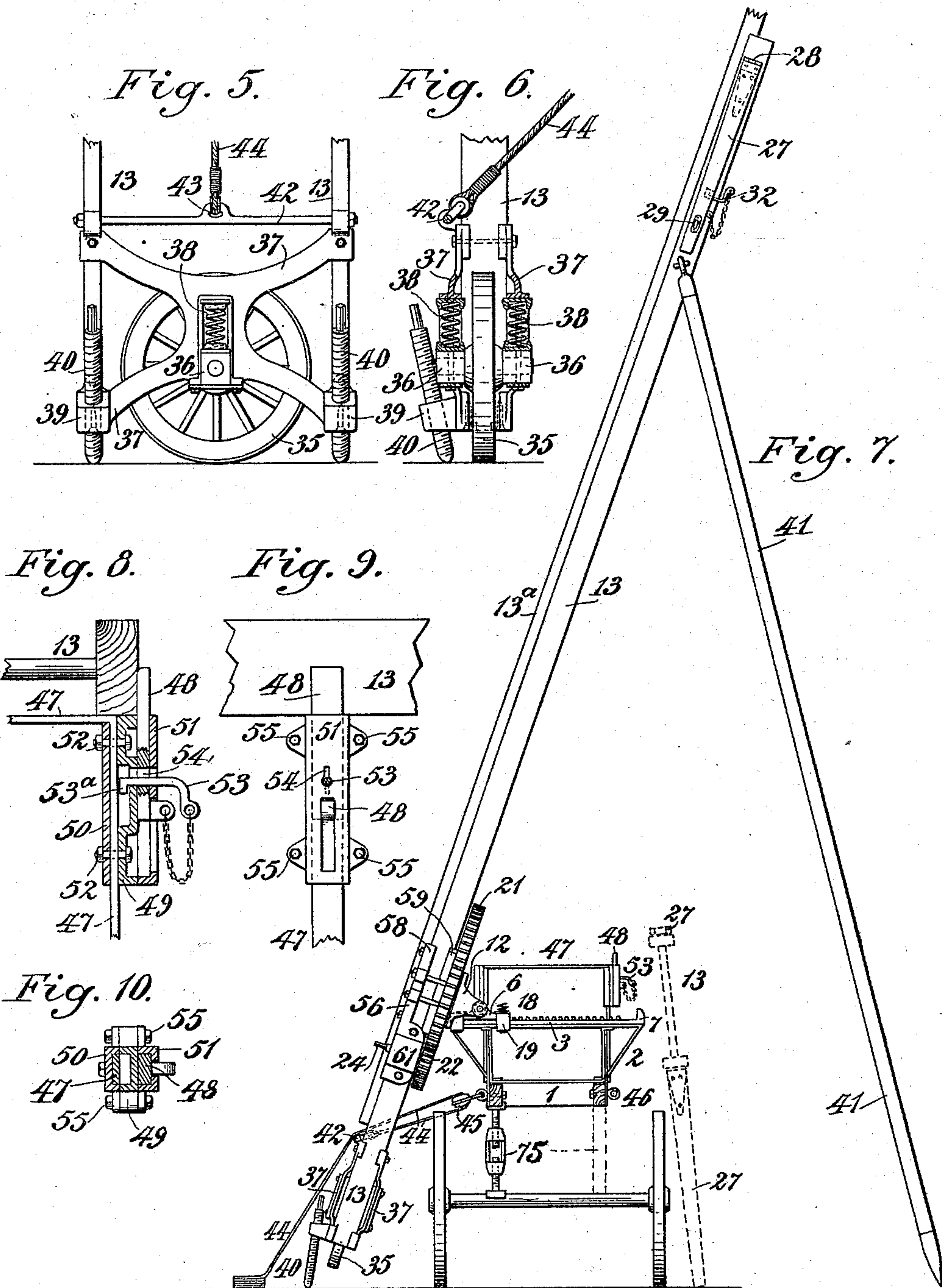
(No Model.)

4 Sheets—Sheet 3.

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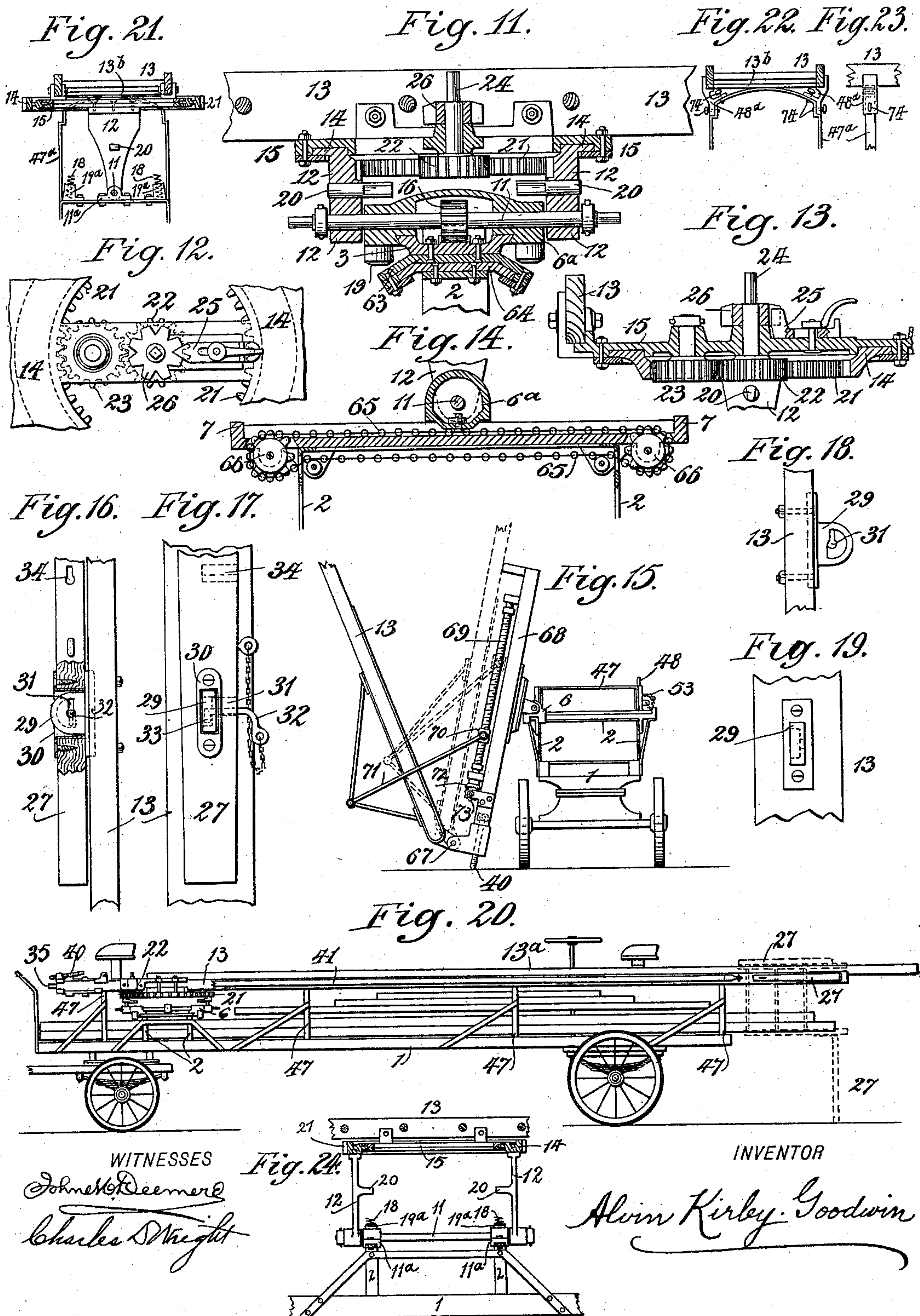
(No Model.)

4 Sheets—Sheet 4.

A. K. GOODWIN.
LADDER APPARATUS.

No. 509,598.

Patented Nov. 28, 1893.



UNITED STATES PATENT OFFICE.

ALVIN KIRBY GOODWIN, OF NEW YORK, N. Y.

LADDER APPARATUS.

SPECIFICATION forming part of Letters Patent No. 509,598, dated November 28, 1893.

Application filed September 15, 1893. Serial No. 485,561. (No model.)

To all whom it may concern:

Be it known that I, ALVIN KIRBY 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 new and useful Improvements in Ladder Apparatus, of which the following is a specification.

My invention relates to ladder apparatus, more especially of that class used by fire departments to save life and property and to help extinguish fires by special service as a water tower and otherwise.

In some of its principal features the apparatus in smaller sizes makes a good movable ladder for painters, fruit pickers and others.

Probably the chief feature of my invention consists in a construction, and in a mode of operation by either two or three principal and collectively novel movements, whereby a ladder may be tilted over sidewise alongside its support or wheeled truck and may then be raised edgewise before being inclined to the most advantageous working position.

In the simplest but least desirable construction, the ladder is held to a turntable device which is pivoted to a shaft ranging lengthwise of the ladder and this pivot shaft is held in immovable bearings on the ladder supporting frame. In this case the ladder has but two principal movements, viz: It tilts over sidewise and then rises edgewise, prior to inclining it to preferred working position. The disadvantages of this simpler construction, especially in large and heavy apparatus, are the following: If the ladder be pivoted to allow it to be tilted over to either side of its truck or support, as should be done, the radial arm portions of the ladder pivot bearings must be made quite long, in order to throw the tilted ladder over sufficiently far at the side of the truck to allow the ladder while being subsequently raised edgewise to properly clear the truck wheels without causing its top to overhang the farther side of the truck; or, in other words, to allow the ladder to describe as nearly as possible a vertical path as it rises edgewise to approximate working position, and thereby permit more easy control of the rising movement of the ladder. The long arc of sidewise tilting movement of the ladder, especially a heavy fire ladder, carries the ladder

downward edgewise alongside its truck or support with great force liable to damage or break the ladder and its operating mechanism. Furthermore, in this simpler construction, the standards sustaining the ladder at places distant from its principal operating mechanism, do not give the ladder such steady support flatwise and against rocking or sidewise swaying movements as it should have when the apparatus is traveling on the road, and the removable side stays for the ladder are not so easily and quickly adjusted as is desirable. In the preferred construction wherein the ladder turntable has a pivotal connection with a laterally movable traveler sustained on the truck, the above named disadvantages are obviated. I have, therefore, in the following specification and drawings given prominence to this preferred construction and modifications thereof.

In either or both of the above named constructions the following mechanisms or appliances are provided, viz: removable side stays for the ladder permitting its sidewise tilting movement; buffers easing said sidewise tilting movement; folding props at the outer end of the ladder sustaining it from the ground when the ladder is tilted sidewise; gearing at the turntable raising the ladder edgewise, and locking devices at this gearing; tormenter poles assisting in raising or lowering the ladder edgewise, and helping to support it when raised; an adjustable stay between the butt of the ladder and the truck support, controlling edgewise rising movement of the ladder, and assisting in its adjustment when raised; a trailing wheel at the butt of the ladder, facilitating change of position of the raised ladder; adjustable ground screws or rests anchoring the raised ladder to the ground; a prop sustaining from the truck axle that side of the truck at which the ladder is tilted, to relieve the truck springs of side strains; and special fastenings securing the ladder to its turntable support.

In modifications adapted to both constructions, two turntables may be used between the ladder and its truck support to allow lateral adjustment of the top of the raised ladder without moving the truck; and the ladder may be pivoted to a platform which is fastened to the turn table to allow the top of the

raised ladder to be swung outward while the platform rests on the ground.

The preferred construction has the following special features, viz: The buffer devices easing sidewise tilting movement of the ladder are carried by the traveler to which the ladder turntable is pivoted; mechanism is provided for moving the traveler laterally prior to tilting it sidewise, and a detent, preferably an automatic latch bolt, is provided for locking the traveler and ladder at extremes of sidewise adjustment.

The novel features are more particularly specified in claims at the end of this specification.

Reference is to be had to the accompanying drawings in which similar numerals indicate the same parts in the several views.

Figure 1 is a detail vertical sectional elevation of the principal mechanism of the preferred form of apparatus. Fig. 2 is a vertical sectional view thereof, taken at right angles to Fig. 1. Fig. 3 is a plan view of most of the parts shown in the preceding views. Fig. 4 is a detail plan view showing one of the traveler latches. Fig. 5 is a detail face view of the trailing wheel and stay at the butt of the ladder. Fig. 6 is a vertical sectional view thereof. Fig. 7 shows the ladder adjusted for use. Figs. 8, 9, and 10 are detail views of the removable side stays on the ladder supporting standards. Figs. 11 to 15 are detail views showing modifications of the principal mechanism. Figs. 16 to 19 are detail views of the ladder prop latch. Fig. 20 is a general side elevation of the preferred apparatus, showing also by dotted lines the rear end or top portion of the ladder tilted over sidewise and sustained by its unfolded prop; and Figs. 21 to 24 sufficiently illustrate the simpler construction of apparatus.

Referring first to the preferred construction, the numeral 1, indicates the body of the wheeled truck or carriage of the apparatus. From 1, rise supports 2, which preferably comprise two braced bar metal frames, see Figs. 1, 2, 7, 15 and 20; or may be one broad metal plate. See Fig. 11. The supports 2, carry a bed plate 3, which for large ladders is made of metal and has opposite front and rear bars, 4, 4, and a center bar, 5. The bars 4, are guides for a laterally adjustable traveler 6, which carries the ladder. The traveler may move to either side detent 7, 7, on the plate 3, and be there held by a self acting latch 8. Each latch moves in a slot of the plate 3, and is lifted by its spring 9, behind a cross-bar 10, of the traveler, after said bar passes over it. See dotted positions of bars 10 in Figs. 2 and 4. The automatic latches 8, are but preferred forms of detents holding the traveler and ladder at extremes of lateral movement to either side, as any other suitable detents may be used for this purpose.

In the traveler 6, is journaled a shaft 11, on which are journaled the pivot bearings 12, 12, of the turntable which supports the ladder

13. The bearings 12, are held rigidly to that part 14, of the turntable on which its other parts 15, 15, rotate, and the ladder is fastened to these revoluble parts 15.

For heavy large ladders, I provide mechanism moving the ladder to either side by shifting the traveler which carries it; I also provide buffer devices easing sidewise tilting movement of the laterally shifted ladder, and I also provide mechanism for raising the ladder edgewise after it has been tilted sidewise. For smaller lighter ladders these ladder adjusting and buffer mechanisms need not be used.

A preferred mechanism for moving the ladder laterally, comprises a pinion 16, fast on the shaft 11, and engaging a rack 17, on the center bar 5, of the bed plate 3, said pinion being rotated by a crank applied to the shaft. Preferred buffer devices for easing sidewise tilting movement of the ladder, comprise four spiral springs 18, held in cups or pockets 19 formed on or fixed to the traveler, and lugs or projections 20, on the bearings 12, which strike the springs, two springs being compressed as the ladder tilts to either side of the truck.

Preferred mechanism for raising the sidewise tilted ladder edgewise to approximate working position, comprises a circular rack or toothed gear 21, on the relatively stationary part 14, of the turntable and engaged by one or more pinions 22, journaled to the ladder. Any other suitable means or mechanism may however be used for these purposes. The gear 21, is preferably formed at the outer edge of the turntable and the pivot bearings 12 having solid buffer lugs are preferably cast separate from the part 14, of the turntable, see Figs. 1, 2, and 7, but the gear 21, may be formed at the inner edge of the turntable and the bearings 12, may be cast solid with the part 14, while the buffer lugs may be steel pins fitted in the bearings. See Figs. 11, 12 and 13, of the drawings. With the internal gear I provide an extra pinion 23, engaged by a central pinion 22, to the shaft 24, of which a wrench is applied when raising or lowering the ladder edgewise. I also provide a suitable detent for holding the ladder in any position to which it may be raised edgewise. This detent may be a sliding bolt 25, having suitable wrench nut fastening and adapted to notches of a ratchet wheel 26, fast on the shaft 24. See Figs. 11, 12 and 13. A like detent may be applied to either or both pinions 22 which engage the external gear 21. Shown in Figs. 1, 2 and 7.

I provide large heavy ladders near the top and preferably at each side with a prop 27, which at 28 is hinged at one end to the ladder and swings downward automatically as the ladder tilts over sidewise and gives support from the ground to the overhanging outer part of the ladder. The prop thus relieves the turntable mechanism of strains and also prevents fall of the outer end of the ladder

to the ground, thereby lessening the degree of edgewise movement required to raise the sidewise tilted ladder to working position. The prop is especially valuable when the detent or locking devices 25, 26, are not used at the ladder raising gearing. I also provide the hinged prop 27, with a suitable latch device preferably of special construction and comprising a metal lug 29, on the ladder which enters a recess in the prop or a metal casing 30, fitted therein. The lug sustains the prop and relieves its hinge 28 of strains. A keyhole 31, cut from one edge of the prop and through one side of the casing 30, and lug 29, allows entrance of a key 32, having a bit 33 which normally falls into a recess in the lug 29 and behind a wall or part of said lug, which prevents accidental loss of the key or unlocking of the prop by jars of travel of the apparatus on the road. The key may be quickly withdrawn after turning it about half way around, and when removed to unlock the prop it may be conveniently held in an extra hole 34, made in the prop. See Fig. 7. The key is preferably held to the prop by a chain.

A trailing wheel 35, is fitted to the butt of the ladder to run on the ground with the wheeled truck or carriage after the ladder is raised and it is desired to shift its top from one window to another or to different places of use. The wheel axle may be immovable but I prefer to support it in boxes 36, movable vertically on housing plates 37, bolted to the ladder side bars. Suitable springs 38 are held above the boxes. The trailing wheel thus has a yielding or elastic support on the ladder and travels easily over the ground without shock to the ladder or its operating mechanism. There are two housing plates 37, each having one axle box 36, and spring 38, and each plate has four points of connection to opposite side bars of the ladder. The plates thus form substantial crosswise braces to the ladder and prevent overstrain of it or its operating mechanism while the ladder is being raised or lowered edgewise.

My invention includes the attachment of a supplemental trailing wheel (preferably an elastically supported wheel) to the butt of a ladder pivotally sustained in any manner by a truck or traveling support and adapted to be raised to operative position on its pivotal connection, and so that as the truck moves along over the ground, the trailing wheel also travels on the ground and allows the raised ladder to be adjusted laterally in its facial plane, and relieves the raised ladder, its pivotal connections, and the truck, of excessive strains, thereby greatly facilitating various adjustments of the ladder and without lowering the ladder from approximate working position, and without dismembering or otherwise specially adjusting the traveling truck or support.

The front housing plates 37, also carry bear-

ings 39, in which are fitted screws 40, which are run down to the ground to help support the raised ladder and relieve the operating mechanism. Tormenter poles 41, coupled to the ladder may be used to assist in raising or lowering it edgewise, and also to support the raised ladder from the ground. See Fig. 7. The front housing plates also carry a crossbar 42, having an eye 43, to which is connected one end of a stay 44, which preferably is a rope rove through a pulley block 45, held to an eye or support 46, on the truck body 1. The stay may be a suitable rod or bar and may also be otherwise connected to the ladder and truck. This stay is useful for holding the sidewise tilted ladder under control and preventing its top falling outward as the ladder is being raised or lowered edgewise and prior to adjusting the poles 41 to the ground. The stay also is useful for hauling the raised ladder back from inclined position during readjustment of the tormenter poles; or toward a vertical position to carry the trailing wheel 35, to the ground after the screws 40, have been turned back, and the stay also prevents edgewise turning of the ladder as the wheel 35 runs along the ground during change of working position.

A number of standards 47, on the truck body 1, have upper crossbars on which the ladder 13, rests and moves laterally. These crossbars are higher than the supports 2, for the turntable mechanism. Four standards 47, are shown in Fig. 20, of the drawings. To hold the ladder properly and prevent sidewise swinging of it on the truck when traveling on the road, and also to allow the ladder to be moved sidewise on the standards, I use removable side stays at the upper corners of the standards. These side stays may be simple pins or bars having retaining devices; but I prefer the special bolts 48. See Figs. 7, 8, 9, 10 of the drawings.

As shown, the ladder sidebar partly overhangs the side upright of the standard and the bolt 48, has a casing which for convenience is made in three parts 49, 50, 51. The middle part 49, has three recesses, two at the outer face, giving room for the heads of two bolts 52, the bodies of which pass through the part 49, the standard 47 and the inner casing part 50, thus holding the parts 49, 50 to the light metal standard without weakening it. The third recess in part 49, is at its inner face and gives room for the bit 53^a, of a key 53, which is entered through aligned keyholes 54, in the outer part 51, of the casing, in the bolt itself and in the part 49. The key bit falls behind a wall of the part 49 and the key must be turned partly around before it can be removed to allow the bolt to fall. The outer part 51, of the bolt casing is held to its other two parts 49, 50, by bolts 55, passing through lugs on all three parts of the casing and clear of the ladder standard. The key 53, operates like the key 32, which secures the

folding ladder prop 27. I prefer to connect the key 53 and a protruding lug of the bolt by a chain.

I specially mention the fastenings holding the ladder to the turntable and shown in Figs. 1, 2, 3, and 7 of the drawings. These fastenings comprise clamp plates 56, which overlies the tops of the ladder side bars and preferably have, at opposite edges, pendent flanges 57, 58, which lap opposite sides of said bars. The inner flange 57 is let in flush with the inner face of the ladder bar and therefore does not interfere with proper close fitting of an extension ladder 13^a, upon the main ladder 13, and the flange 57, also provides at its ends abutting shoulders which prevent endwise slip of the ladder on the clamp plates. The ladder side bars also rest between ribs or flanges 59, rising from the turntable. Two heavy bolts 60, which would weaken the ladder if run through its side bar, are passed through bosses on the clamp plate 56, and downward outside or clear of the ladder bar and through the two parts 15, of the turntable, and two lighter bolts 60^a, which do not weaken the ladder bar, are passed through the plate 56, the bar and the parts 15, of the turntable. A very strong and durable connection of the ladder and turntable is thus assured.

As a further improvement, I make the bearings 61, for the shafts 24, of the ladder raising pinions 22, which engage the external turntable gear 21, integral or in one piece with the clamp plates 56. This maintains the turntable, the ladder and the ladder raising gearing in proper mutual relation to assure positive and correct working of these parts. A few small bolts 62, are passed through the side and top flanges of the bearing 61, into the ladder bar. I also provide a prop or brace to be placed between the body 1, of the wheeled truck and its front axle to relieve the truck springs of side strains which otherwise would be brought upon them by the laterally moved or raised ladder. This prop or brace is preferably made adjustable vertically or with one or two screws. The brace 75, shown in Fig. 7 of the drawings, consists of aligned right and left hand screws connected by a turnbuckle. This construction is preferred as its action is quick and it is readily adjusted. Any other style of prop or brace may however be used, such as the straight plain prop shown at the right hand in dotted lines in Fig. 7.

The operation of the preferred construction of apparatus is as follows: After reaching a fire, the keys 53 at one side of the ladder standards 47, are removed to let the stay bolts 48 fall below the top cross bars of the standards, and the key 32, of one side prop 27 will be removed from the ladder lug 28 and placed in the prop hole 34. The prop or brace 75, will then be adjusted between the truck body and axle at that side of the truck to which the ladder is to be shifted. A crank now will be applied to the pivot shaft 11, to turn it and

its pinion 16 which by engaging the bed plate rack 17, will move the traveler 6, the turntable 14, 15 and the ladder 13, over laterally to one side as the ladder slides on the standards 47, and until the traveler strikes the bed plate detent 7, at one side of the truck, whereupon the latch 8 at that side will automatically spring up behind the traveler crossbar 10, and prevent backward or inward movement of the turntable and ladder. The ladder now overhangs the side of the truck sufficiently to allow it to be easily tilted downward sidewise by hand to the position indicated by dotted lines at the right hand side of Fig. 7 of the drawings. As the ladder thus tilts downward sidewise, the turntable bearing lugs 20 will strike and compress two of the buffer springs 18, to ease the tilting movement and prevent undue shock to the apparatus and the firemen operating it. These buffer devices allow the ladder to be tilted over sidewise quite quickly and carelessly without damage to the parts. As the ladder thus tilts over sidewise, its unlatched prop 27 automatically unfolds and falls upon its hinge 28, to the ground and sustains therefrom the outer end of the ladder to relieve the turntable gearing and hold the ladder about horizontal and edgewise alongside the truck. Should the locking bolt detents 25, be used at the ladder raising gearing 21, 22, they are released and thrown back, and after the stay 44 is connected to the ladder and truck as shown in Fig. 7, wrenches are applied to turn the shafts 24 of pinions 22. These pinions by engaging the relatively stationary turntable gearing 21, will turn or swing the ladder 13, upward edgewise to approximate working position. During this upward edgewise movement the prop 27, automatically folds flat to the ladder. When the ladder is thus raised edgewise it may be inclined to reach any desired upper window or place, by easing the stay 44, and at the same time the tormenter poles 41 will be adjusted to the ground to help support the ladder, and when the ladder is properly adjusted its screws 40 will be turned to bear on the ground and thus relieve the turntable gearing and the truck of strains. The extension ladder section 13^a, gives access to high windows, roofs or other places. The ladder may be quickly and easily raised in this manner from or at either side of the truck by first moving the traveler and ladder laterally to one side or the other before tilting the ladder sidewise, thus allowing the ladder to be adjusted to a burning building at either side of a street without regard to the direction of approach of the apparatus to the building. When the ladder is raised and supported as above described and after it may have been used to mount a high building or to save life, it may be used as a water tower and without leaning it against the building walls and while standing at a safe distance therefrom to avoid being burned by outbursting flames. For this water tower service one or more lines of hose will be run up the ladder

and from their nozzles water will be discharged from a height directly into a fire. The ease and rapidity with which the ladder may be raised and its stability when raised, makes it possible to render this water tower service at any or every fire, thus giving the apparatus the greatest possible usefulness.

When the ladder is raised it may, without lowering it, be moved to adjust its top to different windows or places. Before doing this, the screws 40, are to be raised from the ground and the stay 44, should be hauled up to swing the ladder back to nearly vertical position to carry the trailing wheel 35 to the ground and put its springs 38 in tension to cause the wheel to give proper elastic support to the ladder from the ground and relieve the turntable mechanism and the truck of strains.

To replace the ladder in normal position on the truck, the screws 40, are first turned back clear of the ground and the ladder is then hauled up by the stay 44, nearly to a vertical position while it rocks on the shaft 11, as a fulcrum. After the ladder is lowered edgewise by the gearing 21, 22, and is again sustained at its outer end by the now unfolded prop 27, the stay 44, will be disconnected from the ladder, which then will be swung or tilted upward sidewise partly upon the standards 47. By a new connection of the stay 44, it may be used to effect this upward sidewise tilting movement of the ladder which however may readily be performed by hand. The latch 8, now is drawn downward by hand to release the traveler 6, and the ladder, with the traveler, will be moved laterally inward by the gearing 16, 17, and until the ladder strikes the farthest unremoved stay bolts 48, whereupon the removed stays 48 will be shot upward outside the ladder to hold it in place laterally and flat upon the truck standards 47. The keys 53, 32, will be readjusted to hold the bolts 48 raised and to latch the prop 27 safely to the ladder, and the prop 75 will be removed. The tormenter poles 41, may be handled by the firemen to assist in raising and lowering the ladder. The usual complement of hand ladders is carried on the truck within the support 2, and standards 47. See Fig. 20 of the drawings.

In smaller apparatus of the preferred construction, all adjustments of the ladder may be made by hand and the pinion and rack 16, 17, the turntable gearing 21, 22, the buffer devices 18, 20, the props 27, and perhaps the trailing wheel 35 and tormenter poles 41, may be omitted, and the laterally movable traveler carrying a pivoted turntable to which the ladder is held, may be fitted to slide directly upon the truck supports 2, or upon equivalent lighter supports made of wood.

Fig. 11 of the drawings sufficiently shows a further improvement, which consists in fastening the bed plate 3, which supports the laterally movable traveler 6^a, and ladder 13, to the upper movable parts 63, of a lower auxiliary turntable, the stationary disk por-

tion 64 of which is bolted to the ladder support 2 on the truck. The advantage here is, that after the ladder is raised to working position it may be turned horizontally from side to side at the top for some distance, as the parts 63 of the lower turntable turn on the parts 64 thereof. This allows the top of the raised ladder to be adjusted or swung sidewise to reach different windows of the same floor of a building without requiring the wheeled truck to be moved.

Fig. 14 shows how the traveler and attached ladder may be moved from side to side by chain and sprocket wheel gearing 65, 66.

In Figs. 11 and 14, the traveler 6^a, has a somewhat different form from the traveler 6, shown in other views.

In the modification shown in Fig. 15 of the drawings, the ladder 13 is pivoted at 67 to one end of a platform 68, to which the laterally movable traveler and turntable mechanism is connected instead of being held directly to the ladder itself. In this case the ladder has a normal position relatively to the platform shown by dotted lines and the platform and ladder are together moved laterally and are then tilted sidewise and are afterward swung up together edgewise at that side of the truck nearest the burning building. After the screws 40, in this case fitted to the platform, are turned to the ground, the ladder 13 is swung off at the top to or toward the building either by tormenter poles 41, (not shown in this view,) which afterward support its top from the ground, or by means of one or two screws 69 held to the platform and having nuts 70, connected by rods 71, with a braced cross shaft or other fixture on the ladder. The screws 69 are turned by bevel gearing 72, from a transverse shaft 73, on the platform.

In the simpler construction shown in Figs. 21 to 24 of the drawings, the longer bearings 12, fast to the part 14, of the ladder turntable, are mounted on a shaft 11, which is held in boxes 11^a, rigidly fastened to the centers of the supports 2, and the buffer springs 18, which the bearing lugs 20, strike as the ladder tilts over sidewise, are held in cups or pockets 19^a, fixed to the rigid supports 2. After the ladder is tilted over to either side on the pivot shaft 11, of its turntable 14, 15, the ladder will be raised edgewise on the turntable and clear of the truck wheels in substantially the manner hereinbefore described. In this simpler construction also, the standards 47^a, which sustain the ladder independently of its principal turntable mechanism, are curved at the top on an arc struck from the center of the pivot shaft 11, and the ladder has cross pieces 13^b, which rest and slide on the arched tops of the standards. The side stays 48^a, are shown held at the outer corners of the standards by screws 74. Any other fastenings permitting quick removal of the side stays may be adopted. These stays 48^a, preferably have side flanges overlapping opposite edges of the standards and also have

an end bearing in a recess of the standards which relieves the fastenings of the stays from strains.

It will be understood that the modification shown in Fig. 11, of a lower auxiliary turntable 63, 64, is equally applicable when the upper turntable 14, 15, is pivoted to tilt the ladder over sidewise, and the laterally movable traveler is dispensed with. The modification shown in Fig. 15, of a platform held to the turntable, and carrying a pivoted ladder, may also be made when the turntable is pivoted directly to a fixed support and the traveler 6 is not used.

Obviously, the standards 47, and removable side stays 48, of the preferred construction first described give better support to the ladder both vertically and laterally when it is flat upon the truck, and the use of the traveler 6, allowing lateral movement of the turntable and ladder prior to the sidewise tilting movement, also promotes easier and more satisfactory working of the entire apparatus.

I believe I am the first one to operate a ladder apparatus by tilting the ladder directly over sidewise and then raising the ladder edgewise prior to inclining it to preferred working position, as in the simpler and last described construction. I also believe that I am the first one to operate such apparatus by first moving the ladder laterally on its supports and then tilting it over sidewise and then raising it edgewise prior to inclining it to working position, as in the herein described preferred construction.

I specially state that by operating the ladder by a sidewise tilting movement followed by an edgewise rising movement, injurious flatwise strains are not brought upon the ladder while raising it, as during both of these movements the strains are edgewise of the ladder or in its facial plane and the ladder by its own construction is self bracing edgewise as it is being raised to approximate working position. I therefore consider that my invention includes the practical accomplishment by either the two or the three above described successive and collectively novel movements, of the results aimed at, namely: the adjustment in a simple, convenient and rapid manner of a ladder, from especially a heavy fire ladder, from the best and safest flat position on its truck or support to a raised position for use. It is obvious therefore that my invention is not limited to the mere selection or use of any particular means or mechanism whereby these two or three collectively novel movements of the ladder may be performed. The pivoted turntable mechanism herein described and shown in the drawings is considered a desirable means of attaining a simple and practical embodiment of my invention.

I wish to clearly distinguish the simpler form of my invention from the apparatus shown in United States Patent No. 280,227, issued June 26, 1883, as follows: This patent

describes an extensible ladder movable endwise on a turntable device to which it may be clamped. The turntable is pivoted so as to be capable of swinging over toward either side of the truck. In operation the ladder is first turned about one-quarter around and clear of its normal front support J, requiring considerable space for this movement, and the ladder is then tilted downward at its butt as it rises flatwise at the other end, and the ladder is then adjusted endwise on the turntable prior to being clamped thereto in working position.

It will be seen that in my apparatus the ladder is immovable endwise on the turntable, and the turntable tilts over sidewise with the ladder, and the ladder is afterward raised edgewise and longitudinally of the truck, and is then inclined to preferred working position. These adjustments may all be quickly effected in a comparatively narrow space and with little labor and there is practically no danger of the heaviest ladder slipping beyond easy control of the operators.

I also mention the importance of some special combinations of parts of my apparatus, as follows: the adjustable stay combined with the pivoted ladder carrying a trailing wheel, and operating to draw the raised ladder into approximate vertical position to carry the trailing wheel to the ground and then facilitate travel of the raised ladder on said wheel along with the truck; also the adjustable stay combined with the pivoted ladder carrying a trailing wheel and ground screws, whereby the ladder is controlled by the stay during transference of the weight of the ladder from the trailing wheel to the screws or from the screws to the wheel; and the combinations of these parts with the principal and novel ladder holding turntable mechanism on the truck or traveling support.

I claim as my invention—

1. The combination, with a suitable frame, of a support pivoted thereto, and a ladder immovable endwise on said support and adapted to tilt sidewise therewith and then rise edgewise, substantially as described.

2. The combination, with a support, of a turntable pivoted thereto, and a ladder immovable endwise on the turntable and adapted to tilt sidewise therewith and then be raised edgewise during rotative action of the turntable, substantially as described.

3. The combination, with a support, of a turntable pivoted thereto, a ladder held to the turntable and adapted to tilt sidewise therewith and then be raised edgewise during rotative action of the turntable, and mechanism on the turntable and ladder effecting edgewise rising movement of the ladder, substantially as described.

4. The combination, with a support, of a turntable pivoted thereto, a ladder held to the turntable and adapted to tilt sidewise therewith and then be raised edgewise during rotative action of the turntable, mechanism on

the turntable and ladder effecting edgewise rising movement of the ladder, and an adjustable detent locking the raised ladder against edgewise movement by or with said mechanism, substantially as described.

5 The combination, with a support, of a ladder movable laterally thereon, means for tilting the laterally shifted ladder sidewise, and means for raising the tilted ladder edge-
10 wise, substantially as described.

6. The combination, with a support, of a ladder movable laterally thereon, mechanism effecting such lateral movement, means for tilting the laterally shifted ladder sidewise,
15 and means for raising the tilted ladder edgewise, substantially as described.

7. The combination, with a support, of a traveler laterally movable thereon, a turntable pivoted to the traveler, and a ladder supported by or from the turntable, substantially
20 as described.

8. The combination, with a support, of a traveler laterally movable thereon, mechanism on the support and traveler effecting such
25 lateral movement, a turntable pivoted to the traveler, and a ladder supported by or from the turntable, substantially as described.

9. The combination, with a support, of a traveler laterally movable thereon to a stop, a detent preventing backward movement of the
30 traveler from said stop, a turntable pivoted to the traveler, and a ladder supported by or from the turntable, substantially as described.

10. The combination, with a support, of a traveler laterally movable thereon to a stop, a latch automatically engaging and holding the laterally moved traveler, a turntable pivoted
35 to the traveler, and a ladder supported by or from the turntable, substantially as described.

11. The combination, with a truck having supports on which the ladder or its platform normally rests, of a guide or guides at a lower level than said ladder supports, a laterally
40 movable traveler on the guides, and a tilting turntable connected to the traveler and ladder and interposed between the guides and ladder, substantially as described.

12. The combination, with a support, of a traveler laterally movable thereon, a tilting turntable pivoted to the traveler, a ladder supported by or from the turntable, and gearing
50 at the turntable raising or lowering the tilted ladder edgewise, substantially as described.

13. The combination, with a support, of a traveler laterally movable thereon, a turntable pivoted to the traveler, a ladder supported by or from the turntable, gearing at the turntable raising or lowering the ladder edgewise,
55 and an adjustable detent locking the ladder against movement by or with said gearing, substantially as described.

14. The combination, with a ladder which tilts over sidewise from a flat or horizontal
60 position to an edgewise position alongside its truck or support, of buffers easing said side-

wise tilting movement, substantially as described.

15. The combination, with a ladder held to a pivoted turntable and which tilts over side-
70 wise from a flat or horizontal position to an edgewise position alongside its truck or support, of buffers easing said sidewise tilting movement, substantially as described.

16. The combination, with a support, of a traveler laterally movable thereon, a turntable pivoted to the traveler, a ladder supported by or from the turntable, and buffers easing
75 sidewise tilting movement of the ladder, substantially as described.

17. The combination, with a sidewise tilting ladder, of a folding prop at its outer end sustaining it from the ground when the ladder is tilted, substantially as described.

18. The combination with a sidewise tilting
80 ladder, of a folding prop thereon sustaining its outer end from the ground when tilted, and a detent holding the prop folded to the ladder, substantially as described.

19. The combination, with a sidewise tilting
90 ladder, of a prop hinged thereto and sustaining its outer end from the ground when tilted, the ladder having a lug entering a recess of the prop and preventing its vertical movement and relieving its hinge of strains, and a
95 detent holding the prop folded to the ladder, substantially as described.

20. The combination, with a support, of a turntable pivoted thereto, a ladder immovable endwise on the turntable and adapted to
100 tilt sidewise therewith and then be raised edgewise during rotative action of the turntable, and an adjustable stay connecting the butt of the ladder with a relatively stationary support, substantially as described.

21. The combination, with a support, of a traveler laterally movable thereon, a turntable pivoted to the traveler, a ladder supported by or from the turntable, and an adjustable
110 stay connecting the butt of the ladder with a relatively stationary support, substantially as described.

22. The combination, with a support, of a turntable pivoted thereto, a ladder immovable endwise on the turntable and adapted to
115 tilt sidewise therewith and then be raised edgewise during rotative action of the turntable, and tormenter poles at the latter assisting the raising or lowering or supporting of it, substantially as described.

23. The combination, with a support, of a traveler laterally movable thereon, a turntable pivoted to the traveler, a ladder supported by or from the turntable, and tormenter poles
120 at the ladder assisting the raising or lowering or supporting of it, substantially as described.

24. The combination, with a traveling support, and a ladder pivoted thereto and adapted to be raised to operative position on its pivotal connection, of a trailing wheel held to the
125 butt of the ladder and adapted for rotation in the facial plane of the ladder and facilitating

change of position of the raised ladder, substantially as described.

25. The combination, with a traveling support, and a ladder pivoted thereto and adapted to be raised to operative position on its pivotal connection, of an elastically supported trailing wheel held to the butt of the ladder, and adapted for rotation in the facial plane of the ladder substantially as described.

26. The combination, with a traveling support, of a turn table pivoted thereto, a ladder immovable endwise on the turntable and adapted to tilt sidewise therewith and then be raised edgewise during rotative action of the turntable, and a trailing wheel held to the butt of the ladder, substantially as described.

27. The combination, with a traveling support, and a ladder pivoted thereto and adapted to be raised to operative position on its pivotal connection, of a trailing wheel held to the butt of the ladder, and adapted for rotation in the facial plane of the ladder and an adjustable stay connecting the ladder with a relatively stationary support, substantially as described, whereby the stay controls the raised ladder to make the trailing wheel operative, and then sustains the ladder, as set forth.

28. The combination, with a traveling support, and a ladder pivoted thereto, and adapted to be raised to operative position on its pivotal connection, of a trailing wheel held to the butt of the ladder, and adapted for rotation in the facial plane of the ladder adjustable ground screws also at the butt of the ladder, and an adjustable stay connecting the ladder with a relatively stationary support, substantially as described, whereby the stay controls the raised ladder during transference of its weight to either the trailing wheel or the screws, as set forth.

29. The combination, with a support, of a traveler laterally movable thereon, a turntable pivoted to the traveler, a ladder supported by or from the turntable, and a trailing wheel at the butt of the ladder, substantially as described.

30. The combination, with a traveling support, and a ladder pivoted thereto and adapted to be raised to operative position on its pivotal connection, of a trailing wheel held to the butt of the ladder by bearing or housing plates having a bracing connection at four places with opposite side bars of the ladder, substantially as described.

31. The combination, with a support, of a turntable pivoted thereto, a ladder immovable endwise on the turntable and adapted to tilt sidewise therewith and then be raised edgewise during rotative action of the turntable, and adjustable ground screws or rests at the butt of the ladder, substantially as described.

32. The combination, with a support, of a traveler laterally movable thereon, a turntable pivoted to the traveler, a ladder supported by or from the turntable, and adjustable ground screws or rests at the butt of the ladder, substantially as described.

33. The combination, with a support, of a turntable pivoted thereto, a ladder immovable endwise on the turntable and adapted to tilt sidewise therewith and then be raised edgewise during rotative action of the turntable, adjustable ground screws or rests at the butt of the ladder, and tormenter poles at the ladder assisting in raising or lowering the ladder and aiding the screws in supporting it when raised, substantially as described.

34. The combination, with a support, of a turntable pivoted thereto, a ladder immovable endwise on the turntable and adapted to tilt sidewise therewith and then be raised edgewise during rotative action of the turntable, and removable side stays on the supporting frame which hold the ladder in normal position when out of use, substantially as described.

35. The combination, with a support, of a traveler laterally movable thereon, a turntable pivoted to the traveler, a ladder sustained by or from the turntable, and removable stays on the supporting frame which brace the ladder in normal position when out of use, substantially as described.

36. The combination, with the ladder supporting standards, of side stays comprising sliding bolts each having a three-part casing, two parts of which are fastened to the standard, and the third part to the other two parts, substantially as described.

37. The combination, with the ladder supporting standards, of side stays comprising sliding bolts, each having a three-part casing, two parts of which are fastened to the standard and the third part to the other two parts; the casing and bolt having a key hole and the casing also having a recess; and a detachable key entering the key hole and having a bit locking behind a wall or shoulder to hold the bolt raised next the ladder, substantially as described.

38. The combination, with a support, of a ladder, and two turntables interposed between them, the upper turntable supporting the ladder being pivoted, substantially as described, whereby the ladder may be tilted sidewise and may then be raised and afterward be adjusted horizontally at the top by action of the lower turntable, as set forth.

39. The combination, with a support, of a turntable thereon, a guide on the turntable, a traveler laterally movable on the guide, an upper turntable pivoted to the traveler, and a ladder sustained by or from the upper turntable, substantially as described, whereby the ladder may be moved bodily to one side on the support and may then be tilted sidewise and may then be raised edgewise and may then be adjusted horizontally at the top by action of the lower turntable, as set forth.

40. The combination, with a support, of a turntable pivoted thereto, a platform sustained by the turntable, and a ladder pivoted to said platform and adjustable outward on its pivot after being tilted sidewise and raised

edgewise with the platform, substantially as described.

41. The combination, with a support, of a traveler laterally movable thereon, a turntable pivoted to the traveler, a platform sustained by the turntable, and a ladder pivoted to the platform and adjustable outward on its pivot after being moved laterally and tilted side-
10 substantially as described.

42. The combination, with a support, of a turntable pivoted thereto, a platform sustained by the turntable, a ladder pivoted to said platform and movable outward on its
15 pivot after being tilted sidewise and raised edgewise, and gearing at the turntable raising and lowering the tilted ladder and platform edgewise, substantially as described.

43. The combination with a ladder sustained by a turntable, of fastenings for the ladder comprising upper clamp plates and bolts passed through the plates and turntable and clear of the ladder side bars, substantially
20 as described.

44. The combination with a ladder sustained by a turntable, of fastenings for the ladder comprising upper clamp plates and bolts passed through the plates and turntable and clear of the ladder side bars, and other
25 bolts passed through the clamp plates, the ladder bars and the turntable, substantially as described.

45. The combination, with a ladder sustained by a turntable provided with flanges rising at the sides of the ladder bars, of fastenings for the ladder comprising upper clamp
35 plates having pendent flanges at the sides of the ladder bars, and bolts passed through the plates and turntable and clear of the ladder side bars, substantially as described.

46. The combination, with a ladder sustained by a turntable, of fastenings for the ladder comprising upper clamp plates, having a flange along the inner edge set into the
45 ladder bars, and bolts passed through the clamp plates and turntable and clear of the ladder side bars, substantially as described.

47. Ladder apparatus having a ladder sustained by a turntable having gearing adapted
50 to raise the ladder edgewise, of fastenings for the ladder comprising upper clamp plates bolted to the turntable, said plates formed integral with the bearings of the pinion gearing of the ladder raising mechanism, substan-
55 tially as described.

48. The combination, with a support, of a turntable pivoted thereto, a ladder immov-
60 able endwise on the turntable and adapted to tilt sidewise therewith and then be raised edgewise during rotative action of the turntable, and a prop placed between the truck body and axle and relieving the truck springs of side strains, substantially as described.

49. The combination, with a support, of a traveler laterally movable thereon, a turntable pivoted to the traveler, a ladder support-
65 ed by or from the turntable, and a prop placed

between the truck body and axle and relieving the truck springs of side strains, substan-
tially as described.

50. The combination, with a wheeled truck, of supports 2, 47, thereon, guides on the sup-
70 port 2, a traveler 6 on the guides, a turntable 14, 15, pivoted by a shaft 11, to the traveler, and a ladder held to the turntable and adapt-
75 ed to the supports 47, substantially as described.

51. The combination, with a wheeled truck, of supports 2, 47 thereon, guides on the sup-
80 port 2, a traveler 6 on the guides, a turntable 14, 15, pivoted by a shaft 11, to the traveler, gearing 16, 17 for laterally moving the trav-
85 eler, and a ladder held to the turntable and adapted to the supports 47, substantially as described.

52. The turntable and ladder carrying trav-
eler 6 adapted to a guide and provided with buffer spring receiving pockets 19, substan-
tially as described.

53. The turntable and ladder carrying trav-
90 eler 6, adapted to guides and provided with pockets 19, and springs 18 in said pockets, the turntable having lugs 20 adapted to the buffer springs, substantially as described.

54. The combination, with a wheeled truck,
95 of supports 2, 47, thereon, guides on the support 2, a traveler 6 on the guides and having pockets 19, buffer springs 18, in said pockets, a turntable pivoted at 11, to the traveler, and
100 having studs 20, acting on the springs, and a ladder held to the turntable, substantially as described.

55. The combination, with the ladder hav-
ing a lug 29, of a prop 27, hinged at 28, and having a recess, which the lug 29, enters, a
105 key-hole 31, being made in the prop and lug, and a key 32, having a bit 33, all operating substantially as described.

56. The combination with the ladder, of housing plates 37, fastened thereto, boxes 36,
110 movable in the plates, a trailing wheel 35, held to the boxes, and springs 38, above the boxes, substantially as described.

57. The combination, with a wheeled truck, of supports 2, 47, thereon, guides on the sup-
115 port 2, a traveler on the guides, a turntable 14, 15 pivoted to the traveler and having a toothed gear 21, on its part 14, a ladder adapted to the supports 47, and fastened to the part
120 15 of the turntable, and one or more pinions held to the ladder and engaging the turntable gear 21, substantially as described.

58. The combination, with a wheeled truck, of supports 2, 47 thereon, guides on the sup-
125 port 2, a traveler on the guides, a turntable 14, 15 pivoted to the traveler and having a toothed gear 21, on its part 14, a ladder adapted to the supports 47 and fastened to the part
130 15, of the turntable, one or more pinions held to the ladder and engaging the turntable gear 21, and locking devices 25, 26, for said pinions, substantially as described.

59. The combination with the support 2 and guides having end stops 7, 7, of a laterally

movable traveler, a turntable pivoted to the traveler, a ladder sustained by the turntable, and spring actuated latches 8, 9, automatically engaging and holding the traveler at the end stops 7, substantially as described.

60. The combination with supporting standards 47, and a laterally movable ladder adapted thereto, of removable side stays for the ladder on the standards, and comprising a bolt 48, fitted in a three-part casing, 49, 50, 51, the part 49, having three interior recesses, two of them receiving bolts, 52, holding the casing to the standard, and the third recess adapted to receive a locking key bit; the third casing part 51, being held by side bolts 55, to the parts 49, 50; a key hole 54, being made through the bolt 48, and the parts 49, 51; and a key, 53, having a bit and adapted to hold and lock the bolt raised, substantially as described.

61. The combination with a wheeled truck having supports 2, 47, of a turntable, 63, 64, held to the support 2, guides held to this turntable, a traveler on said guides, an upper turntable 14, 15, pivoted at 11, to the traveler, and a ladder sustained by or from the upper turntable, substantially as described.

62. The combination with a wheeled truck and supports 2, 47, thereon, of guides on the

support 2, a traveler on said guides, a turntable pivoted at 11 to the traveler, a platform 68, held to the turntable, and a ladder pivoted to the platform, substantially as described.

63. The herein described method of operating ladder apparatus, which consists in tilting the ladder over sidewise alongside its truck or support, and then raising the ladder edgewise, prior to inclining it to preferred working position, as herein set forth.

64. The herein described method of operating ladder apparatus, which consists in moving the ladder laterally on its supports while lying flatwise thereon, then tilting the ladder downward sidewise, and then raising the ladder edgewise, as herein set forth.

65. The herein described method of operating ladder apparatus, which consists in moving the ladder laterally on its supports while lying flatwise thereon, then tilting the ladder downward sidewise, then raising the ladder edgewise, and then inclining the ladder to preferred working position, as herein set forth.

ALVIN KIRBY GOODWIN.

Witnesses:

JOHN M. DEEMER,

CHARLES D. WRIGHT.

It is hereby certified that in Letters Patent No. 509,598, granted November 28, 1893, upon the application of Alvin Kirby Goodwin, of New York, N. Y., for an improvement in "Ladder Apparatus," errors appear in the printed specification requiring correction, as follows: In line 51, page 6, the word "from" should read *and*; in line 118, page 7, the word "latter" should read *ladder*; and in line 48, page 9, the clause "Ladder apparatus having" should read *The combination with*; and that said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 19th day of December, A. D. 1893.

[SEAL.]

JNO. M. REYNOLDS,
Assistant Secretary of the Interior.

Countersigned:

JOHN S. SEYMOUR,
Commissioner of Patents.