

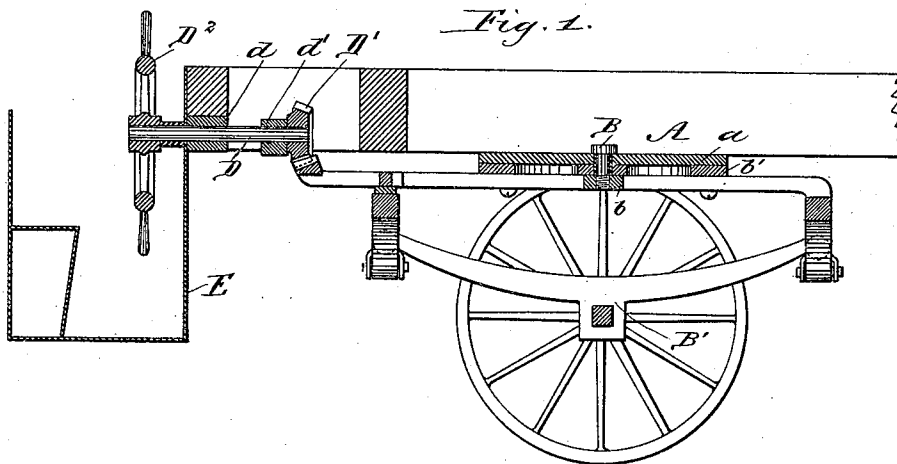
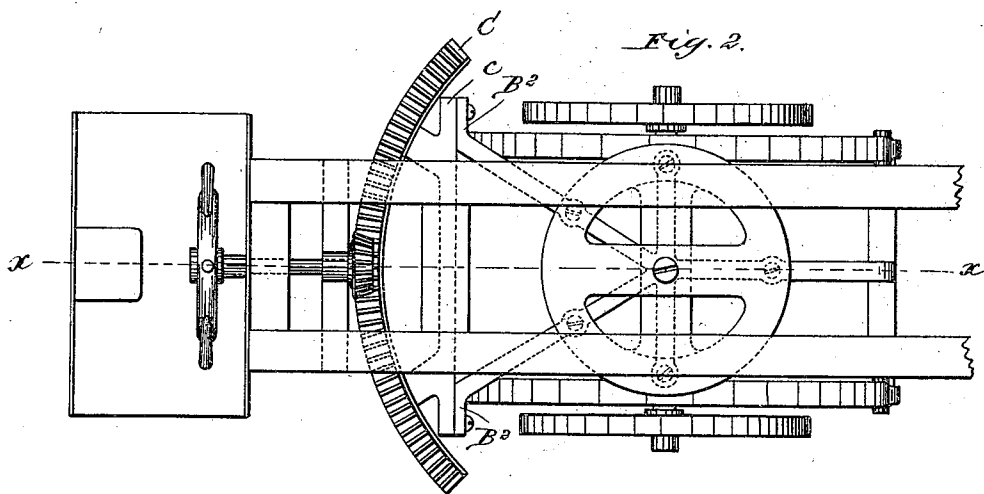
(No Model.)

4 Sheets—Sheet 1.

D. BARNES.
FIRE LADDER APPARATUS.

No. 356,088.

Patented Jan. 18, 1887.



WITNESSES:

W. Rossiter
J. Mills.

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David Barnes

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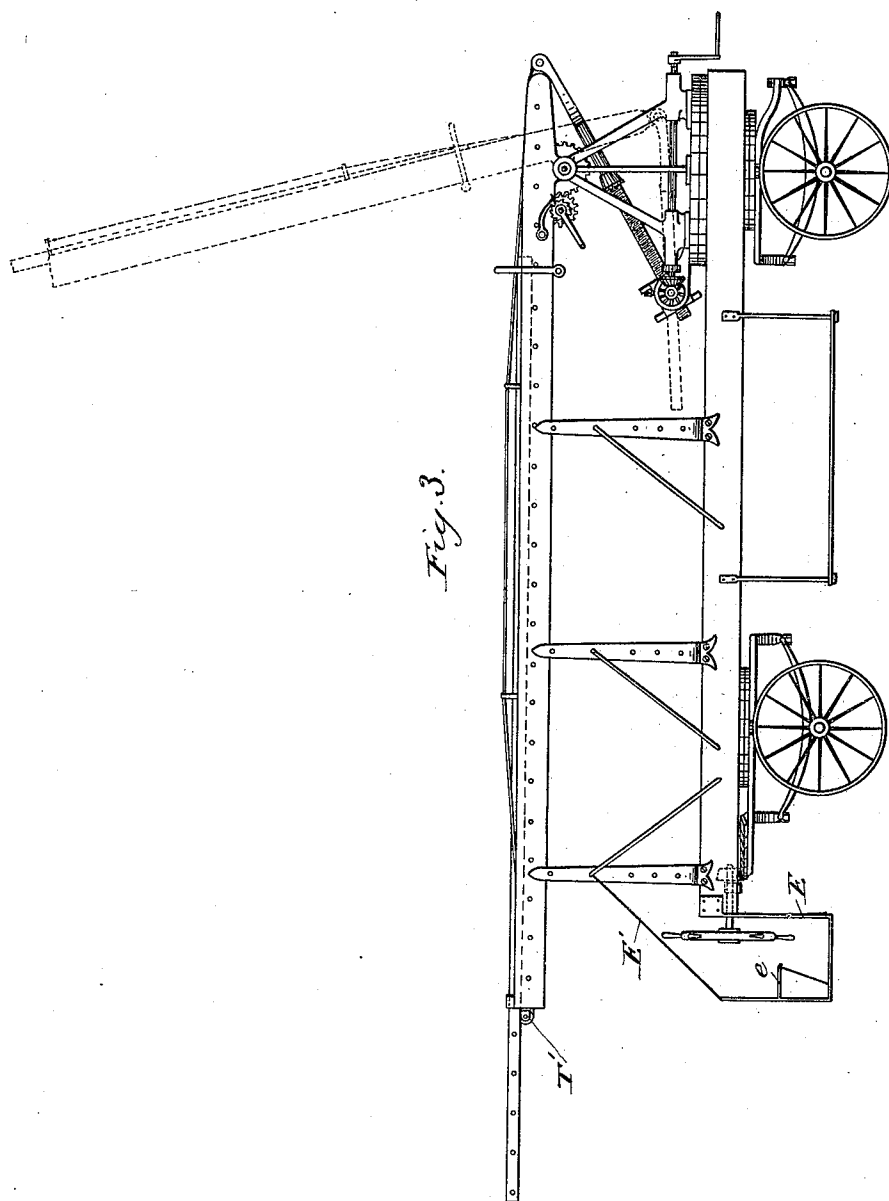
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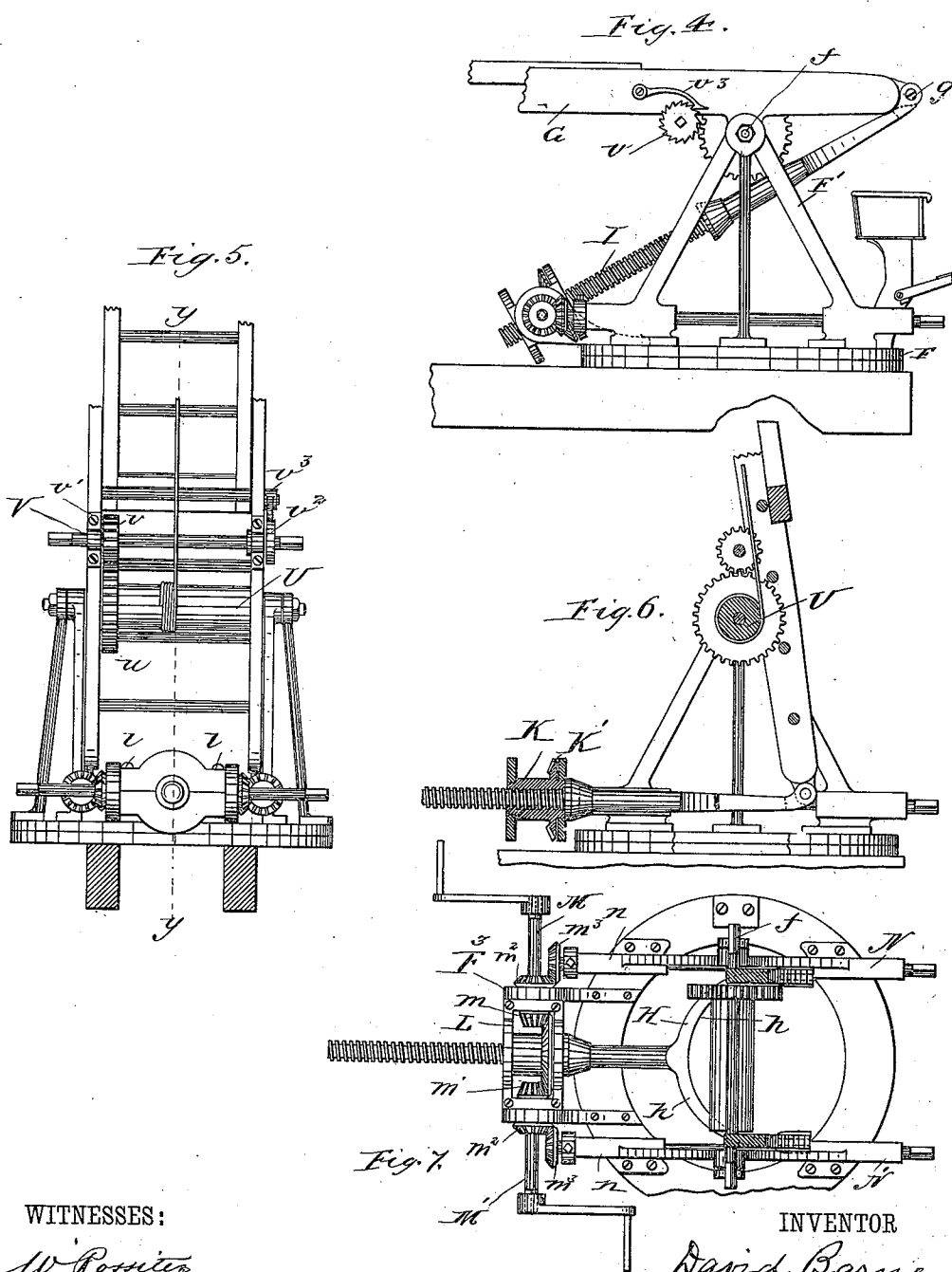
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FIRE LADDER APPARATUS.

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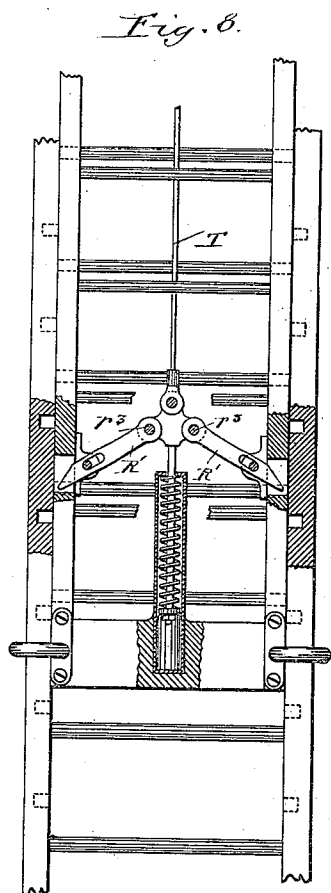
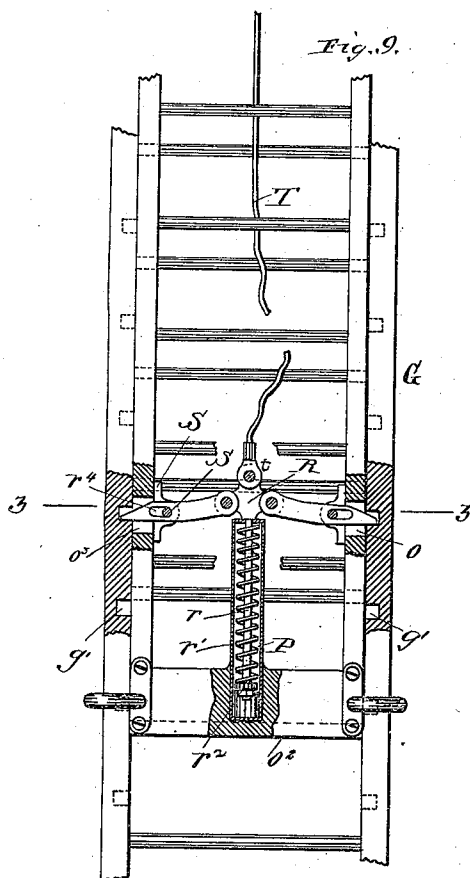
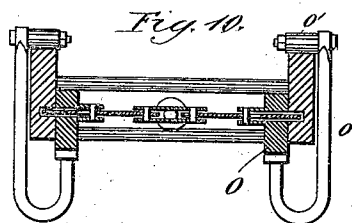
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UNITED STATES PATENT OFFICE.

DAVID BARNES, OF CHICAGO, ILLINOIS.

FIRE-LADDER APPARATUS.

SPECIFICATION forming part of Letters Patent No. 356,088, dated January 18, 1897.

Application filed April 24, 1886. Serial No. 200,074. (No model.)

To all whom it may concern:

Be it known that I, DAVID BARNES, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Fire-Ladder Apparatus, of which I do declare the following to be a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My present invention has relation to that class of fire-ladder apparatus commonly employed by the "hook-and-ladder companies" of fire departments, and particularly does it relate to the improvement of that class of apparatus wherein the main truck that carries the ladders is provided with a turn-table and a standard whereon an extension-ladder is pivotally mounted, and with means whereby such ladder can be quickly raised and swung into position for use.

One object of my present invention is to improve the construction of steering apparatus for the truck-frame, and this object I accomplish by the novel construction and arrangement of parts hereinafter described, and particularly pointed out in the claims.

My improved mechanism for effecting the elevation of the principal ladder, which is pivotally sustained upon the standard of the turn-table, consists, essentially, of a screw-shaft, in connection with the short end of the ladder and mounted in a threaded sleeve, to which movement is imparted through the medium of a suitable driving shaft or shafts, at the outer ends of which the usual crank-arms will be affixed.

In this connection my invention also consists in pivotally connecting the end of the screw-shaft with the end of the main ladder and in mounting the threaded sleeve for such shaft in swivel-bearings.

My invention also consists in combining with the screw-shaft suitable driving shafts extending to the sides of the main truck-frame and to the front end thereof, so that the ladder can be elevated by operating the side shafts when the main truck is in such position that the end shafts cannot be conveniently worked, and vice versa.

In the construction of this class of appa-

ratus it is customary to mount upon the main ladder an extension-ladder adapted to slide upon the main ladder and to be brought to its highest position thereon after such main ladder has been lifted by means of an endless chain or of a lifting-cable that is wound upon a drum, the movement of which is effected by a suitable crank-shaft.

A further object of my invention is to provide the extension-ladder with the improved construction of safety-catch hereinafter described, which, in event of the breakage of the endless chain or of the lifting-cable, will certainly prevent the dropping of the extension-ladder.

To this end my invention consists in the novel construction of safety-catch hereinafter described, and particularly pointed out in the claims at the end of this specification.

Figure 1 is a view in vertical longitudinal section on line *x x* of Fig. 2. Fig. 2 is a plan view of the rear portion of the main truck-frame, parts being removed for the purpose of better illustration. Fig. 3 is a view in side elevation of a fire-ladder truck embodying my invention. Fig. 4 is a view in side elevation of the front portion of the main truck-frame, showing the main ladder mounted upon the turn-table and its standard and my improved mechanism for effecting the raising of this ladder. Fig. 5 is a rear view of the parts shown in Fig. 4, the main ladder being in raised position. Fig. 6 is a view in vertical section on line *y y* of Fig. 5. Fig. 7 is a plan view of the parts shown in Figs. 4, 5, and 6. Fig. 8 is a plan view of the main and extension ladders and the safety-catch, parts being shown in section. Fig. 9 is a view similar to Fig. 8, but with the lifting-cable broken and the safety-catch in position to prevent the descent of the extension-ladder. Fig. 10 is a view in transverse section on line *z z* of Fig. 9.

A designates the main truck-frame, to the under side of the rear portion of which is fixed a suitable plate, *a*, through which passes the king-bolt B, that serves to pivotally connect the rear truck, B', with the main frame. The threaded end of the bolt B enters a suitable seat in the cross-bar *b* of the rear truck, upon which is mounted a turning ring, *b'*, whereon the plate *a* of the main frame bears.

From the top of the rear truck projects the brackets B^2 , to which is bolted the frame c of the segmental rack-bar C , the teeth or cogs of this rack-bar being arranged in an approximately horizontal plane. In suitable bearings, d and d' , at the rear of the main frame is journaled the steering-shaft D , the inner end of this shaft being provided with the pinion D' , that meshes with the segmental rack-bar, and the opposite end of this shaft being furnished with the hand-wheel, similar in construction to the rudder-wheel of a ship. To the rear end of the main truck-frame A is bolted the operator's support or stand E , the bottom of which extends below the main frame a sufficient distance to bring the hand-wheel D^2 within convenient reach, and this support E is preferably furnished with a seat, e , and with stay-rods E' , extending from the top thereof to the side bars of the main frame, as seen in Fig. 3.

In placing the ladders upon the main frame it is usual to arrange the short ladders at the bottom, and the longer ladders above the same upon the cross-bars that extend between the side bars, A , of the main frame, so that the ladders which project beyond the rear end of the truck will be at some distance above the head of the operator when upon his support or stand E . From the foregoing construction of parts it will be seen that the operator by means of the hand-wheel D^2 can readily shift the position of the rear truck, B' , for the purpose of turning curves of street intersections. By arranging the steering-shaft D in horizontal position, and by extending this shaft to the rear of the main frame, I am enabled not only to provide a better and more readily accessible stand for the operator, but also to avoid the interference of this shaft with the removal of the ladders, as is the case in constructions where the shaft is arranged in vertical position upon the main frame.

Upon the forward portion of the main truck-frame is mounted in suitable manner the turn-table F , from which rises the side brackets, F' , whereon is pivotally sustained, as at f , the main ladder G , the front or lower end of this ladder extending a short distance beyond the pivotal points to the front of the main frame. To the end of the main ladder G is pivotally connected, as at g , the arms h of the yoke-bar H , the rear end of this bar being joined to or formed in piece with the screw-shaft I , which extends backward beneath the main ladder. Upon the screw-shaft I is fitted the correspondingly-threaded sleeve K , the ends of which are journaled in suitable bearings in the sides of the box-frame L , through which the screw-shaft passes, and which is sustained between the journal-brackets F^3 , that are bolted, as shown, to the turn-table. Upon this sleeve K is formed the "bull-pinion" or "sleeve-pinion" K' , which serves to impart movement to the sleeve and by means of it to the screw-shaft, and meshing with this pinion K' are the gear-pinions m and m' , which are keyed, respectively, to the inner ends of the drive-

shafts M and M' . These shafts M and M' extend through the journal-brackets F^3 and through the ends of the bearing-box L , which box is formed in sections, as shown in Fig. 5, bolted together at l , and is held upon the drive-shafts M and M' in such manner as to swivel or turn thereon. My purpose in sustaining the sleeve K in the swivel-bearing box is to permit said sleeve to accommodate itself to the movement of the screw-shaft, as this shaft shifts from an inclined to a horizontal position in the operation of raising the ladder.

Upon the outer ends of the driving-shafts M and M' suitable crank-handles will be placed when the shafts are to be turned for the purpose of operating the main screw-shaft. Upon each of the drive-shafts M and M' will be fixed the gear-pinions m^2 , and with these pinions will mesh the gear-pinions m^3 of the drive-shafts N and N' . These drive-shafts N and N' are journaled in the brackets n and extend across the turn-table F to the front of the main truck-frame, their outer ends being squared to receive crank-handles by which the shafts will be operated.

From the foregoing construction it will be seen that when power is applied to either the drive-shafts M and M' or N and N' the bull-pinion or sleeve-pinion K' will be caused to revolve, and it in turn will move the threaded sleeve K and by means of it the screw-shaft I . Assuming the parts to be in the relative position shown in Fig. 4, it will be apparent that if the threaded sleeve K is caused to revolve by means of either of the drive-shafts this sleeve will in turn draw downwardly and backwardly the screw-shaft I until such shaft assumes a substantially horizontal position, as shown in Fig. 6, at which time the main ladder will be completely raised. In the movement of the shaft I the sleeve K is shifted from an oblique to a horizontal position, such movement being permitted by reason of the swiveled box-frame L , within which this sleeve is sustained.

My purpose in extending the drive-shafts M and M' to the sides of the main frame, in addition to the shafts N and N' , extending to the end thereof, is to afford a ready means for operating the screw-shaft in case the main truck-frame be so placed with respect to adjacent buildings that the drive-shafts N and N' cannot be conveniently operated. A further advantage incident to such arrangement is that it affords a means for more quickly operating the screw-shaft in raising the ladder.

In Figs. 8, 9, and 10 of the drawings is illustrated my improved safety-catch for preventing accidents in event of the breakage of the cable by which the extension-ladder is raised upon the main ladder. This extension-ladder O is held on the main ladder in the usual manner—as by the straps o , provided with friction-rollers o' —so as to permit it to slide up and down between the sides of the main ladder; and at the base o^2 of the extension-ladder is fixed the barrel P , wherein is

held the rod r of the safety-catch R, this rod being provided with the coil-spring r' , the upper end of which bears against the top of the barrel P, while the lower end bears against the washer r'' , fastened to the end of the rod r .

To the sides of the body R of the safety-catch are pivotally connected, as shown at r^3 , the dogs or pawls R', the outer ends of which pass through suitable slots, o^3 , in the sides of the extension-ladder O, and are of sufficient length to enter the catch-seats g' in the sides of the main ladder G when the safety-catch is in the retracted position shown in Fig. 9. Suitable slots, r^4 , are formed in the pawls R' to receive the guard-pins s of the brackets S, which are fastened to the extension-ladder, and upon which the strain is thrown when the cable T is operating to lift the ladder, as shown in Fig. 8. The cable T, which passes over the pulley T', affixed to the top of the main ladder, has one of its ends connected by means of the plate t to the body of the safety-catch R, while its opposite end is connected to the winding-drum U, that is journaled upon a suitable shaft sustained by the ladder-brackets F' of the turntable. At one end of this winding-drum U is fixed the gear-wheel u , which engages with the gear-wheel v , that is keyed to the winding-shaft V, journaled within suitable bearings, v , upon the inner side of the main ladder. The ends of the winding-shaft V are squared to receive the usual crank-handles, and upon the shaft is keyed the ratchet-wheel v^2 , with which will engage the pivoted pawl v^3 , which serves to check the backward movement of the drum, and consequently holds the extension-ladder at any desired height.

From the foregoing construction it will be seen by reference to Fig. 8 of the drawings that in the operation of winding the cable T upon the drum U, for the purpose of raising the extension-ladder, the dogs or pawls R' of the safety-catch R are so retracted that their ends will not engage with the catch-seats g' of the main ladder, the weight of the extension-ladder as it is raised being borne upon the pins s of the bracket-plates S and by the dogs or pawls R'. So long as the weight of the extension-ladder, either as the same is raised or lowered, is upon the cable T, the dogs or pawls R' of the safety-catch will continue to be held in the retracted position. If, however, the cable T is severed or broken from any cause, the spiral spring r' within the barrel P will retract the safety-catch, as shown in Fig. 9, and cause the ends of the dogs or pawls R' to be thrust outwardly into such position that they will enter the catch-seats g' of the main ladder, and will thus serve to arrest the further descent of the extension-ladder.

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

1. In fire-ladder apparatus, the combination, with the rear truck and the truck-frame pivotally mounted thereon, of the segment-gear C, the frame c , affixed to the truck, the cog-

wheel D', engaging with the segment-gear, the horizontal shaft D, journal-bearings on the main frame for said shaft, and the hand-wheel for said shaft, all substantially as described.

2. In fire-ladder apparatus, the combination, with the truck-frame, the ladder-standard, and the ladder pivotally mounted upon said standard, of a screw-shaft pivotally connected with the end of the ladder, a threaded sleeve for said shaft, and suitable mechanism for imparting movement to said sleeve, substantially as described.

3. In fire-ladder apparatus, the combination, with the truck-frame, the ladder-standard, and the ladder pivotally sustained upon said standard, of a screw-shaft pivotally connected with the end of the ladder, a threaded sleeve for said shaft, a pinion for imparting movement to said sleeve, and suitable driving-shafts in gear with said pinion, substantially as described.

4. In fire-ladder apparatus, the combination, with the truck-frame, the ladder-standard, and the ladder pivotally sustained upon said standard, of a screw-shaft having one end pivotally connected with the end of the ladder, a threaded sleeve for said shaft mounted in swivel-bearings, a pinion on said sleeve for imparting movement thereto, and a driving-shaft geared to said sleeve-pinion, substantially as described.

5. In fire-ladder apparatus, the combination, with the truck-frame, the ladder-standard, and the ladder pivotally sustained on said standard, of the screw-shaft I, connected to the end of the ladder, the threaded sleeve K, the swiveled box-frame L, wherein said sleeve is held, the pinion K' on said sleeve, the drive-shafts M and M', and the gear-pinions m and m' , substantially as described.

6. In fire-ladder apparatus, the combination, with the truck-frame, the ladder-standard, and the ladder pivotally sustained on said standard, of the yoke-frame H, pivoted to the end of the ladder, the screw-shaft I, connected to the yoke-bar, the threaded sleeve K, having pinion K' thereon, the swiveled bearing-box for said sleeve, and a suitable drive-shaft in gear with the sleeve-pinion K', substantially as described.

7. In fire-ladder apparatus, the combination, with the truck-frame, the ladder-standard, and the ladder pivotally sustained thereon, of a screw-shaft for turning said ladder about its pivotal point, and drive-shafts in gear with said screw-shaft and extending to both front and sides of the truck-frame, substantially as described.

8. In fire-ladder apparatus, the combination, with the truck-frame, the ladder-standard, and the ladder pivotally sustained upon said standard, of a screw-shaft connected with the end of the ladder, a threaded sleeve, and a sleeve-pinion for said shaft, the drive-shafts M and M' in gear with the sleeve-pinion, the pinions m^2 and m^2 upon said shafts, and the drive-shafts N and N', geared to the pinions m^2 and m^2 and extend-

ing to the front of the truck-frame, substantially as described.

9. In fire-ladder apparatus, the combination, with the main ladder, the extension-ladder arranged to slide thereon, and the lifting-cable, of the safety-catch R, having the pivoted pawls or arms R', with slots r^4 therein, the pins s, the

rods r^2 , the coil-spring r' , and the barrel P, substantially as described.

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