

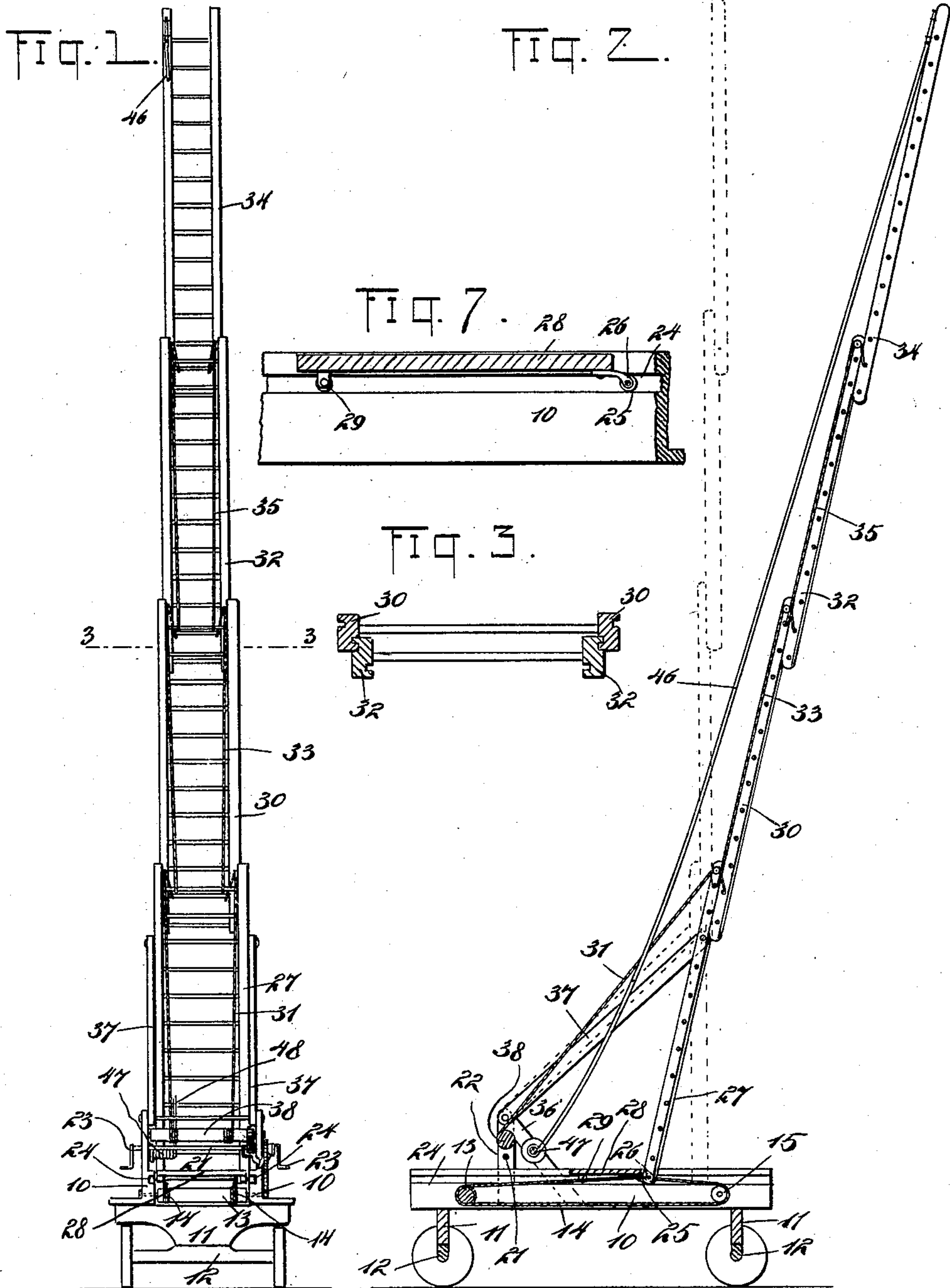
(No Model.)

2 Sheets—Sheet 1.

C. H. WATERMAN.
EXTENSION LADDER.

No. 592,182.

Patented Oct. 19, 1897.



WITNESSES:

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(No Model.)

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FIG. 4.

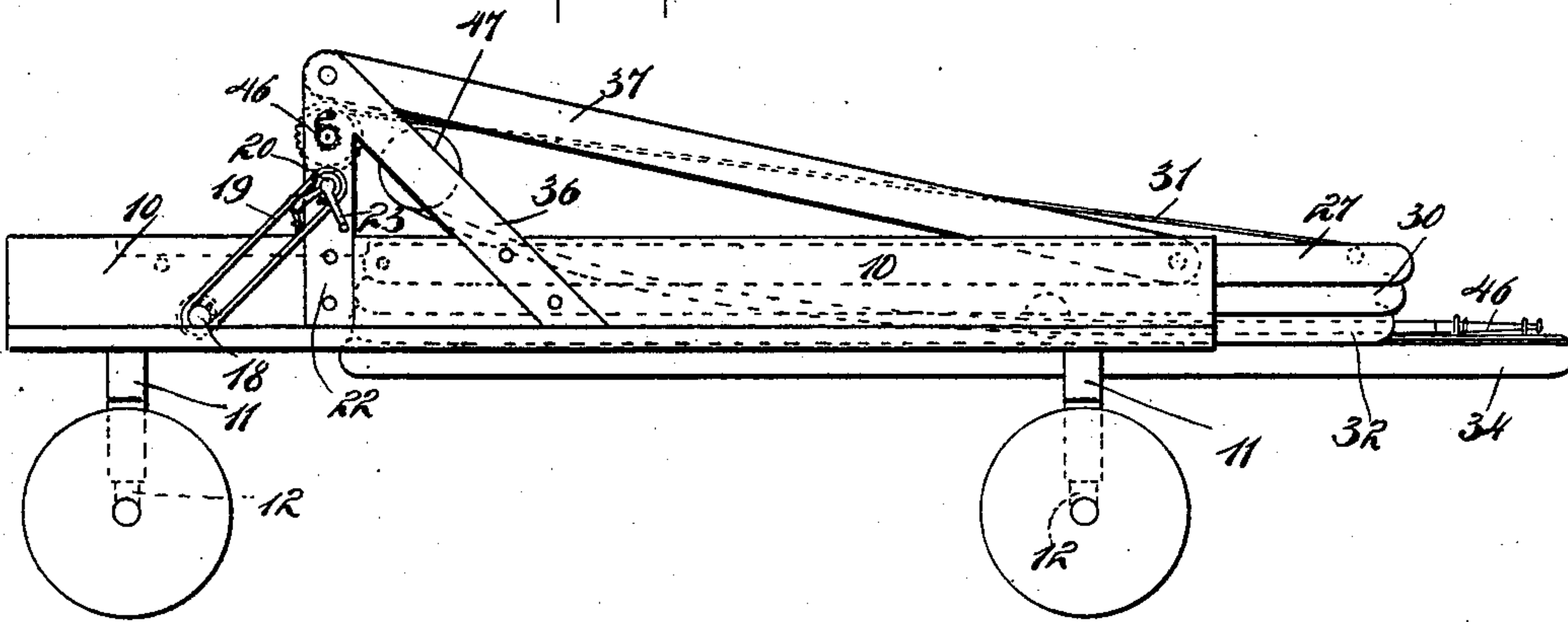


FIG. 5.

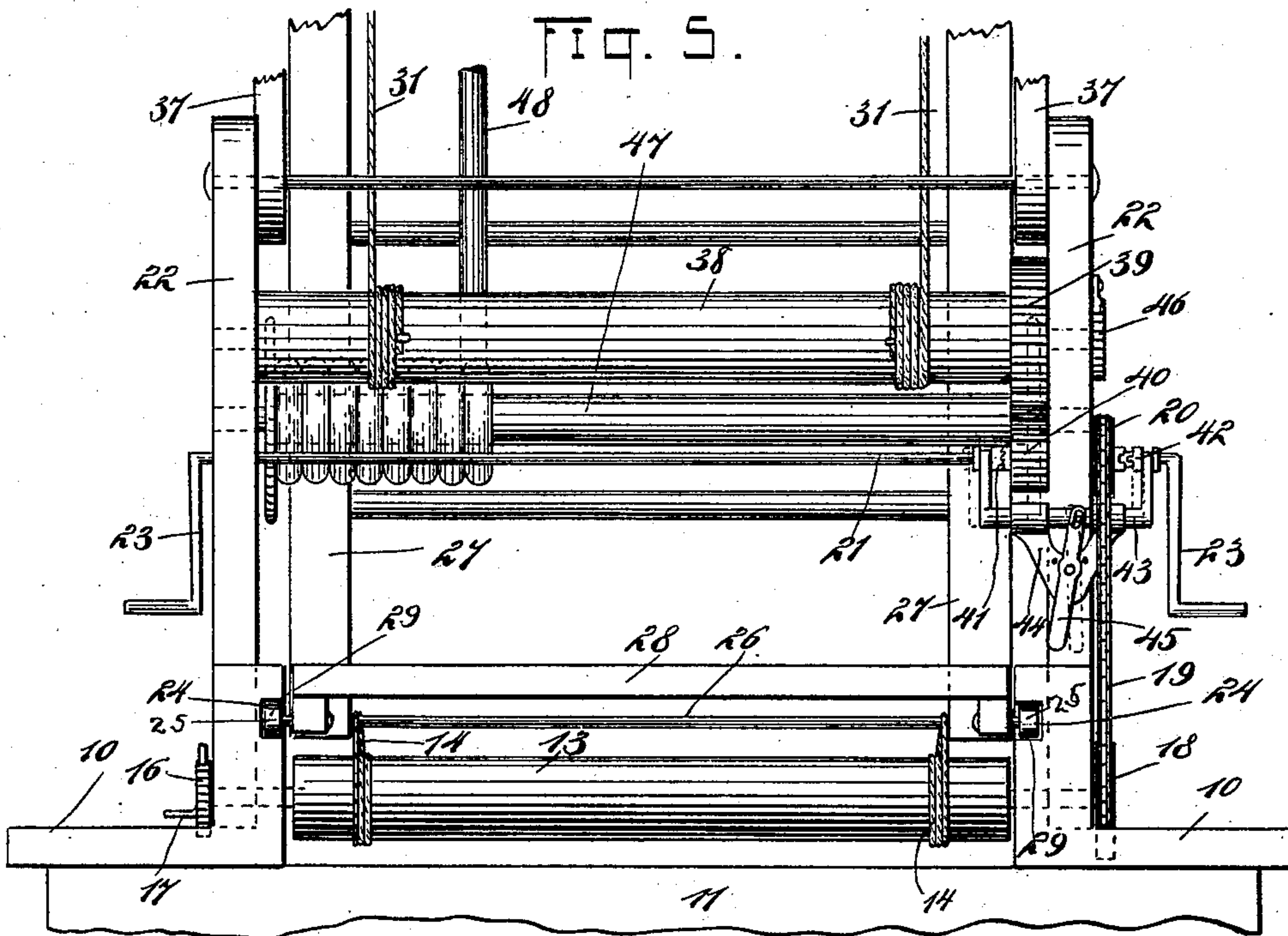
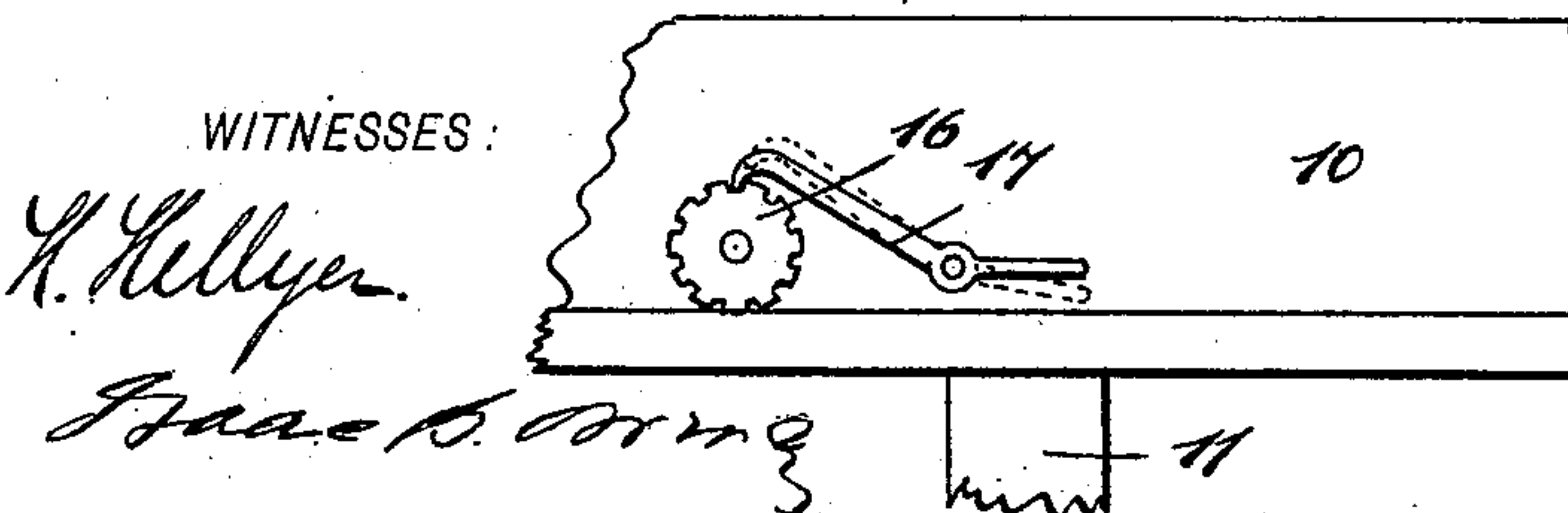


FIG. 6.



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UNITED STATES PATENT OFFICE.

CHARLES H. WATERMAN, OF DAYTON, WASHINGTON, ASSIGNOR OF THREE-FOURTHS TO ADOLPH ROTH, JOHN BRINING, AND JAMES N. STROHM, OF SAME PLACE.

EXTENSION-LADDER.

SPECIFICATION forming part of Letters Patent No. 592,182, dated October 19, 1897.

Application filed April 10, 1897. Serial No. 631,540. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. WATERMAN, of Dayton, in the county of Columbia and State of Washington, have invented a new and Improved Extension-Ladder, of which the following is a full, clear, and exact description.

This invention is an extension-ladder of that class in which the ladder proper is mounted on a truck and operated by winding and adjusting devices also carried on the truck.

This specification is a disclosure of one form of my invention, while the claims define the actual scope of the conception.

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

Figure 1 is a rear elevation of the invention with the ladder extended. Fig. 2 is a vertical section through the ladder with the parts as shown in Fig. 1. Fig. 3 is a detail section on the line 3 3 of Fig. 1. Fig. 4 is a side elevation of the invention folded. Fig. 5 is a fragmentary rear elevation. Fig. 6 is a detail of parts to be hereinafter described, and Fig. 7 is a detail view showing the means for adjusting the inclination of the ladder.

The truck is a structure composed of two parallel angle-plates 10, mounted on front and rear bolsters 11, in turn supported by the axles 12. Mounted in the plates 10 at the rear portions thereof is a transverse drum 13, over which endless flexible connections 14 pass. The flexible connections 14 run forward, respectively, over idler-pulleys 15. The pulleys 15 are mounted on stub-shafts held, respectively, by the plates 10; and the pulleys are respectively located snugly against the plates 10 for a purpose to be hereinafter explained. The left-hand trunnion of the drum 13 carries a ratchet-wheel 16, (see Fig. 6,) engaged by a foot-pawl 17, whereby the drum 13 may be held in any position in which it is put. A sprocket-wheel 18 is fixed on the right-hand trunnion of the drum 13 and carries a chain 19, running upward and forward over a sprocket 20, fixed on a shaft 21, journaled in standards 22, respectively rising from the vertical portions of the angle-plates

10. The shaft 21 has hand-cranks 23 by which the shaft may be operated. The chain 19 transmits movement to the drum 13. The inner face of each plate 10 has a horizontal groove 24. In these grooves 24 the antifriction-rollers 25 of the transverse shaft 26 respectively run. Pivoted on the shaft 26 are the lower ends of the main section 27 of the extension-ladder. The flexible connections 14 are attached to the shaft 26. As the flexible connections are wound over the drum 13 and pulleys 15 the shaft 26 is shifted forward and rearward in the grooves 24, which adjusts the inclination of the ladder, as will more fully appear hereinafter. A platform 28 slides with the main section 27 of the ladder as such connection is adjusted. This platform has its front portion connected to the shaft 26 and has rollers 29 respectively running in the grooves 24, whereby to support the rear of the platform. This construction is best shown in Fig. 7.

The section 27 of the extension-ladder carries a section 30, having flexible connections 31 attached thereto and run over an idler-pulley at the top of the section 27. Sliding on the section 30 is a section 32 of the ladder, which has flexible connections 33 attached to it and run over an idler-pulley at the top of the section 30 and attached to the top of the section 27. The section 32 in turn carries a section 34, extended by the action of flexible connections 35, attached to the lower portion of the section 34, run over an idler-pulley at the top of the section 32 and attached to the top of the section 30. The sections of the ladder slide or telescope into each other, so that the ladder may be readily adjusted to any length within the two extremes. The standards 22 are braced by struts 36, running forward, respectively, to the side plates 10. Pivoted, respectively, to the standards 22 are links 37, which are also pivoted, respectively, to the sides of the section 27 of the ladder. By these means as the lower end of the section 27 slides with the shaft 26 the ladder will be moved to adjust its inclination as the dotted lines in Fig. 2 illustrate.

Mounted in the standards 22 is a transverse drum 38, over which the flexible connections

31 are wound. By the operation of this drum the flexible connections 31 are drawn in and out, which operation serves to extend or contract the ladder, as will be understood.

5 Fixed to the drum 38 is a spur-gear 39, engaged by a pinion 40, loose on the shaft 21. The pinion 40 is provided with a clutch-face coacting with a clutch-collar 41, splined on the shaft 21. The sprocket-wheel 20 is also loose

10 on the shaft 21 and has a clutch-face coacting with a clutch member 42. The clutch members 41 42 are operated in unison to alternately engage their respective clutch-faces by a U-shaped bar 43, sliding in bearings 44, held by

15 the right-hand standard 22. The bar 43 is actuated by a shifting lever 45, fulcrumed below the bar and having slotted connection therewith. When the parts are arranged as shown in the drawings, revolution of the shaft

20 21 will transmit movement to the connections 31 and extend the ladder. When this extension has been effected, the lever 45 should be shifted, which disengages the clutch member 41 and its appropriate clutch-face and throws

25 the clutch member 42 into engagement with the sprocket-wheel 20. Movement is now transmitted to the drum 13, by which the inclination of the ladder may be adjusted. The drum 38 is removably held from retrograde

30 movement by a ratchet-wheel 46, engaged by a gravity-pawl carried on the right-hand standard 22. The ladder is particularly adapted for use at fires and may be provided with a water-hose 48, wound over a drum 47,

35 carried between the struts 36.

The apparatus is normally kept in the folded position shown in Fig. 4. In this position the ladder is located between the idler-pulleys 15. When it is desired to operatively adjust the

40 parts, the lever 45 is thrown so that movement may be transmitted to the drum 13, whereupon the ladder then folded will be swung to a vertical position. The lever 45 should now be returned so that the ladder

45 may be extended by the action of the drum 38 and the flexible connections associated therewith. When this has been accomplished, should a certain nicety of inclination be desired for the ladder, the lever may

50 be again thrown to engage the clutch member 42 with the sprocket-wheel 20, whereupon the drum 13 may be turned to adjust the ladder.

Having thus described my invention, I

55 claim as new and desire to secure by Letters Patent—

1. The combination with a truck, of a pivoted extension-ladder slidable on the truck, a flexible connection attached to the ladder, a

drum to which the flexible connection is at- 60 tached whereby to swing the ladder on the truck, a flexible connection coacting with the ladder to extend the same, a drum over which the second flexible connection is wound, a 65 drive-shaft geared with the two drums, and clutch mechanism for alternately throwing said gearings in and out of mesh.

2. The combination with a truck, of a pivoted extension-ladder carried thereon, means for swinging the ladder, means for extending 70 the ladder, a drive-shaft, gearing connecting the drive-shaft with the two aforesaid means, and clutch mechanism alternately throwing said gearing in and out of mesh.

3. The combination of a drive-shaft, a pin- 75 ion loose thereon, a gear meshed with the pinion, a clutch member sliding on the drive-shaft and capable of engaging the pinion to fix the same to the drive-shaft, a sprocket-wheel loose on the drive-shaft, a second clutch 80 member slidable to engage the sprocket-wheel and fix the same on the drive-shaft, a chain passing over the sprocket-wheel, a U-shaped bar the ends of which are respectively at- 85 tached to the clutch members to slide the same in unison, and a lever pivoted to the U-shaped bar.

4. The combination with a truck, of an extension-ladder, an endless flexible connection mounted on the truck and attached to the ex- 90 tension-ladder, a link pivotally connecting the extension-ladder with the truck, a flexible connection attached to the extension-ladder to extend the same, two gearings respectively for driving the flexible connections, a drive- 95 shaft, and a clutch alternately throwing the two gearings in and out of connection with the drive-shaft.

5. The combination with a truck, of two standards mounted thereon, a drive-shaft car- 100 ried in the standards, two pairs of clutch members mounted on the drive-shaft, a U-shaped lever in connection with said pairs of clutch members; a U-shaped shaft in con- 105 nection with said clutch members, a hand-lever attached to the shaft whereby to communicate movement thereto, an extension-ladder mounted to swing on the truck, and two means, one of said means being for swing- 110 ing the ladder and the second of said means being for extending the same, such means being respectively controlled by the said pairs of clutch members.

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Witnesses:

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