

(No Model.)

4 Sheets—Sheet 1.

T. W. RUSSELL.

EXTENSION FIRE LADDER.

No. 388,448.

Patented Aug. 28, 1888.

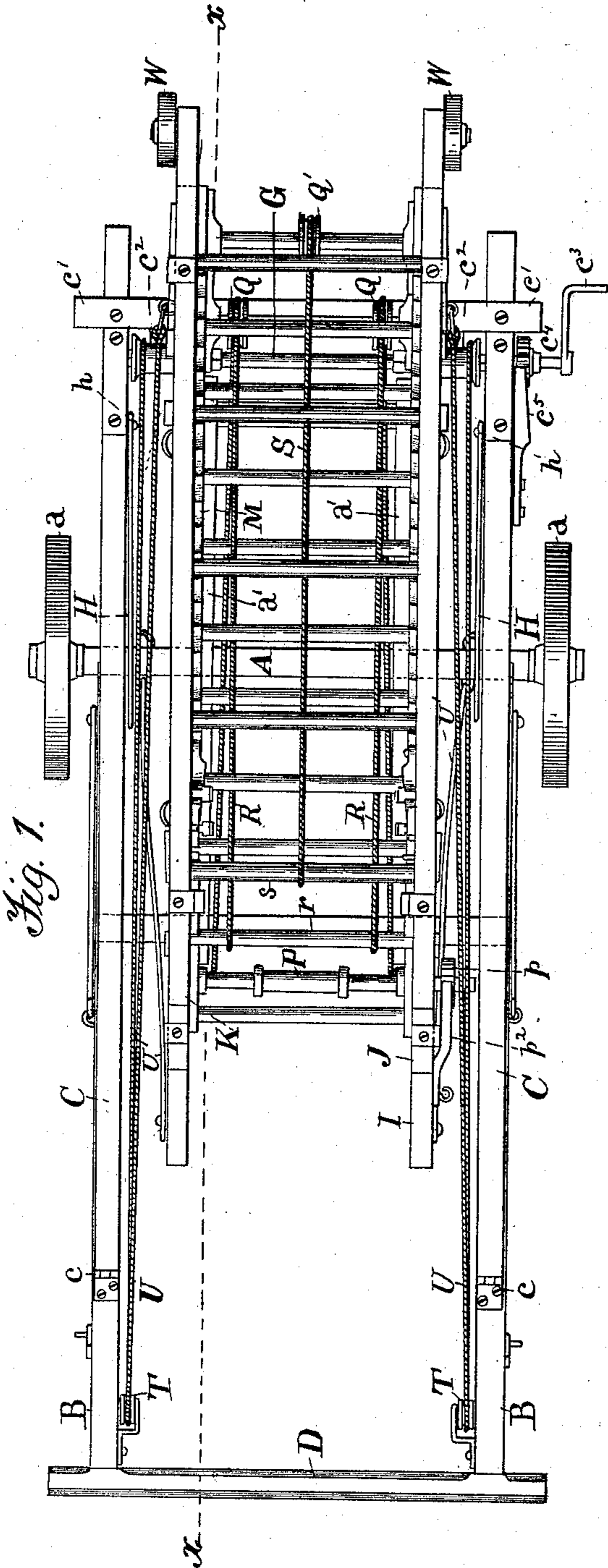
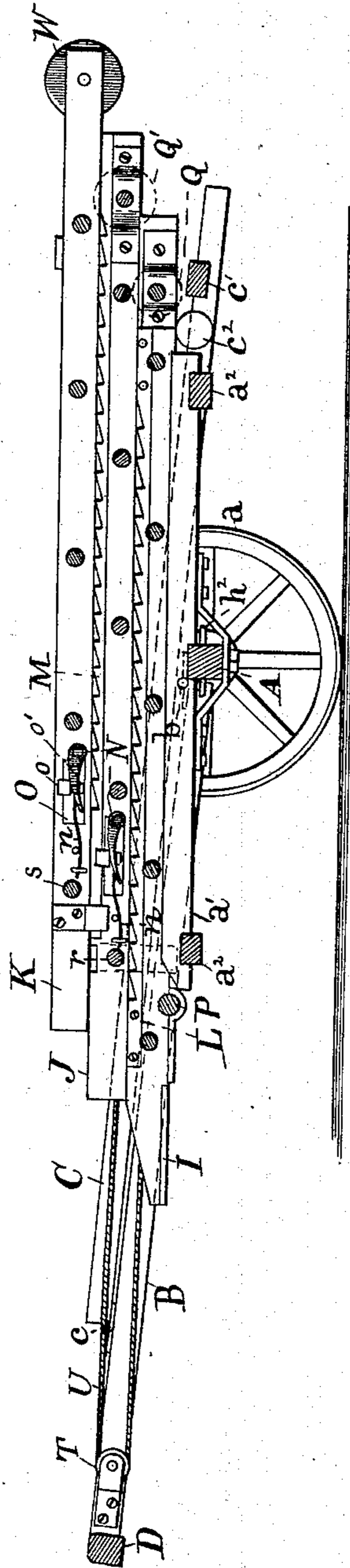


Fig. 1.

Witnesses.  
A. Ruppert.  
Dan'l Fisher.

Fig. 2.



Inventor.  
Thomas W. Russell,  
by G. H. H. Howard  
Atty.

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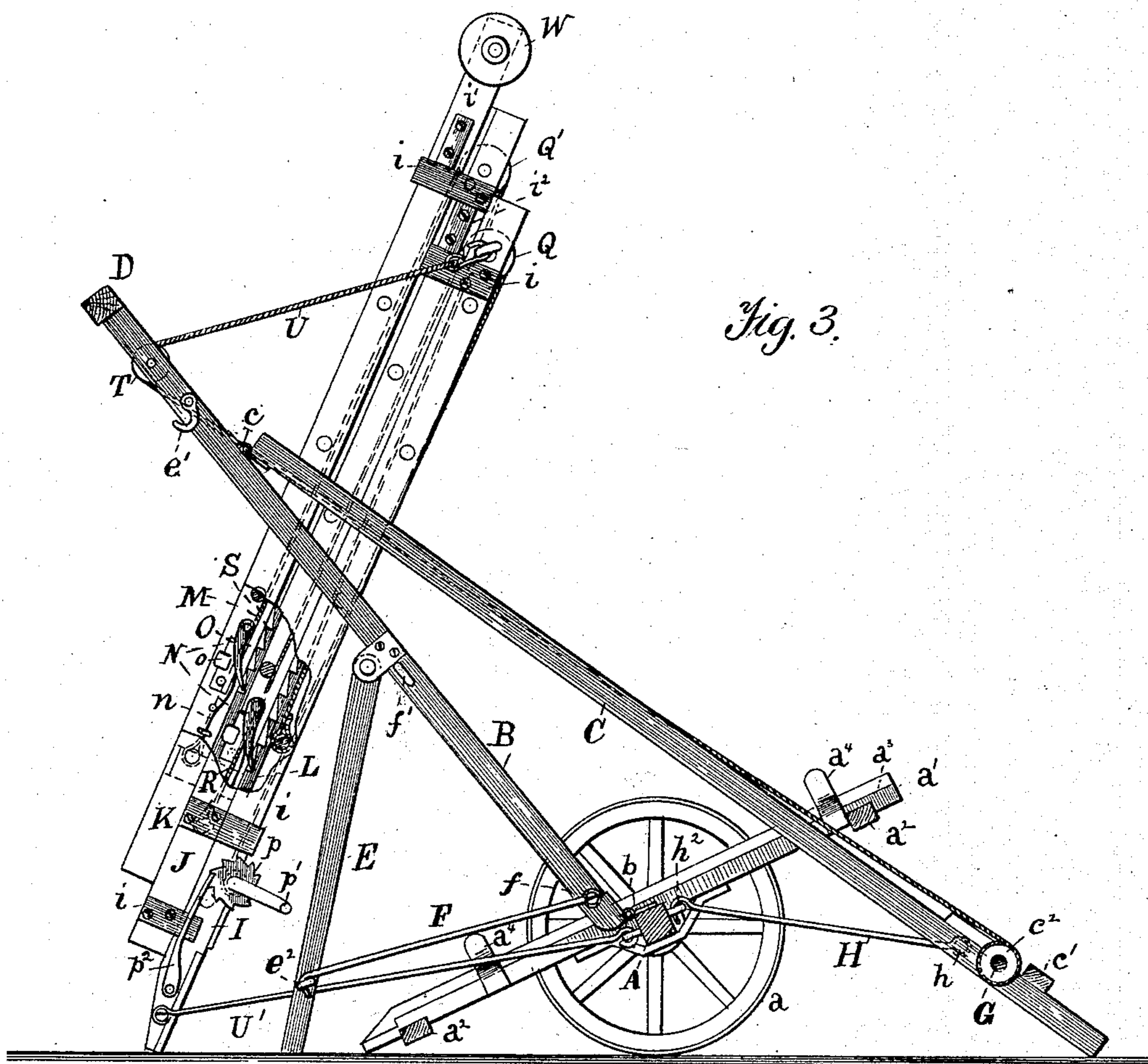
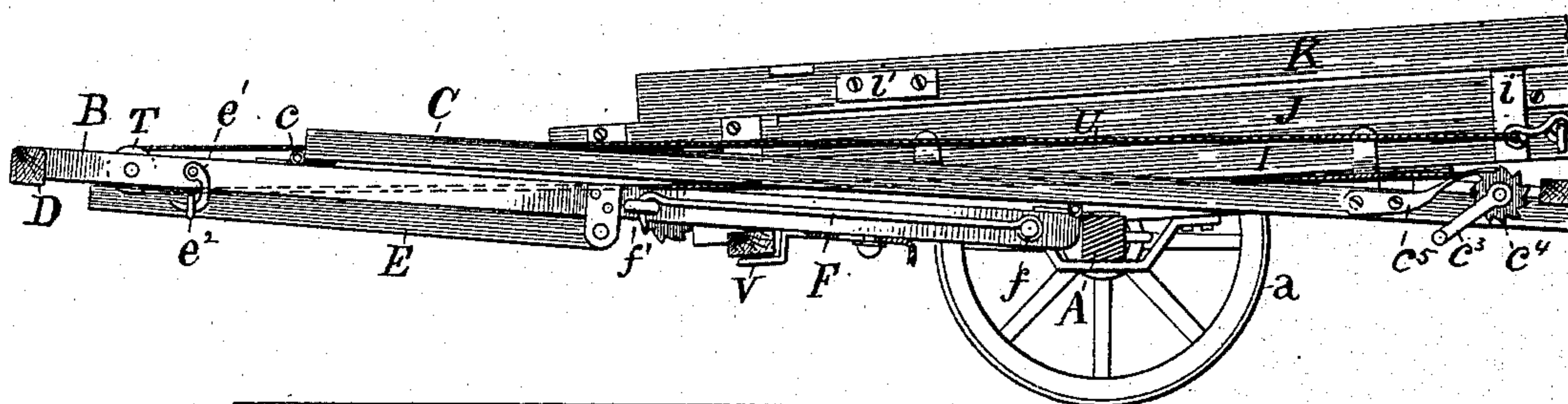


Fig. 4.



*Witnesses.*

A. Ruppert.

Dan'l Fisher.

*Inventor*

*Inventor.*  
Thomas H. Russell,  
by G. H. H. T. Howard,  
attor-

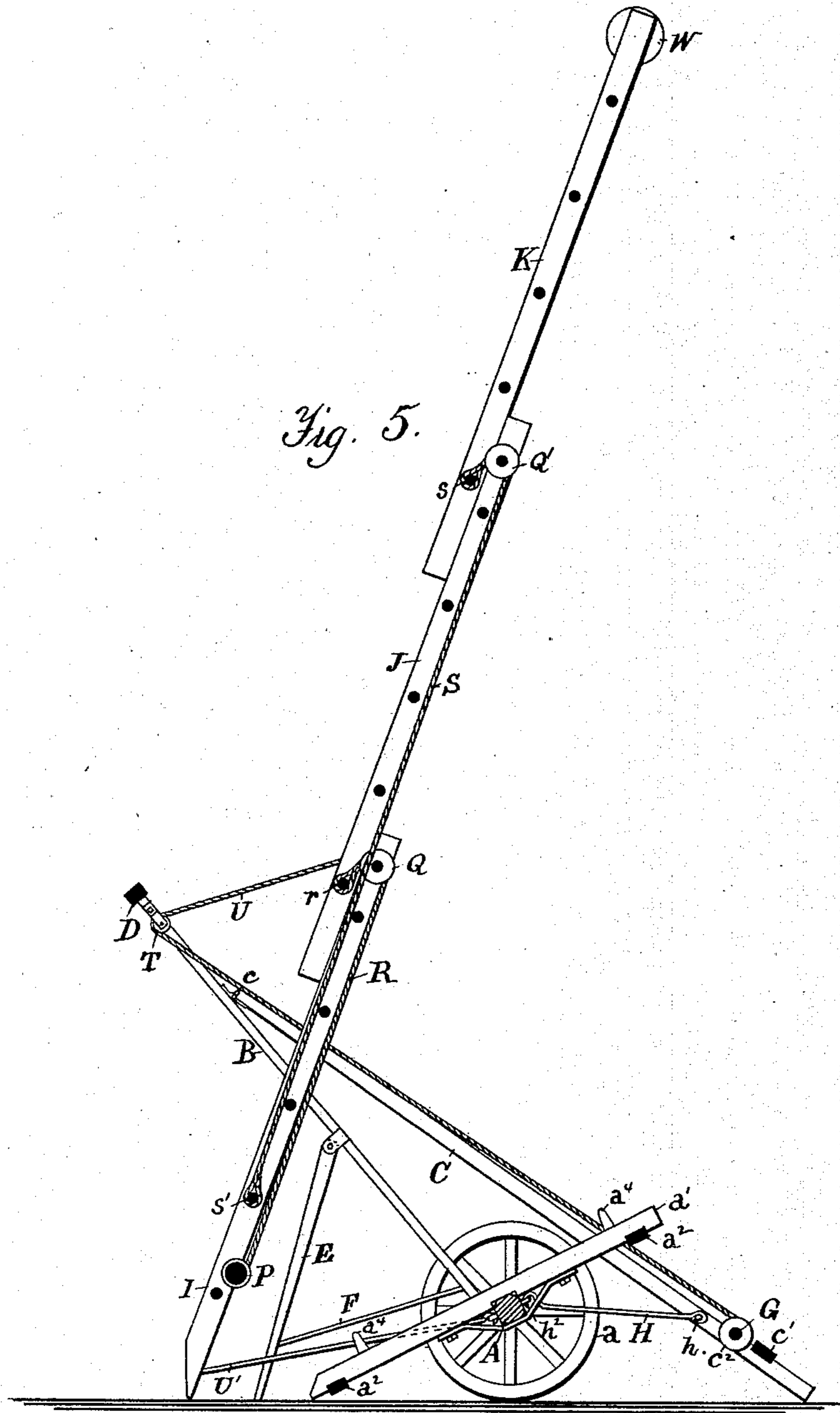
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WITNESSES-

Dan'l Fisher  
A. Ruppert

-INVENTOR-

Thomas W. Russell  
by E. H. I. Howard  
Atty.

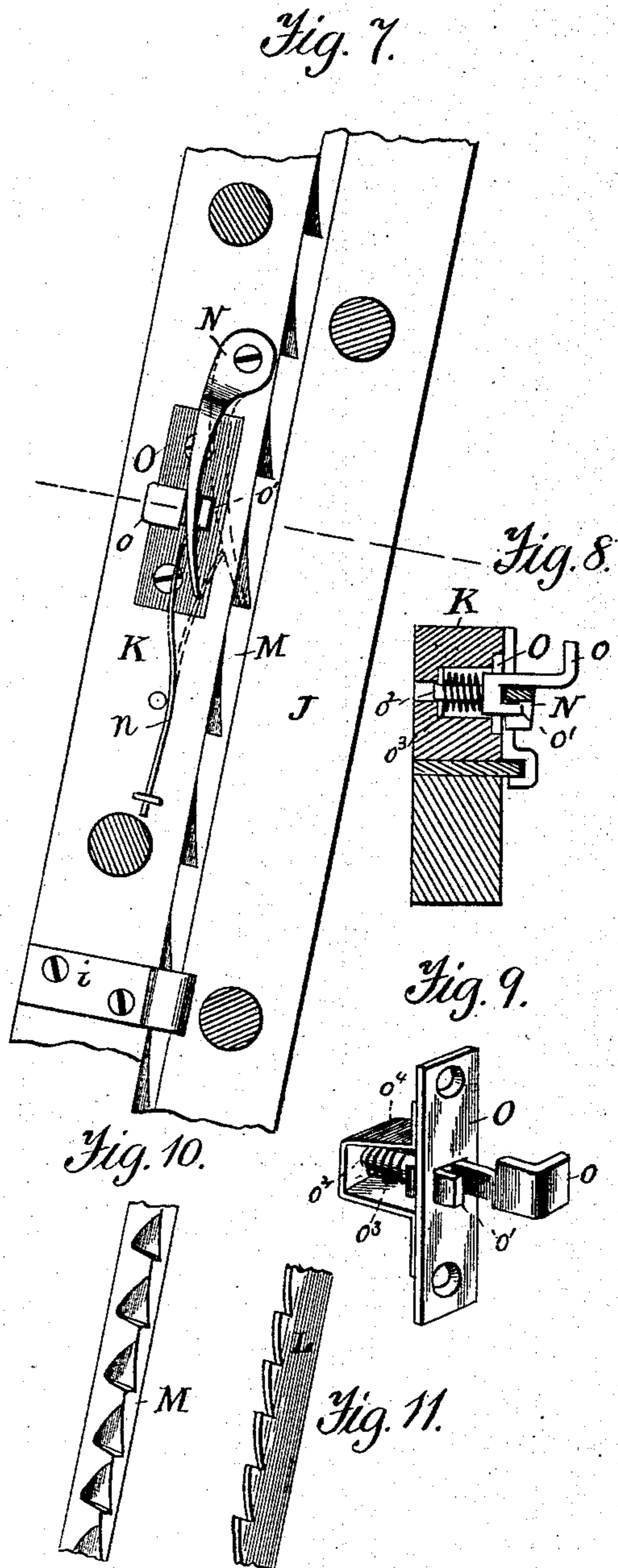
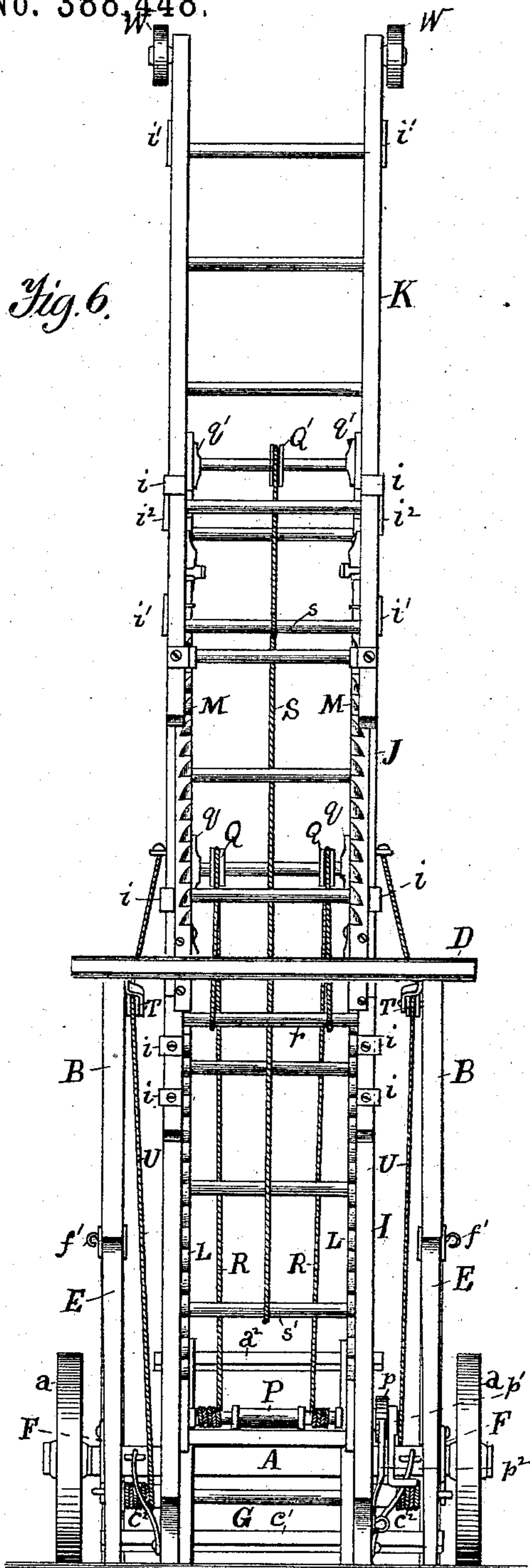
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A. Ruppert.  
Dan'l Fisher.

Inventor.  
Thomas W. Russell  
by G. H. W. T. Howard  
att'y.

# UNITED STATES PATENT OFFICE.

THOMAS W. RUSSELL, OF UNION BRIDGE, MARYLAND.

## EXTENSION FIRE-LADDER.

SPECIFICATION forming part of Letters Patent No. 388,448, dated August 28, 1888.

Application filed November 19, 1887. Serial No. 255,670. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS W. RUSSELL, of Union Bridge, in the county of Carroll and State of Maryland, have invented certain new and useful Improvements in Extension Fire-Ladders, of which the following is a specification, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

10 The object of my invention is to provide an extension-ladder that can be readily transported on a two-wheeled truck, quickly elevated and extended at any desired angle, and be firmly held in position by means of suitable  
15 braces and ropes attached to the truck and the ladder; and my invention consists in the construction and arrangement of parts, as hereinafter described.

In the accompanying drawings, Figure 1 is a top view of the ladder and truck when in position for transportation. Fig. 2 is a vertical longitudinal section on the line *xx* of Fig. 1. Fig. 3 is a side view, partly in section, showing the truck braced and the ladder elevated but not extended. Fig. 4 is a side view  
25 of the truck and ladder when in position for transportation, one wheel being removed. Fig. 5 is a vertical central section showing the truck with the ladder elevated and extended. Fig. 6 is a front view of the same. Figs. 7, 8, 9, 10, and 11 are detached details, as hereinafter described.

Similar letters of reference indicate similar parts in all the figures.

35 A is the axle, and *a a* are the wheels. To the axle A is rigidly secured a rectangular frame composed of sides *a' a'* and the ends *a<sup>2</sup> a<sup>2</sup>*. The sides are made of two pieces securely fastened together, the upper piece being narrower than the bottom piece, so as to form a  
40 rabbet, *a<sup>3</sup>*. (See Fig. 3.) The sides are also provided with posts *a<sup>4</sup> a<sup>4</sup>* on their outer edge. This frame is of the same width as the ladder-sections, and is intended to support them while  
45 being transported or when they are not elevated. The rabbets *a<sup>3</sup>* and posts *a<sup>4</sup>* serve to prevent any side movement of the ladder-sections. Near each end of the axle, and at a point, *b*, between the wheels *a* and the sides *a'*  
50 of the frame, are hinged the side beams, B B, and at points *c c* on the beams B B are hinged

the side beams, C C, the latter lying on the upper face of the former when the apparatus is closed and extending some distance beyond the axle in a direction opposite to that in which  
55 the beams B B extend. The beams B B are connected together at their ends remote from the axle by the bar D, which bar also serves as a handle to be used in propelling the apparatus. To the under side of the beams B  
60 are hinged the braces E, which, when not in use, can be folded up under the beams B and held in position by the hook *e'* and eyebolt *e<sup>2</sup>*. (See Fig. 4.) When, however, the braces E are in use, they are securely held in position  
65 by means of the rods F, which are pivoted at one end on the beams B at *f* and provided with hooks on their other end to hook into the eyebolt *e<sup>2</sup>*. (See Fig. 3.) When not in use, these rods F can be folded up and secured to the  
70 sides of the beams B by means of the eyebolts *f'*. (See Fig. 4.) The beams C C are connected together at their ends remote from the point where they are hinged to the beams B by the cross-bar *e'*. Just above the cross-bar  
75 *e'* is a shaft, G, mounted in suitable bearings on the beams C, and provided at each end, near the inner sides of the beams C, with a reel, *e<sup>2</sup>*. One end of the shaft G extends beyond the outer side of one of the beams C, and is provided with a handle, *e<sup>3</sup>*, and a ratchet-wheel,  
80 *e<sup>4</sup>*, with which the pawl *e<sup>5</sup>*, secured to the side of the beam C, is adapted to engage. On the inner sides of the beams C, and at a point, *h*, immediately above the shaft G, are pivoted the  
85 rods H, which, when the ladder is elevated, are adapted to hook into eyebolts *h<sup>2</sup>* on one side of the axle A, and when the apparatus is closed will lie on and be supported by the top face of the axle. (See Fig. 1.)

90 The parts above described constitute the truck. I will now proceed to describe the ladder, the manner of connecting it to the truck, and the means for operating the ladder.

I J K are ladder-sections of uniform width, 95 adopted to lie one above the other, and being provided with suitable guides, *i*, on their sides to prevent lateral movement. These guides *i*, which are rigidly secured at one end to one of the ladder-sections, are bent at their free ends 100 either over or under the contiguous section, as the case may be, thus serving to hold the sec-

tions together when extended. The section K is also provided on each side with two stops,  $i' i''$ , which are adapted to come in contact with the upper guide,  $i$ , on the section J when the ladder has been extended or lowered to its full limit, as the case may be. (See Fig. 6.) The shaft J is also provided on each side with a stop,  $i^2$ , adapted to come in contact with the upper guide on the section I when the ladder has been lowered to its full extent. To the inner sides of the stiles of the ladder section I are secured ratchet-plates L, (an enlarged view of which is seen in Fig. 11,) and to the upper faces of the stiles of the ladder-section J are secured the ratchet-plates M, (an enlarged view of which is seen in Fig. 10.)

The stiles of the ladder-sections J and K are each provided on their inner sides with pawls N, adapted to engage with the teeth of the ratchet-plates L and M. These pawls are held in engagement with the teeth by means of the spring  $n$ . When it is desired to hold the pawl out of engagement with the teeth, I use a spring-catch constructed in the following manner, reference being had particularly to Figs. 7, 8, and 9:

A plate, O, has a square hole cut in its center, into which hole a rectangular bent hook is inserted, its longer part,  $o$ , being bent and enlarged at its outer end to form a thumb-piece, and its shorter end,  $o'$ , extending beyond the plate O a distance about equal to the width of the pawl N. From the under side of the hook a pin,  $o^2$ , projects, around which a spiral spring,  $o^3$ , is coiled. The end of the pin  $o^2$  extends through a hole in the housing  $o^4$ , which is attached to the under side of the plate O and incloses the pin, spring, and part of the hook. By pressing on the thumb-piece  $o$  the short end  $o'$  of the hook may be forced back till it is flush with the face of the plate O. The pawl N is then lifted up till it comes in contact with the longer part of the hook, when on removing the pressure on the thumb-piece the spiral spring will force the hook outward and the pawl will be supported by the short end  $o'$  of the hook. (See Fig. 7.) When it is required to release the pawl, it is only necessary to press the short end of the hook out of engagement with it, when it will drop down into engagement with the ratchet-teeth.

Near the lower end of the section I a shaft, P, is mounted in suitable bearings, and extends at one end beyond the outer face of the stile of the ladder, and is provided with a handle,  $p'$ , and a ratchet-wheel,  $p$ , with which the pawl  $p^2$  is adapted to engage.

On the top rung of the ladder-section I two pulleys, Q Q, are mounted, the rung being mounted in bearings  $q$  on the inner sides of the stiles and revolving therein. On the top rung of the ladder-section J another pulley,  $Q'$ , is mounted, the rung revolving in suitable bearings,  $q'$ . Ropes R R are attached at one end to the bottom rung,  $r$ , of the section J, pass over the pulleys Q Q, and are secured—one at either end—to the shaft P, on which they can be

wound. Another rope, S, is attached at one end to the bottom rung,  $s$ , of the section K, passes over the pulley  $Q'$ , and is secured to the second rung,  $s'$ , of the section I.

On the inner sides of the beams B, and near the bar D, pulleys T T are secured. Ropes U U are attached—one on each stile—to the top of the ladder-section I, pass over the pulleys T, and are wound on the reels  $c^2$  of the shaft G.

Rods U' U' are pivotally attached at one end to the axle A and at their other end to the foot of the stiles of the ladder-section I, thus holding the foot of the ladder firmly in position.

V is a sliding catch on the under side of the beam B, for the purposes of supporting the rectangular frame when the ladder is being transported.

At the upper ends of the stiles of the section K are friction-wheels W W, which may be of any suitable material, and are for the purpose of allowing the ladder to be more easily extended should its upper end be in contact with a wall or other surface.

The ladder is operated as follows: Supposing the ladder and truck to be in the position shown in Fig. 4, in order to elevate the ladder, the sliding catch V is moved back, allowing the beams B and the rectangular frame to move independently of each other. The braces E are then released from the hooks  $e'$ , the beams B are elevated, and the braces E pushed under them until the rods F can be hooked into the eyebolts  $e^2$ . The beams C must at the same time be extended outward at their free ends till the rods H can be hooked into the eyebolts  $h^2$ . The apparatus will then be in the position shown in Fig. 3, with the exception that the ladder-sections will still be lying on the rectangular frame. By revolving the shaft G the ladder-sections can be elevated to any desired angle and securely held in position by means of the ratchet-wheel  $c^4$  and pawl  $c^5$ . The pawls N having been released from the spring-catches, the apparatus will now be in the position shown in Fig. 3. By revolving the shaft P the ropes R R will be wound thereon and the sections J K will be extended beyond the section I, and at the same time the section K will be extended beyond and independently of the section J in the same relative degree by means of the rope S. The apparatus will then be in the position shown in Figs. 5 and 6, and the ladder will be securely held in such position by means of the ratchet-plates L and M, pawls N, and the ratchet-wheels  $p$  and  $c^4$  and pawls  $p^2$  and  $c^5$ . In order to close and lower the ladder-section, the pawls N are lifted out of engagement with the teeth of the ratchet-plates L and M and held up by the spring-catches. The pawl  $p^2$  is then lifted out of engagement with the ratchet-wheel  $p$ , when the sections J and K will lower themselves by their own weight. By releasing the pawl  $c^5$  from the ratchet-wheel  $c^4$  the ladder-sections can be lowered till they again rest on the rectangular frame. The braces E and rods H can then be released, the

beams B B lowered, and the rectangular frame secured to the beams by means of the sliding catch V, when the apparatus will again be in the position shown in Fig. 4 and be ready for transportation.

Having thus described my invention, I claim—

1. The axle A, having a rectangular frame rigidly secured thereto, said frame having a rabbet formed on its side pieces and being provided with posts secured to said pieces, combined with the beams B and C and a sectional ladder, substantially as described.

2. The axle A, having a rectangular frame rigidly secured thereto, said frame having a rabbet formed on its side pieces and being provided with posts secured to said pieces, combined with the beams B and C, braces E, rods F and H, and a sectional ladder, substantially as described.

3. The beams C C, having the shaft G mounted in suitable bearings thereon and provided with a ratchet-and-pawl mechanism, the beams B B, provided with pulleys at their free ends, the braces E, rods F and H, and the axle A, combined with a sectional ladder and ropes attached to the upper ends of the stiles of one of the sections and leading over the said pulleys to the shaft G, to be wound thereon, substantially as set forth.

4. The ladder-sections I J K, having the guides *i*, and a system of ropes and pulleys operated by a revoluble shaft having a ratchet-and-pawl mechanism for extending said ladder-section, combined with a truck, rods connecting the foot of the section I with the axle of said truck, beams B and C, suitably connected and braced to said truck, and ropes leading from the top of the section I over pulleys at the upper end of the beams B to a shaft mounted in the beams C near their lower ends, substantially as and for the purpose specified.

5. The ladder-sections I J K, having the guides *i* and stops *i'* *i''*, and a system of ropes and pulleys for operating said sections, the sections I and J being also provided with ratchet-plates L and M, combined with the spring-pawls N, mounted on the stiles of the sections J K and adapted to engage with the teeth of said ratchet-plates, and a catch consisting of a spring-actuated hook, substantially as described, for holding the pawl out of engagement with the ratchet-teeth, as specified.

In testimony whereof I have hereunto set my hand and seal.

THOMAS W. RUSSELL. [L. S.]

Witnesses:

WM. H. H. CLARY,  
FRANK HODGES.