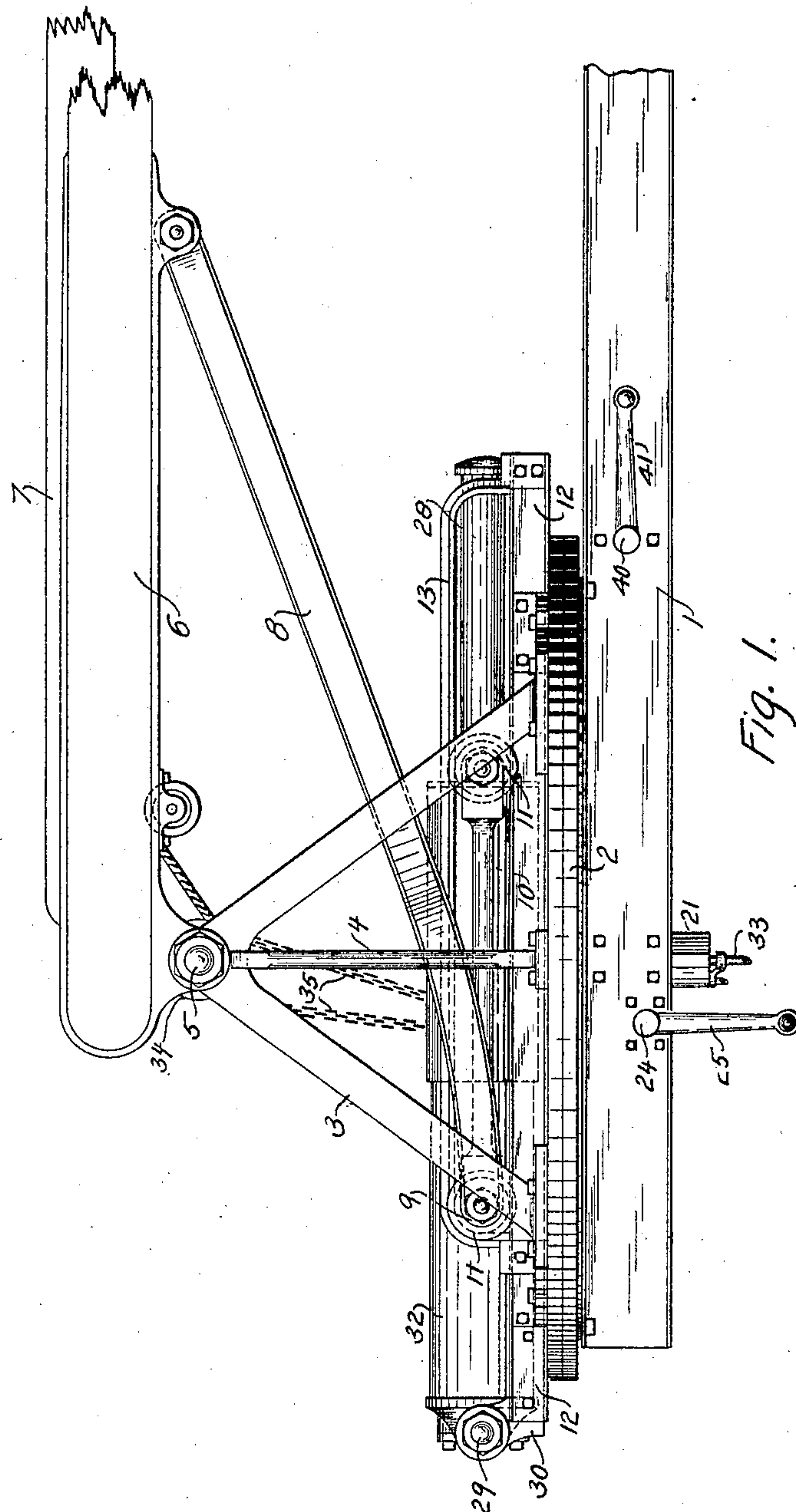


No. 836,709.

PATENTED NOV. 27, 1906.

J. RILEY.  
AERIAL APPARATUS.  
APPLICATION FILED APR. 14, 1906.

3 SHEETS—SHEET 1.



WITNESSES:  
*L. V. Stoltzman*  
*G. St. O'Brien*

INVENTOR  
*Joseph Riley*  
BY  
*Eugene Wren*  
ATTORNEY

No. 836,709.

PATENTED NOV. 27, 1906.

J. RILEY.  
AERIAL APPARATUS.  
APPLICATION FILED APR. 14, 1906.

3 SHEETS—SHEET 2.

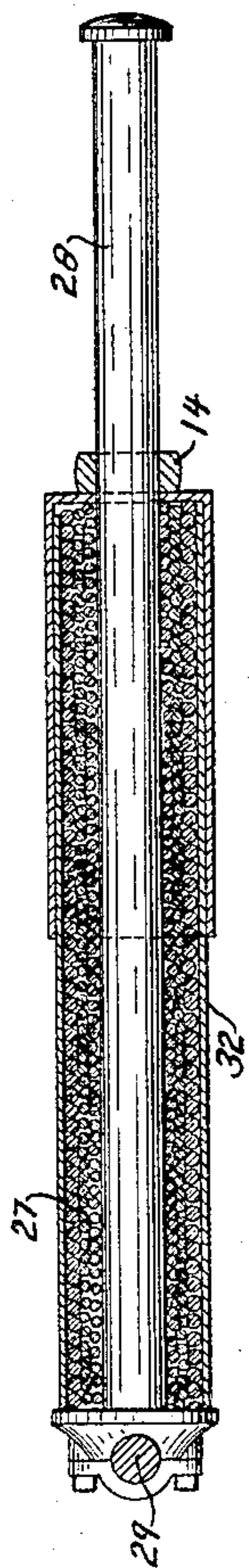


Fig. 4.

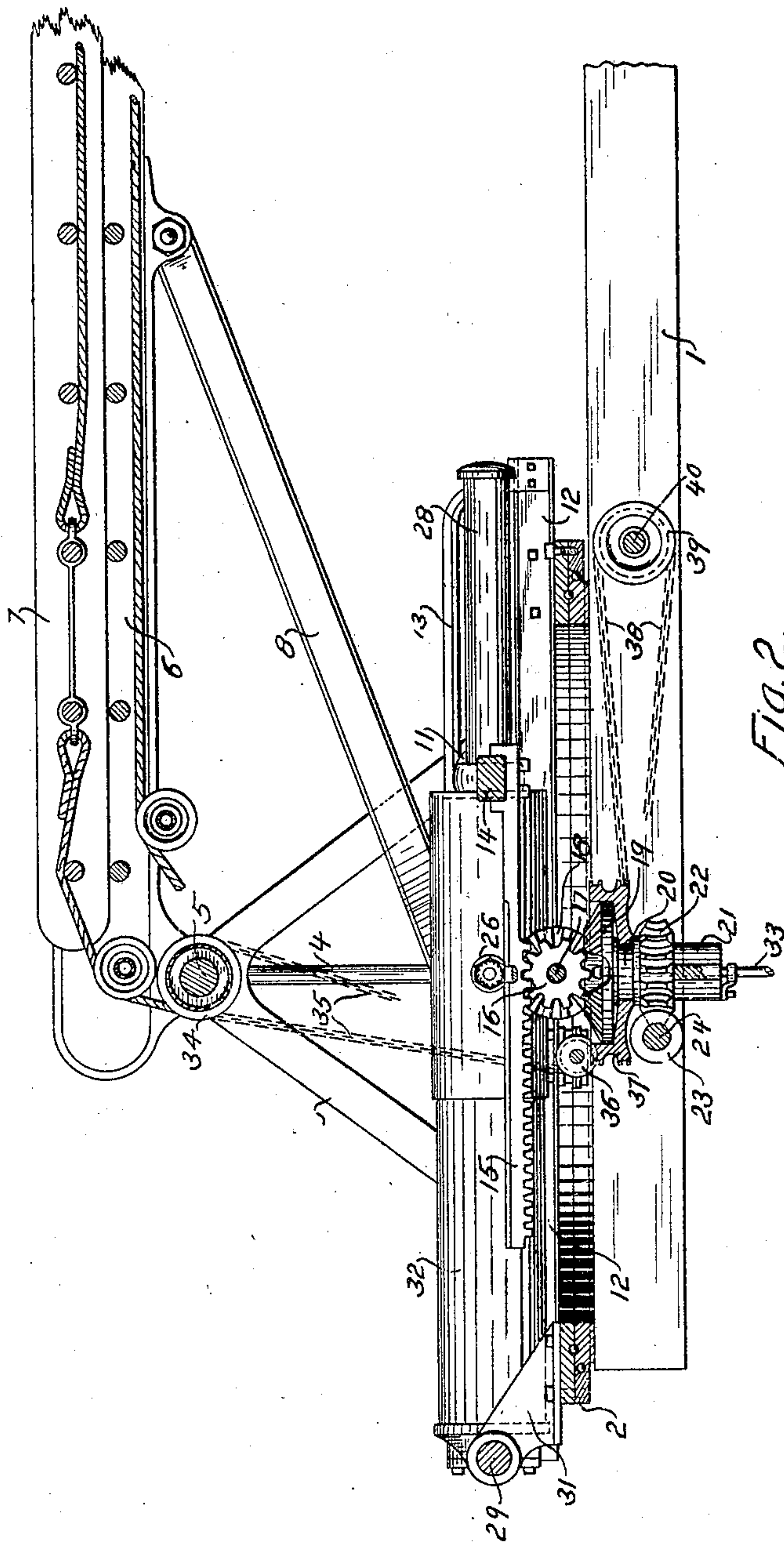


Fig. 2.

WITNESSES:

*L. V. Stockton*  
*J. H. O'Brien*

INVENTOR

*Joseph Riley*

BY

*Eugene Diven*  
ATTORNEY

No. 836,709.

PATENTED NOV. 27, 1906.

J. RILEY.  
AERIAL APPARATUS.  
APPLICATION FILED APR. 14, 1906.

3 SHEETS—SHEET 3.

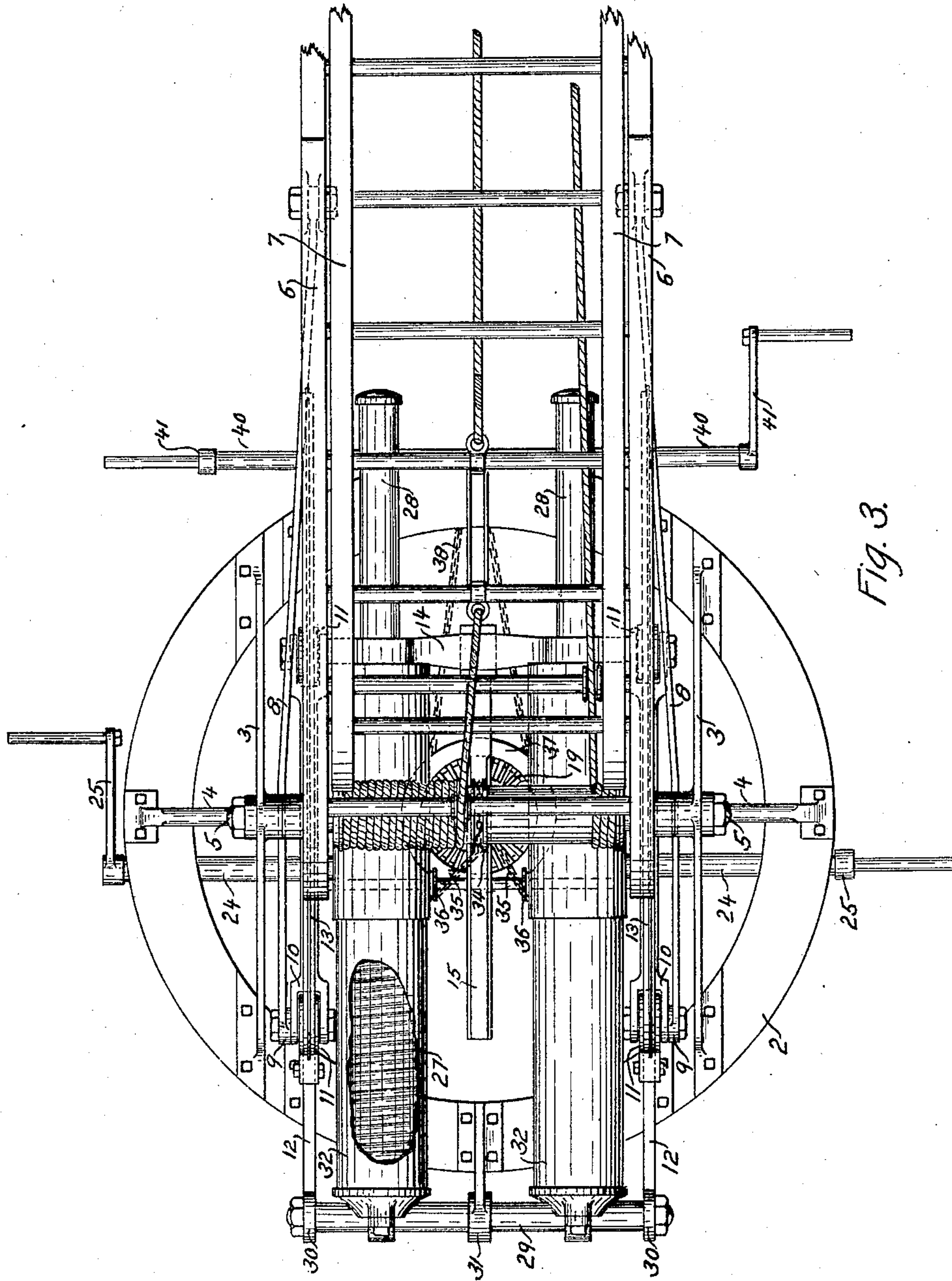


Fig. 3.

WITNESSES:

*L. V. Stoltz*  
*J. H. Orin*

INVENTOR

*Joseph Riley*  
BY  
*Eugene Owen*  
ATTORNEY



# UNITED STATES PATENT OFFICE.

JOSEPH RILEY, OF ELMIRA, NEW YORK.

## AERIAL APPARATUS.

No. 836,709.

Specification of Letters Patent.

Patented Nov. 27, 1906.

Application filed April 14, 1906. Serial No. 311,780.

*To all whom it may concern:*

Be it known that I, JOSEPH RILEY, a citizen of the United States, residing at Elmira, in the county of Chemung and State of New York, have invented certain new and useful Improvements in Aerial Apparatus, of which the following is a specification.

This invention relates to improvements in aerial apparatus intended more particularly for fire-fighting purposes, such as ladder-trucks, water-towers, and the like.

The object of my improvements is to so arrange the mechanism for elevating the pivotal member of the apparatus that it may be operated from a crank-shaft mounted transversely in the truck-frame below the turn-table, thereby avoiding any change of position on the part of those operating the cranks and permitting the cranks to be manipulated from the ground without the necessity of first detaching the horses from the apparatus.

A further object is to provide means for rotating the turn-table by the same crank-shaft which elevates the pivotal member; and a final object is to provide means for elevating the extension member from a crank-shaft, also mounted in the truck-frame and operated from the ground.

I attain my objects by constructing the pivotal member of the truck and elevating mechanism in the manner illustrated in the accompanying drawings, in which—

Figure 1 represents a side elevation of the forward portion of a ladder-truck with the wheels and running-gear omitted; Fig. 2, a vertical longitudinal section through the same; Fig. 3, a plan view thereof, and Fig. 4 a vertical longitudinal section through the center line of one of the telescoping housing-cylinders and counterbalancing-springs.

Like numerals designate like parts in the four views.

The main truck-frame consists of the usual pair of side sills or shears 1, which will be mounted upon suitable running-gear. Upon the forward end of the frame-shears is mounted the turn-table 2, which is also of ordinary construction. Rising from the movable member of the turn-table at each side of the truck are the inverted-V braces 3 and the side braces 4, which support at their upper ends the shaft 5, upon which the butt-ladder 6 is pivotally mounted. The extension or fly ladder 7 telescopes into the butt-ladder in the usual manner, and it will be under-

stood that in place of the butt and extension ladders I may also mount upon the pivot-shaft 5 the stand-pipe and extensions for a water-tower. This manner of mounting the pivotal member upon the turn-table is similar to that heretofore employed.

For elevating the pivotal member I run connecting-rods 8 from points on the pivotal member positioned a suitable distance from the pivot-shaft 5 to give the required leverage to pins 9, passing through the ends of the forked links 10, which are mounted upon rollers 11 in horizontal guideways, preferably formed by light I-bars 12 and inverted-T bars 13, secured to the top or movable member of the turn-table. The other ends of the links 10 are also mounted on rollers and are coupled to the cross-head 14, to which is secured a central longitudinal rack-bar 15, which meshes with a pinion 16, positioned at the center of the turn-table and attached to a transverse shaft 17, the ends of which shaft are mounted upon the guide-bars 12. Upon the shaft 17 at one side of the pinion 16 is a bevel-gear 18, which meshes with the bevel-gear 19, mounted upon a vertical shaft 20, the axis of which passes through the center of the turn-table. The lower end of the shaft 20 is mounted in a cross-bar 21, the ends of which are secured to the frame-shears 1.

At 22 the vertical shaft 20 is provided with a worm-wheel which is operated by worm 23, mounted upon the transverse shaft 24. Said shaft passes out at both sides of the truck through the shears 1 and is provided at each end with cranks 25, preferably set at an angle of ninety degrees to one another, the crank-shaft at each end being carried out sufficiently to permit the cranks to clear the turn-table and forward wheels of the truck.

The rack-bar is held in engagement with the pinion 16 by a roller 26, carried by a yoke mounted on shaft 17.

At each side, between the guides and the rack-bar, I provide coiled springs 27, which bear upon the cross-head 14 with sufficient force to counterbalance the weight of the pivotal and extension members. These springs are mounted upon horizontal fixed shafts 28, the rearward ends of which pass through the cross-head 14. At the front end of the truck the shafts 28 are attached to a cross-bar 29, supported upon brackets 30 and 31, mounted upon the ends of the guide-bars 12 and the upper member of the turn-



table, respectively. The forward ends of the springs 27 bear upon stationary heads formed upon the outer ends of the shafts 28, where they are secured to the cross-bar 29, and the 5 springs are protected and concealed by telescoping housing-cylinders 32.

To elevate the pivotal member, the shaft 24 will be turned by the cranks 25 in the proper direction to impart rotation to the 10 pinion 16 and throw the rack-bar 15 to the rear, the springs 27 assisting in this rearward motion of the rack-bar by overcoming the weight of the pivotal member and its attachments. As the cross-head 14 is moved to the 15 rear it imparts motion to the links 10, which in turn draw the lower ends of the links to the rear, thereby moving the pivotal member upward about the pivot-shaft 5. By reason of the worm-gear the rack-bar 15 will be held 20 locked in any position of the pivotal member, and no auxiliary locking device is therefore required to hold the pivotal member at any point in its arc of elevation.

When it is desired to move the turn-table 25 to throw the pivotal member around to either side of the truck, I provide means for locking the pinion 16 against rotation. This consists of a vertical lock-bar 33, passing upward through the center of the shaft 20 and actuated by any suitable means to throw the up- 30 per end of said lock-bar into engagement with the teeth on the pinion. When the pinion is so locked, it will be evident that the continued turning of the shaft 20 by the 35 worm-gear will impart motion to the turn-table, inasmuch as the bevel-gear 18 is locked against rotation and will therefore be carried around by the bevel-gear 19. When the turn-table is placed in any desired position, 40 it will be left in such position by simply dropping the lock-pin from engagement with the pinion 16, after which the pivotal member is left free to be further raised or lowered by the movement of the crank-shaft 24 in the 45 proper direction.

By properly proportioning the worm 23 to the worm-wheel 22 and the bevel-gear 19 to the bevel-gear 18 and pinion 17 the pivotal member may be elevated to extreme position 50 by a very few revolutions of the crank-shaft and with the exertion of very little power on the part of the operators, since the weight of the pivotal member is taken from the operating mechanism by means of the counterbalancing-springs 27.

To raise or lower the extension member, namely, the fly-ladder 7 in the truck as herein illustrated, I mount the operating-drum 34 upon the pivot-shaft 5, coupling said drum 60 to the fly-ladder by the usual arrangement of cables which run off and on at opposite ends of the drum as the fly-ladder is raised or lowered. At the center of the drum 34 I provide a sprocket-wheel, around which the 65 chain 35 passes to guide-rollers 36 and thence

to a double horizontal sprocket-wheel 37, loosely mounted upon the shaft 20, said sprocket-wheel 37 being coupled by chain 38 to the sprocket 39, carried by the transverse shaft 40, which is mounted in the frame- 70 shears 1 and provided with cranks 41 at each side thereof. By rotating the shaft 40 in one direction or the other the drum 34 will be rotated in the proper direction to raise or lower the fly-ladder. 75

By thus mounting the vertical shaft 20 in alinement with the center of the turn-table I am enabled to manipulate the pivotal member of the apparatus from the fixed crank-shaft 24, positioned below the turn-table, and 80 I am also enabled to employ said crank-shaft to both elevate the pivotal member and to operate the turn-table. By carrying the chain from the drum 34 to the idle sprocket 37 and driving said sprocket from the shaft 85 40 I am also enabled to elevate and depress the extension or fly member from the ground irrespective of the position of the turn-table. I thus remove all the operating-cranks from 90 above the turn-table and place them in fixed position, where they may be readily operated from the ground and without change of position on the part of the operators. The counterbalancing-springs 27 are mounted upon 95 the core-shafts 28, which maintain a fixed horizontal position regardless of the position of the pivotal member, the springs simply expanding and contracting in their horizontal position upon said shaft. The elevating force is therefore employed solely in elevat- 100 ing the pivotal member.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In an aerial apparatus, the combination of a pivotal member, a turn-table upon which 105 said member is mounted, a vertical shaft mounted in the frame of the apparatus with its axis coincident with the center of the turn-table, mechanism operated by said shaft to elevate and depress the pivotal member, a 110 crank-shaft transversely mounted in the frame of the apparatus below the turn-table and geared to the vertical shaft, and cranks on said shaft at each side of the apparatus.

2. In an aerial apparatus, the combination 115 of a pivotal member, a turn-table upon which said member is mounted, a vertical shaft mounted in the frame of the apparatus with its axis coincident with the center of the turn-table, mechanism operated by said shaft 120 to elevate and depress the pivotal member, an operating-shaft mounted in fixed position in the frame of the apparatus below the turn-table, and a worm on said shaft in gear with a worm-wheel on the vertical shaft. 125

3. In an aerial apparatus, the combination of a pivotal member, a turn-table upon which 130 said member is mounted, a vertical shaft mounted in the frame of the apparatus with its axis coincident with the center of the turn-



table, mechanism operated by said shaft to elevate and depress the pivotal member, means whereby said shaft may also be utilized to rotate the turn-table, and an operating-shaft mounted in fixed position in the frame of the apparatus below the turn-table and geared to the vertical shaft.

4. In an aerial apparatus, the combination of a pivotal member, a turn-table upon which said member is mounted, a vertical shaft mounted in the frame of the apparatus with its axis coincident with the center of the turn-table, a horizontal shaft mounted on the turn-table with its axis intersecting that of the vertical shaft, bevel-gear by which motion is imparted from one shaft to the other, mechanism operated by the horizontal shaft to elevate and depress the pivotal member, means for locking the horizontal shaft against rotation when the turn-table is to be rotated, and an operating-shaft mounted in fixed position in the frame of the apparatus below the turn-table and geared to the vertical shaft.

5. In an aerial apparatus, the combination of a pivotal member, a turn-table upon which said member is mounted, a vertical shaft mounted in the frame of the apparatus with its axis coincident with the center of the turn-table, a horizontal shaft mounted on the turn-table with its axis intersecting that of the vertical shaft, bevel-gear by which motion is imparted from one shaft to the other, a pinion on the horizontal shaft in alignment with the vertical shaft, mechanism operated by said pinion to elevate and depress the pivotal member, a lock-pin passing up through the vertical shaft to engage the teeth of said pinion when the turn-table is to be rotated, and means for imparting motion in either direction to the vertical shaft.

6. In an aerial apparatus, the combination of a pivotal member, a cross-head mounted to slide in fixed guideways below the pivotal member, links coupled to the ends of the cross-head and having their free ends mounted to slide in said guideways, connecting-rods extending from the free ends of the links to the pivotal member beyond its pivotal axis, and means for imparting motion to the cross-head to elevate and depress the pivotal member.

7. In an aerial apparatus, the combination of a pivotal member, a turn-table upon which said member is mounted, longitudinal guideways mounted upon the turn-table below the pivotal member, a cross-head having its ends riding in said guideways at one side of a line dropped from the pivotal axis, links coupled to the ends of the cross-heads with their free ends also riding in the guideways and

positioned at the other side of said line when the pivotal member is depressed, connecting-rods coupled to the free ends of the links and to the pivotal member beyond its pivotal axis on the same side of said line as the cross-head, and means for imparting motion to the cross-head to elevate and depress the pivotal member.

8. In an aerial apparatus, the combination of a pivotal member, a turn-table upon which said member is mounted, longitudinal guideways mounted upon the turn-table, a cross-head having its ends riding in said guideways, means for imparting motion from the cross-head to the pivotal member to elevate and depress it, a longitudinal rack-bar attached to the cross-head at its center, a transverse shaft mounted on the turn-table and carrying a pinion at the center of the turn-table in mesh with the rack-bar, a vertical shaft mounted in the frame of the apparatus with its axis coincident with the center of the turn-table, bevel-gear between said shaft and the transverse shaft, and means for imparting motion in either direction to the vertical shaft to actuate the cross-head.

9. In an aerial apparatus, the combination of a pivotal member, a turn-table upon which said member is mounted, an extension member carried by the pivotal member, a drum and cable by which the extension member is operated, said drum being mounted above the turn-table, an operating-shaft mounted in the frame of the apparatus below the turn-table, and means for imparting motion to the drum from the operating-shaft regardless of the position of the turn-table.

10. In an aerial apparatus, the combination of a pivotal member, a turn-table upon which said member is mounted, an extension member carried by the pivotal member, a drum and cable by which the extension member is operated, said drum being mounted on fixed bearings above and rotating with the turn-table, a double sprocket-wheel mounted on a vertical shaft below the turn-table, the axis of which coincides with the center of the turn-table, a chain passing around a sprocket-wheel on the drum and over guides carried by the turn-table to the double sprocket-wheel, a transverse crank-shaft mounted in the frame of the apparatus, and a second chain passing from the double sprocket-wheel to a sprocket-wheel carried by said shaft.

In testimony whereof I have affixed my signature in presence of two witnesses.

JOSEPH RILEY.

Witnesses:

J. H. O'BRIEN,  
L. V. STOELTZLEN.