No. 756,169. PATENTED MAR. 29, 1904.

J. KAISER.

AERIAL APPARATUS.

APPLICATION FILED MAY 26, 1902.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

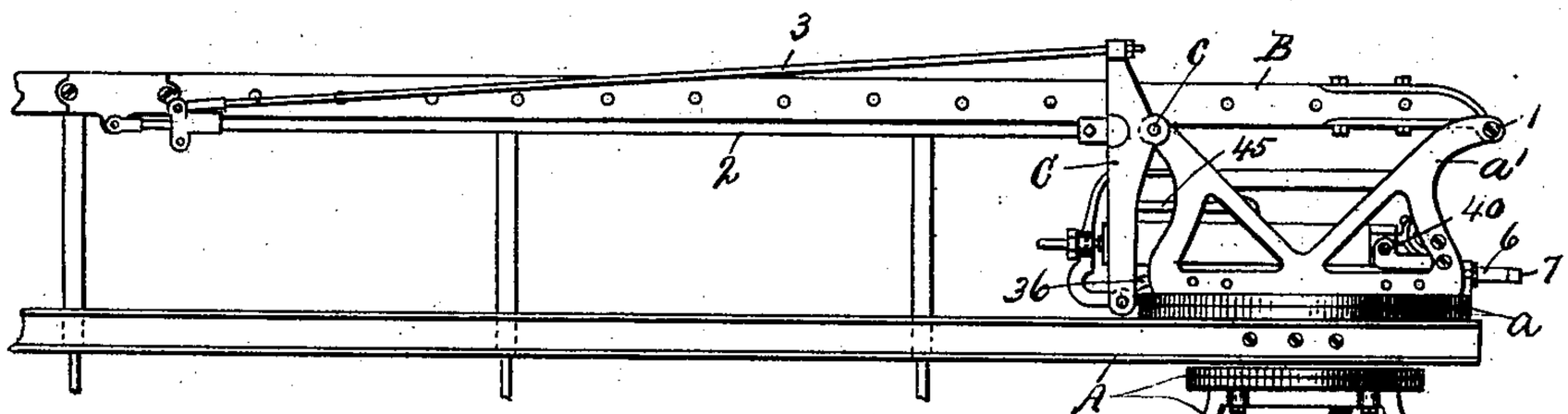


Fig. 2.

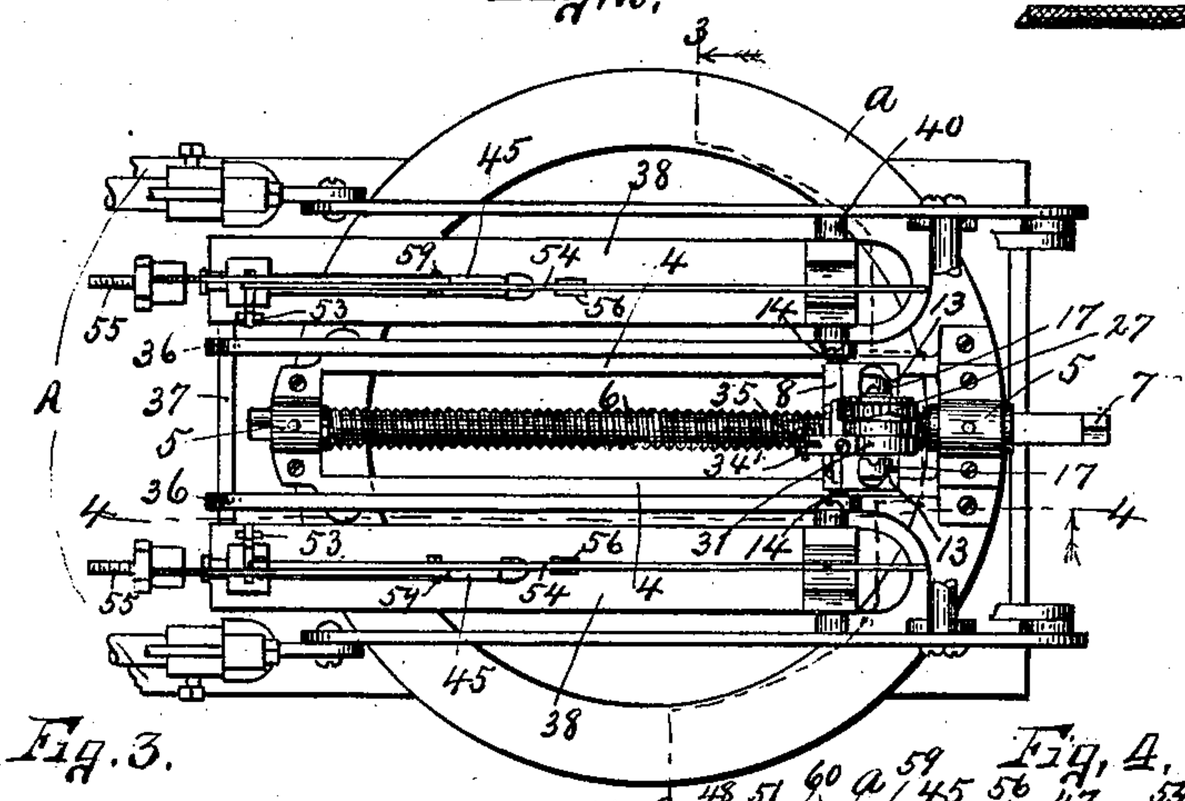


Fig. 3.

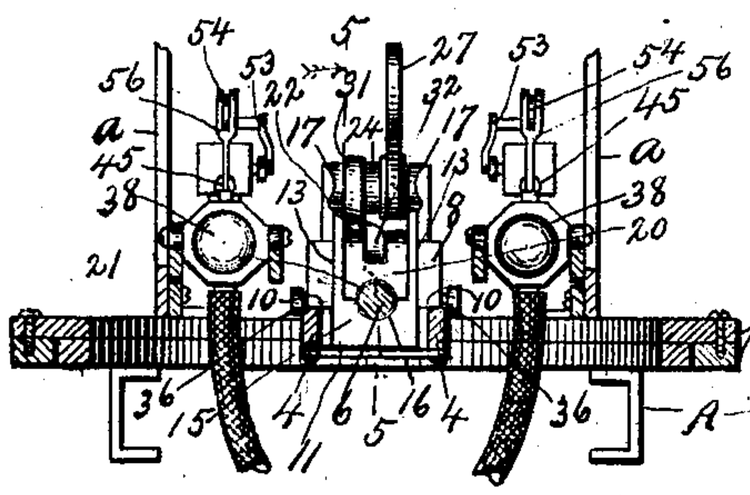


Fig. 4.

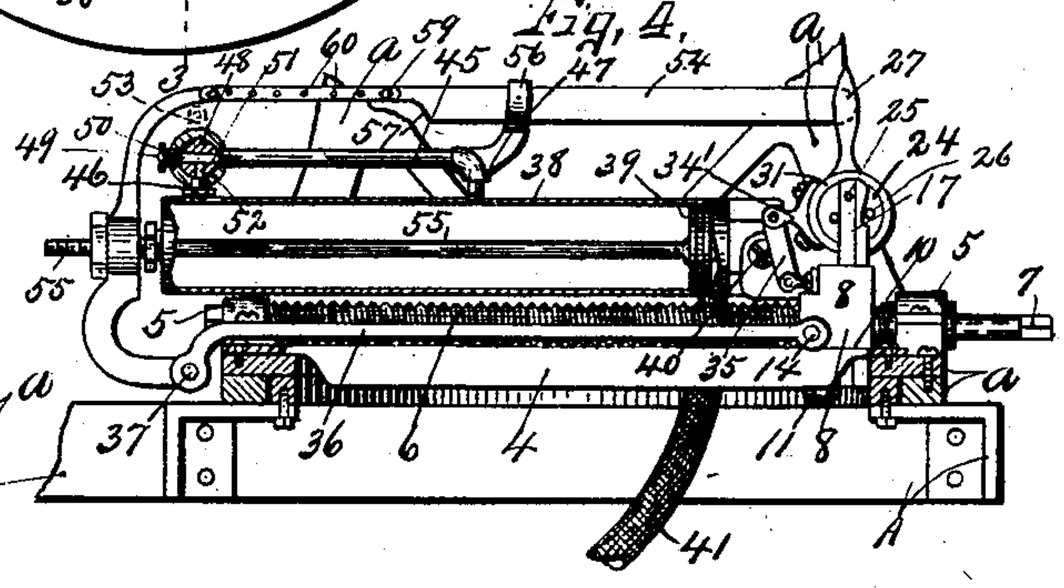
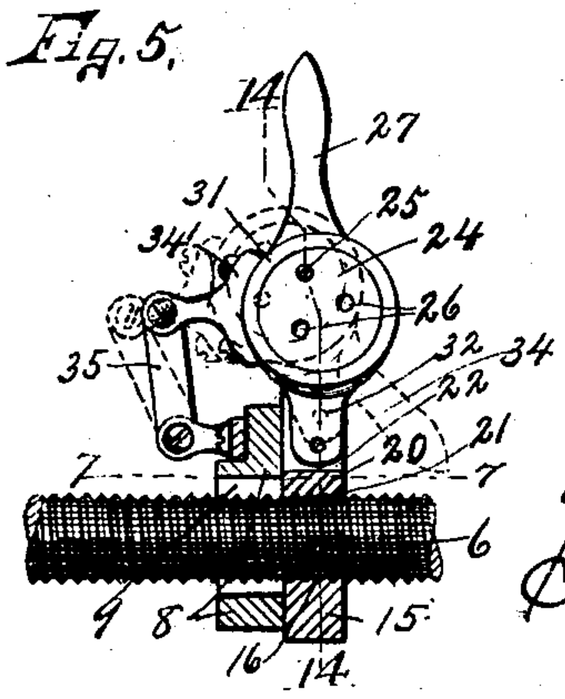


Fig. 5.



WITNESSES:
F. E. Arthur
H. E. Chase,

INVENTOR
John Kaiser.
BY
Smith & Bruson
ATTORNEYS.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 6.

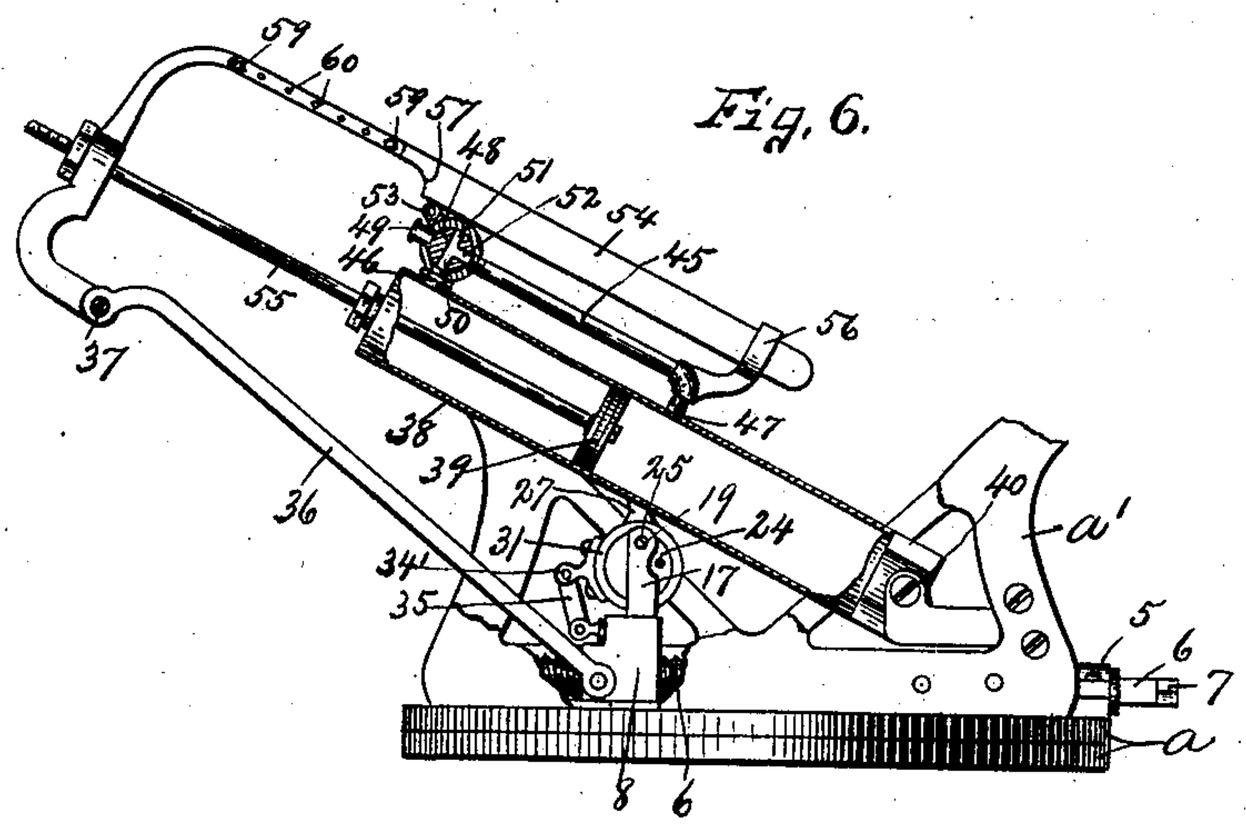


Fig. 8.

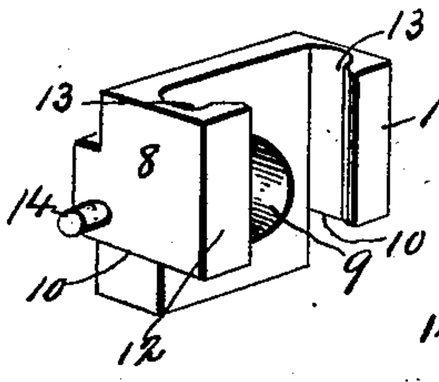


Fig. 14.

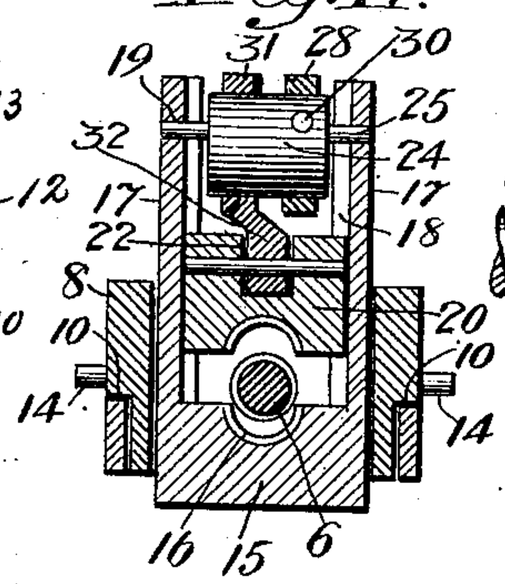


Fig. 7.

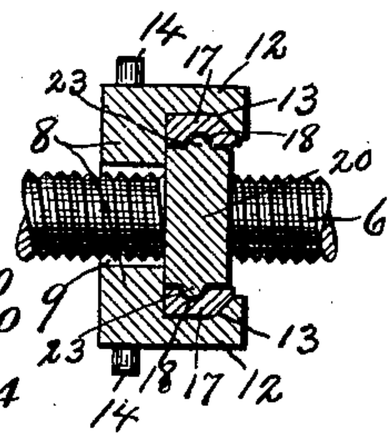


Fig. 9.

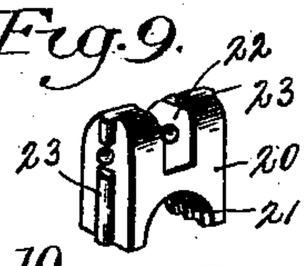


Fig. 10.

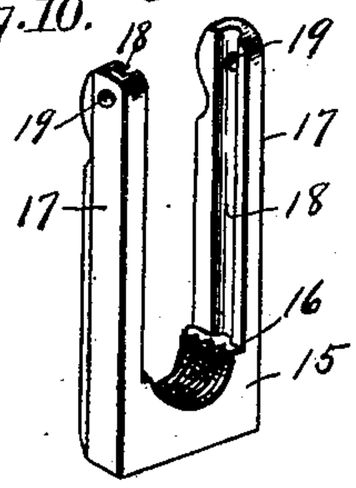


Fig. 11.

Fig. 12.

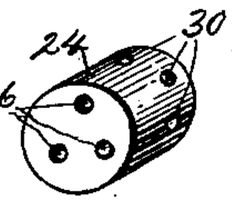
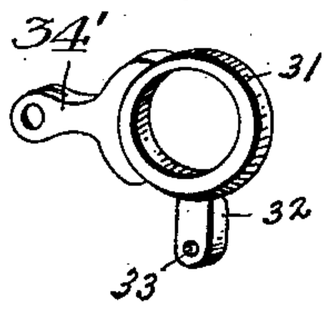


Fig. 13.



WITNESSES:
F. C. Arthur.
H. E. Chase.

INVENTOR
John Kaiser,
BY
Smith & Dueson
ATTORNEYS.

No. 756,169. Patented March 29, 1904.

UNITED STATES PATENT OFFICE.

JOHN KAISER, OF SENECA FALLS, NEW YORK.

AERIAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 756,169, dated March 29, 1904.

Application filed May 26, 1902. Serial No. 109,022. (No model.)

To all whom it may concern:

Be it known that I, JOHN KAISER, of Seneca Falls, in the county of Seneca, in the State of New York, have invented new and useful Improvements in Aerial Apparatus, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to improvements in aerial apparatus, relating more particularly to the means for raising and lowering a fire-ladder, water-tower, or other aerial device; and it consists of certain improvements upon the apparatus as set forth in my former patent, No. 645,645, of March 20, 1900.

The object of my invention is to produce a simple and practical means whereby the ladder, tower, or other device may be more speedily raised and lowered to any desired position and automatically locked in such position and at the same time permitting the aerial device to be raised and lowered gradually, if desired, by a screw and laterally-movable sections or jaws of a sectional nut mounted in a suitable casing or frame.

Referring to the drawings, Figure 1 is a side elevation of a portion of a hook-and-ladder truck, showing particularly the turn-table and a portion of the ladder mounted thereon, the ladder being shown in its normal position. Fig. 2 is a top plan view of the turn-table and the adjacent portions of the frame and superimposed ladder and lifting mechanism. Figs. 3, 4, and 5 are sectional views taken, respectively, on lines 3 3 and 4 4, Fig. 2, and 5 5, Fig. 3. Fig. 6 is a side elevation, partly in section, of the detached lifting mechanism and the adjacent portion of its support, the oscillatory cylinder being shown as partially elevated. Fig. 7 is a sectional view taken on line 7 7, Fig. 5. Figs. 8, 9, 10, 11, 12, and 13 are perspective views showing, respectively, the detached sliding block, the upper and lower movable jaws for engaging the screw, the hand-piece and the cam for operating the movable jaws, and the detached link connection between the cam and one of said jaws. Fig. 14 is a sectional view taken on line 14 14, Fig. 5.

Similar reference characters indicate corresponding parts in all the views.

A represents a portion of the frame of the truck of a hook-and-ladder apparatus, which is provided with a suitable turn-table *a*, the upper section of which is provided with upright braces or standards *a'*.

B represents a ladder pivoted to the forward end of the upright standards *a'*, and C is a suitable lever pivoted at *c* to the rear ends of the standards and connected by braces or tie-rods 2 and 3 to the intermediate portion of the ladder B, all of which parts are substantially the same as described and claimed in my former patent and it is thought unnecessary to further describe in this application.

Secured to the upper section of the turn-table *a* is a suitable frame provided with substantially parallel ways or guide-bars 4 and having its opposite ends provided with bearings 5, in which is journaled a rotary screw 6, having one end provided with suitable shoulders or collars engaged with the opposite end faces of one of the bearings for preventing endwise movement of the screw. This screw 6 is arranged substantially midway between and parallel with the ways 4, and is provided at one end with an angular shank 7, which may be engaged by a suitable crank or other handpiece. (Not illustrated.)

Mounted upon the ways 4 and movable lengthwise thereof is a sliding head-block or casing 8, having an aperture 9 for receiving the screw 6, said sliding block or casing being provided with shoulders 10, resting upon the top face of the ways 4, the lower portion of said block being extended downwardly between the ways and provided with a detachable plate 11, having its opposite ends extending laterally beneath the ways 4 and adapted to engage the lower face of said ways for holding the sliding block in its operative position relatively to the ways 4. This sliding block or casing 8 is also provided with forwardly-projecting wings 12, having substantially vertical ways or guides 13 for receiving a reciprocally-movable clamping-jaw, presently described, and is formed with laterally-projecting trunnions 14 for receiving suitable links, also presently described, which connect the sliding block to the rock arm or lever C, presently described. This sliding block 8 is mov-

able lengthwise of the screw 6 independently of said screw, the aperture 9 being of greater diameter than the diameter of the screw for permitting said block to move freely along the ways 4 between the bearings 5 at the opposite ends of said screw. Mounted in the vertical ways 13 of the casing 8 is a separable nut, having a reciprocally-movable jaw 15, formed with a threaded engaging face 16 and oppositely-arranged upwardly-extending arms 17, which are formed with lengthwise grooves or guides 18, extending downwardly from their upper end faces. The threaded portion 16 of the jaw 15 is movable into and out of engagement with the lower face of the screw 6, and the arms 17 extend upwardly on opposite sides of the said screw and usually above the upper end of the sliding block 8, said arms being provided at their upper ends with suitable apertures 19 for receiving an eccentric operating member, presently described.

Movable in the casing 8, and preferably guided in grooves or ways 18 of the upright arm 17, is a second jaw 20, forming the other half of the separable nut and having its lower end provided with a threaded engaging face 21, adapted to engage the upper surface of the screw, and its upper end formed with a recess 22 for receiving one end of a suitable link, presently described, the opposite lateral faces of said upper jaw being provided with ribs 23, which enter the grooves 18 of the arms 17 and serve to guide the jaw 20 in its reciprocal movement toward and away from the upper surface of the screw.

The eccentric operating member previously mentioned preferably consists of a cylindrical drum 24, which is eccentrically supported in the apertures 19 of the arms 17 of the lower jaw by a pin 25, said eccentric cylinder or drum being provided with two or more eccentric apertures 26, either of which is adapted to receive the pin 25, said apertures 26 being of varying distances from the center of the cylinder in order that the throw of the cam may be varied as may be desired. I usually provide this eccentric drum with a suitable handpiece 27, which is provided with an eye 28, adapted to receive the drum 24, and is secured to said drum by a suitable set-screw 29, said cylinder being provided with two or more threaded peripheral apertures 30, either of which is adapted to receive the inner end of the set-screw for permitting peripheral adjustment of the handpiece 27 upon the eccentric 24. Loosely mounted or journaled upon the periphery of the eccentric 24 is an annular ring 31, which is provided with a depending arm 32, arranged in the recess 22 of said upper jaw, said arm being formed with an aperture 33 for receiving a pin 34, mounted in the apertures of the jaws 20. This annular ring 31 and its depending arm 32 form the link connection previously mentioned between the eccentric operating member, as the drum 24 and the upper jaw 20, for moving the jaws in opposite directions into and out of engagement with the screw 6. This annular ring 31 is also provided with a peripheral lug 34′, which is connected by a link 35 to a similar lug secured to the sliding block 8 and preferably projecting rearwardly therefrom to afford ample clearance for the eccentric drum 24 and parts connected thereto.

It is evident from the foregoing description that the jaws 15 and 20 are eccentrically connected to the drum 24, the jaw 15 being pivotally connected to the drum 24 at one side of its center by a pin 25, upon which the drum is adapted to rotate with an eccentric or cam movement, and the ring 31 being connected to the other jaw and loosely mounted upon the periphery of the drum 24 and flexibly connected to the sliding block 8. It is evident that as said cam is rotated upon the pin 25 the jaws 15 and 20 will be simultaneously moved into or out of engagement with the opposite faces of the screw 6 and that when said jaws are moved out of engagement with the screw the sliding block 8 and the mechanism carried thereby may be moved freely lengthwise of the screw along the ways 4 independently of the rotary movement of said screw. This is a particularly important feature of my invention, for the reason that it enables the operator to speedily elevate or lower the aerial device by hand or by any other desired means, preferably by a piston actuated by compressed air, as set forth in my former application referred to. It is also apparent that when the ladder or other device is moved approximately to the desired position the jaws may be operated by the handpiece 27 to engage the screw for holding the sliding block and the ladder connected thereto in its adjusted position, and, if desired, to move the ladder carefully toward a building or to adjust the same to any particular angle, the screw may be readily rotated for moving the sliding block and the ladder connected thereto without fear of disengagement of the jaws from the screw, since said jaws form substantially a solid nut when the cam is forced to its operative position, as seen in Fig. 5.

The means for connecting the sliding block 8 to the rock-arm C preferably consists of a link 36, having its forward ends provided with eyes for receiving the trunnions 14 and their rear ends also formed with eyes for receiving a transverse rod 37, which in turn is connected to the lower ends of the rock arms or levers C, it being understood that the upper ends of said rock arms or levers are connected to the ladder by the rods 2 and 3, previously mentioned. It is therefore apparent that as the sliding block 8 is moved rearwardly and forwardly along the ways 4 the ladder B will be raised or lowered, and, as set forth in my former patent, I usually employ a cylinder 38 and a piston 39, movable in said cylinder and actuated by the compressed air or other fluid for

the purpose of speedily elevating the ladder or other aerial device a limited distance, said piston being connected to the bell-crank lever C for effecting the movement of the ladder or other device. This cylinder is pivoted at one end at 40 to the supporting-frame of the truck, or rather to the upper section of the turn-table *a*, and its opposite end is movable vertically at any desired angle, as seen in Fig. 6.

It has been found that, during the process of elevating the ladder by means of the compressed air acting upon the piston, when the piston had approached the limit of its movement, particularly when the ladder was extended to its full length, there was more or less vibration to the ladder, caused by the sudden stoppage of the piston, and that the incidental strain upon the moving parts of the apparatus might prove to be detrimental to the machine in the hands of a careless or inexperienced operator. I have therefore provided means controlled by the moving piston for introducing compressed air into the cylinders in advance of the outwardly-moving piston, between the piston and the outer end wall of the cylinder, in order to form a compressed-air cushion for said piston as the same reaches the limit of its outward movement.

As seen in the drawings, the compressed air is admitted at the front ends of the chamber or cylinder 38 through a pipe or conduit 41, which may be connected to a compressed-air reservoir, similar to the one seen in my former patent, but unnecessary to herein illustrate or describe, as any means may be employed for forcing compressed air through the conduit 41 into the pivoted end of the cylinder 38. This means for introducing the compressed air into the cylinder in advance of the outwardly-moving piston preferably consists of a conduit 45, having one end 46 communicating with the piston-chamber in proximity to its outer or free end, and its other end 47 communicating with the intermediate portion of the piston-chamber, said conduit being provided with a valve 48 and a vent-opening 49, the valve 48 being provided with branch passages 50, 51, and 52 and a rock-arm 53, secured to the valve for rocking the same within its valve-chamber, the branch passages 50 and 51 being normally alined with the conduit 45 and vent-opening 49 for connecting said conduit to the vent-opening when the piston is in its normal or innermost position and during the movement of the piston a limited distance outwardly, thus serving as a vent for the air in advance of the piston in its outward movement, it being understood that as the piston moves outwardly the air in advance of the piston will be forced through the ends of the conduit 46 and 47 and through the passages 50, 51, and 52, as seen in Fig. 4, for relieving the pressure in advance of the piston.

In order to introduce compressed air through the conduit 45 and inlet-opening 46 when the piston has reached a predetermined position in its outward movement, I provide a suitable operating member 54, having one end connected to the piston-rod 55 of the piston and its other end movable in a suitable bracket 56, the intermediate portion of said operating member being provided with a shoulder 57, which is arranged to engage the free end of the rock-arm 53 as the operating member is drawn outwardly by the piston for rocking the valve 48 and registering the passages 50 and 52, respectively, with the inlet-opening 46 and the adjacent portion of the conduit 45, as seen in Fig. 6, and it is thus evident that as the piston has passed beyond the inner end 47 of the conduit 45 and the shoulder 57 has rocked the valve, as just described, the compressed air will readily pass outwardly through the end 47 into the conduit 45 and thence through the passages 52 and 50 through the inlet-opening 46 and into the cylinder in advance of the piston, thus forming the compressed-air cushion in front of the piston and cutting off the vent or the passage of the air through the vent 49. In order that I may be enabled to introduce the compressed air in advance of the piston at any time after the piston has passed beyond the forward end 47 of the conduit 45, I preferably make the operating member 54 in sections, one being adjusted lengthwise of the other and secured to each other by suitable clamping-bolts 59. These sections of the operating member are preferably lapped one upon the other at the rear of the shoulder 57 and are each provided with a series of apertures 60, which are adapted to receive the clamping-bolts 59, it being understood that when desired to adjust the shoulder 57 in relation to the outer end of the piston-rod 55 it is simply necessary to remove the bolts 59 and to slide the forward section of the operating member forwardly in the bracket 56 and then to reinsert the bolts in alined apertures of the sections. This feature which has just been described is another important element in my invention, and serves to reduce the jar and vibration of the aerial device during the process of elevating the same.

In the operation of my invention when it is desired to elevate the ladder or other aerial device the jaws 15 and 20 are forced out of engagement with the screw 6 by means of the cam 24 and operating-lever 27. The compressed air is then introduced into the pivoted end of the cylinder 38 through the conduit 41, whereupon the piston is forced outwardly by compressed air until it passes the outlet 47, and at the same time the sliding block is also drawn forwardly and the ladder B is rocked upwardly upon its pivot 1 by means of the bell-crank or lever C, which is connected to the link 36 and also to the piston-rod 55. When the compressed air has moved the piston beyond the end 47 of the conduit 45 and

the shoulder 57 has rocked the valve 48 to the position seen in Fig. 6, the compressed air is diverted from the piston-chamber through the conduit 45 in advance of the piston, thereby forming an air-cushion for the purpose previously specified.

If it is desired to move the ladder or other device still higher or to lower the same, the jaws 15 and 20 may be forced into engagement with the screw 6 and the screw may then be rotated to effect the further movement of the ladder.

The operation of my invention will now be readily understood upon reference to the foregoing description and the accompanying drawings, and it will be noted that the essential features of my invention consist in connecting the piston to a sliding block having jaws movable into and out of engagement with the screw and also providing means for automatically introducing compressed air into the cylinder when the piston has reached a predetermined position within said cylinder during its outward movement.

It will be evident that some change may be made in the detail construction and arrangement of the component parts of my invention without departing from the spirit thereof. Therefore I do not limit myself to the precise construction and arrangement as shown and described.

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

1. A lifting device for aerial apparatus comprising a support, a rotary screw, and a sliding block connected to the apparatus and movable lengthwise of the screw independently thereof, a movable threaded jaw carried by the block and a rotary drum carried by the block and connected to the jaw for forcing said jaw into and out of engagement with the screw.

2. The combination with a support and an aerial apparatus mounted thereon, of a rotary screw, a sliding block movable lengthwise of the screw and connected to the apparatus for actuating the same, movable threaded jaws carried by the block, and a drum also carried by the block and eccentrically connected to the jaws for simultaneously forcing the jaws into or out of engagement with the screw.

3. The combination with an aerial apparatus and a support carrying a rotary screw and parallel ways, of a sliding block guided on the ways and connected to the apparatus for transmitting motion thereto, a clamping-jaw mounted on the block and movable into and out of engagement with the screw, and a second jaw mounted on the former jaw and also movable into and out of engagement with the screw, and means flexibly connected to the block and to the jaws for simultaneously forcing said jaws into or out of engagement with the screw.

4. The combination with an aerial apparatus and a support carrying a rotary screw and parallel ways, of a sliding block guided on the ways and connected to the apparatus for the purpose described, clamping-jaws carried by the block, a drum eccentrically pivoted to one of the jaws, and a ring encircling the drum and connected to the other jaw, and means for rotating the drum.

5. The combination with an aerial apparatus and a support carrying a rotary screw and parallel ways, of a sliding block guided on the ways and connected to the apparatus for the purpose described, clamping-jaws carried by the block, a drum eccentrically pivoted to one of the jaws, and a ring encircling the drum and connected to the other jaw and to the sliding block, and a handpiece secured to the drum for actuating the same.

6. The combination with a support and an aerial apparatus mounted thereon, of a rotary screw, a sliding block movable lengthwise of the screw and connected to the apparatus for actuating the same, movable threaded jaws carried by the block, and a drum also carried by the block and eccentrically connected to the jaws for simultaneously forcing the jaws into or out of engagement with the screw, and a handpiece adjustably secured to the drum for rocking the same.

7. The combination with a support and an aerial apparatus mounted thereon, of a rotary screw, a sliding block movable lengthwise of the screw and connected to the apparatus for actuating the same, movable threaded jaws carried by the block, and a drum having a plurality of apertures arranged at varying distances from its center either of which is adapted to receive a pin secured to one of the jaws, said drum being eccentrically connected to the other jaw.

8. A lifting device for aerial apparatus comprising a support, a rotary screw, a sliding block connected to the apparatus and movable lengthwise of the screw independently thereof, said block being provided with upright ways, a jaw mounted in the ways and provided with guides, a second jaw movably mounted in said guides, a rocking drum eccentrically connected to said jaws for moving the same into or out of engagement with the screw, and a handpiece for actuating said drum.

In witness whereof I have hereunto set my hand this 19th day of May, 1902.

JOHN KAISER.

Witnesses:
H. E. CHASE,
MILDRED M. NOTT.