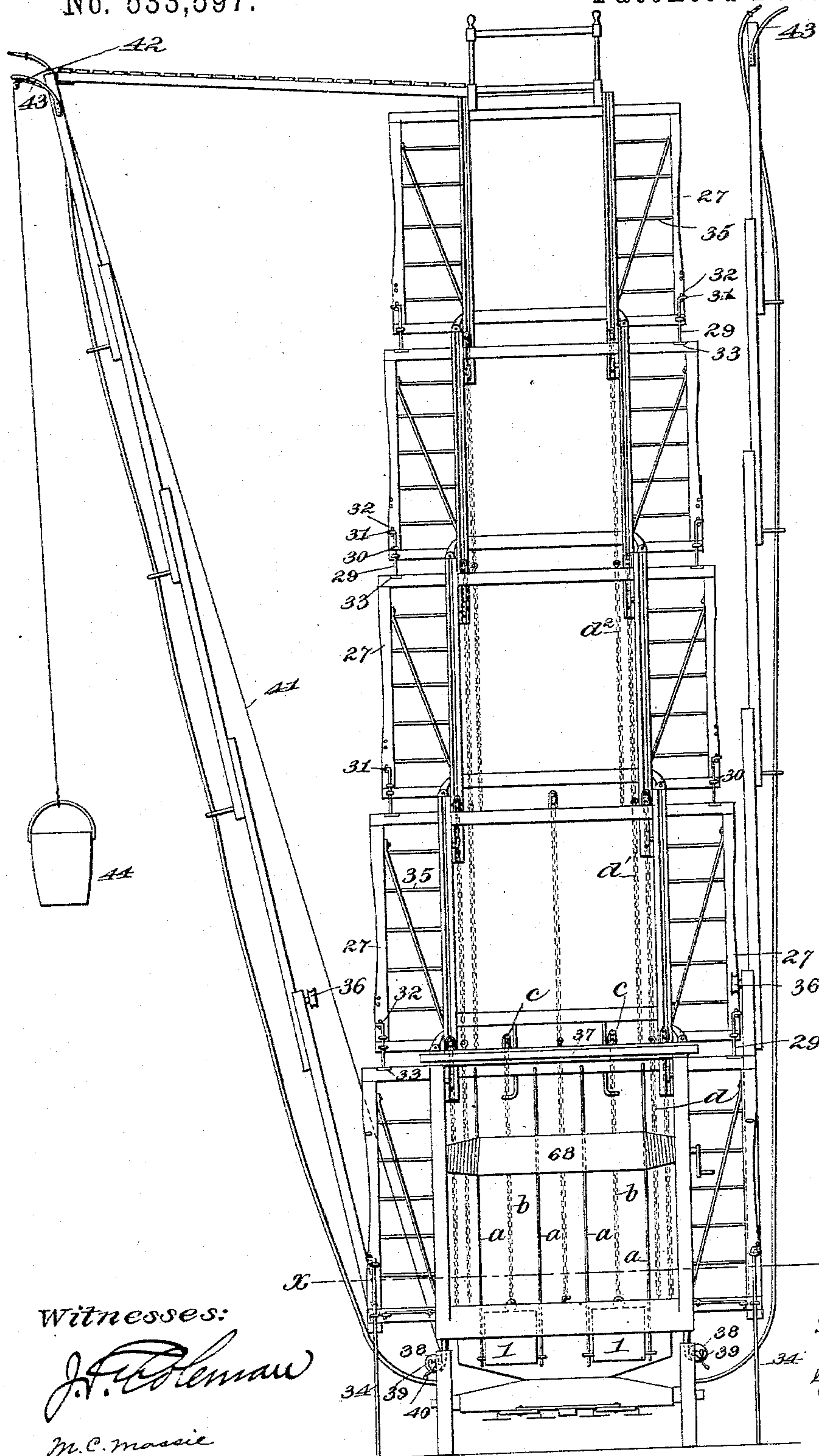


4 Sheets—Sheet I.

No. 533,597.

Patented Feb. 5, 1895.



*Fig. 1*

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(No Model.)

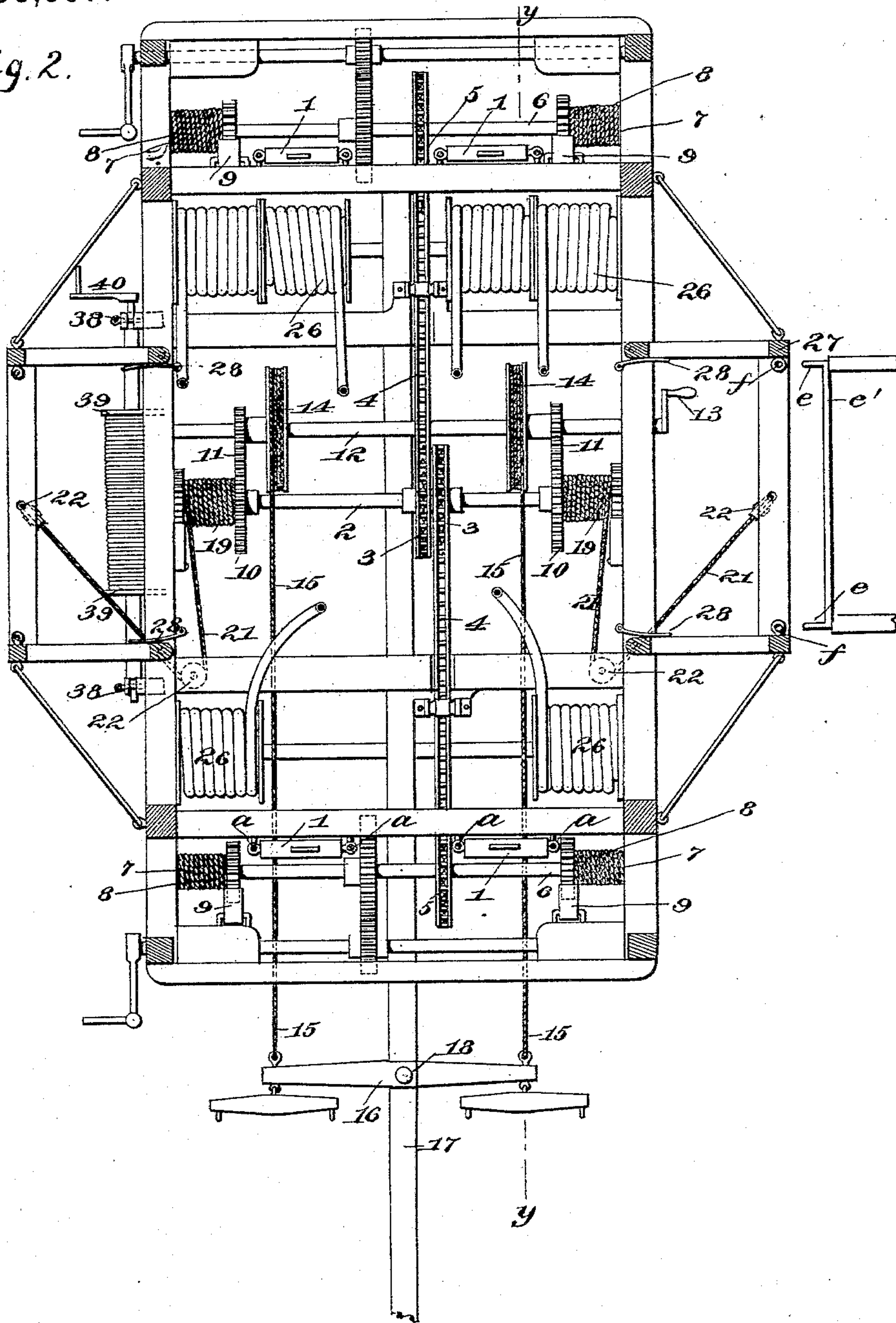
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COMBINED WATER TOWER AND FIRE ESCAPE.

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Fig. 2.



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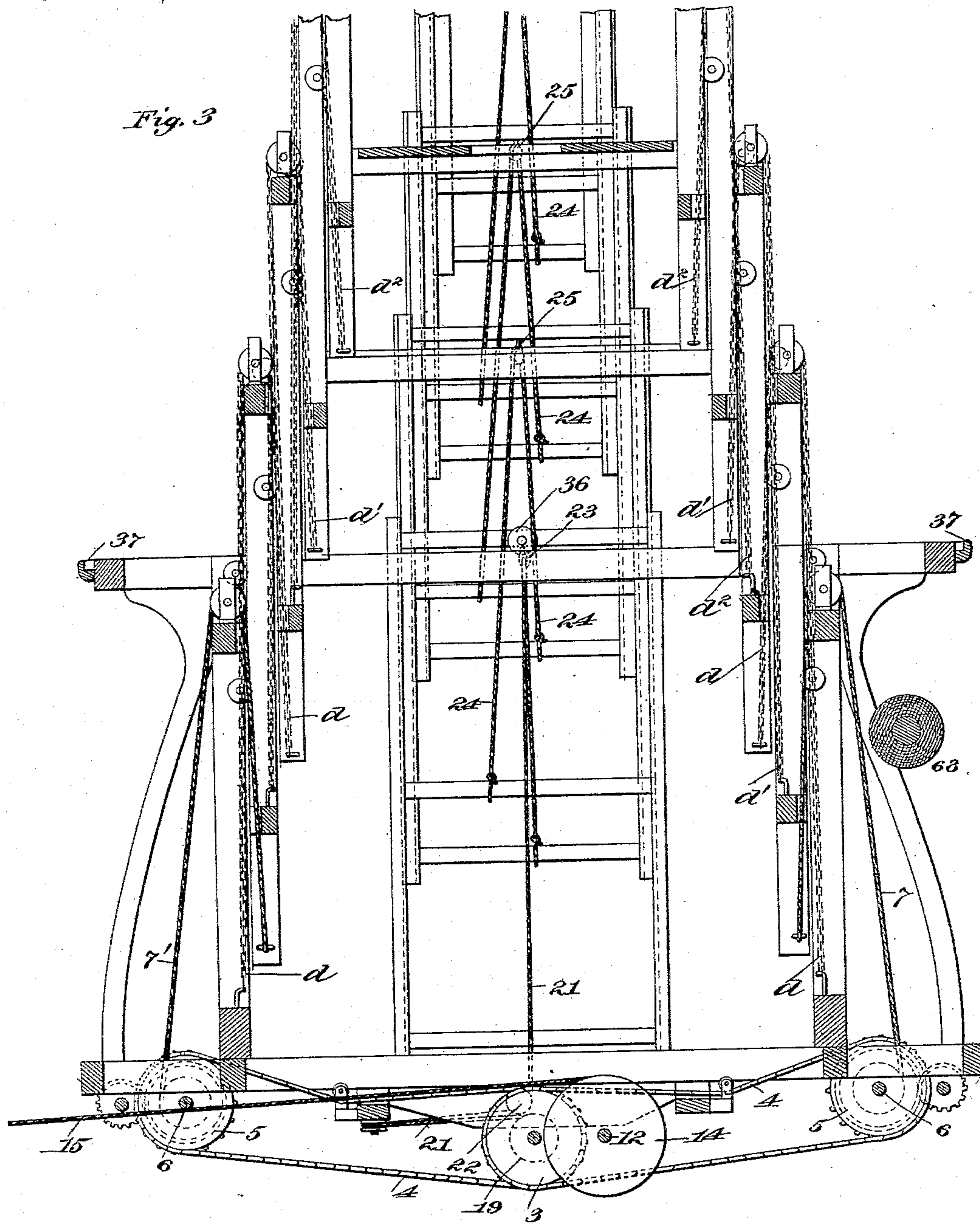
(No Model.)

4 Sheets—Sheet 3.

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COMBINED WATER TOWER AND FIRE ESCAPE.

No. 533,597.

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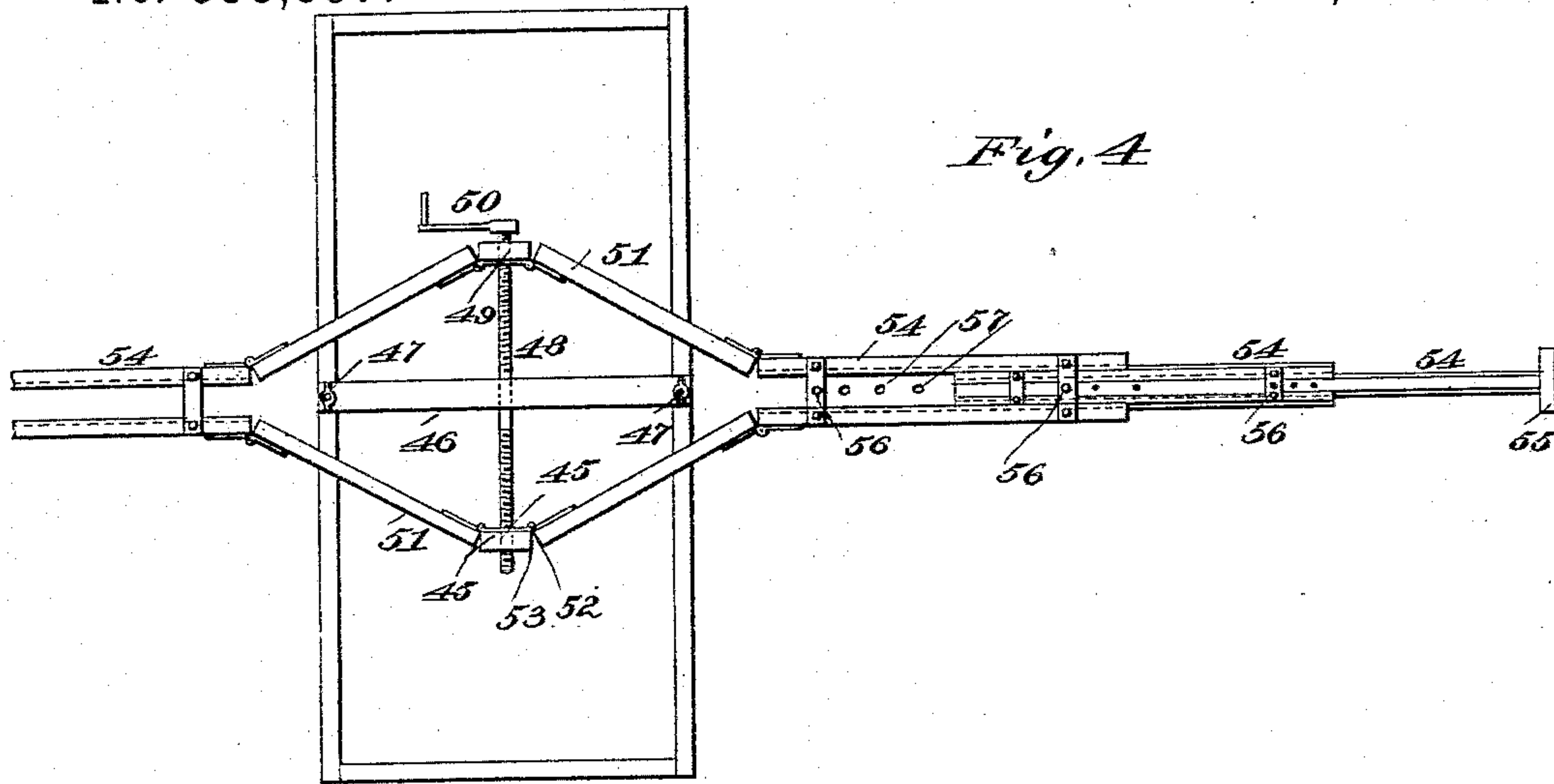
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F. M. C. HUGHES.

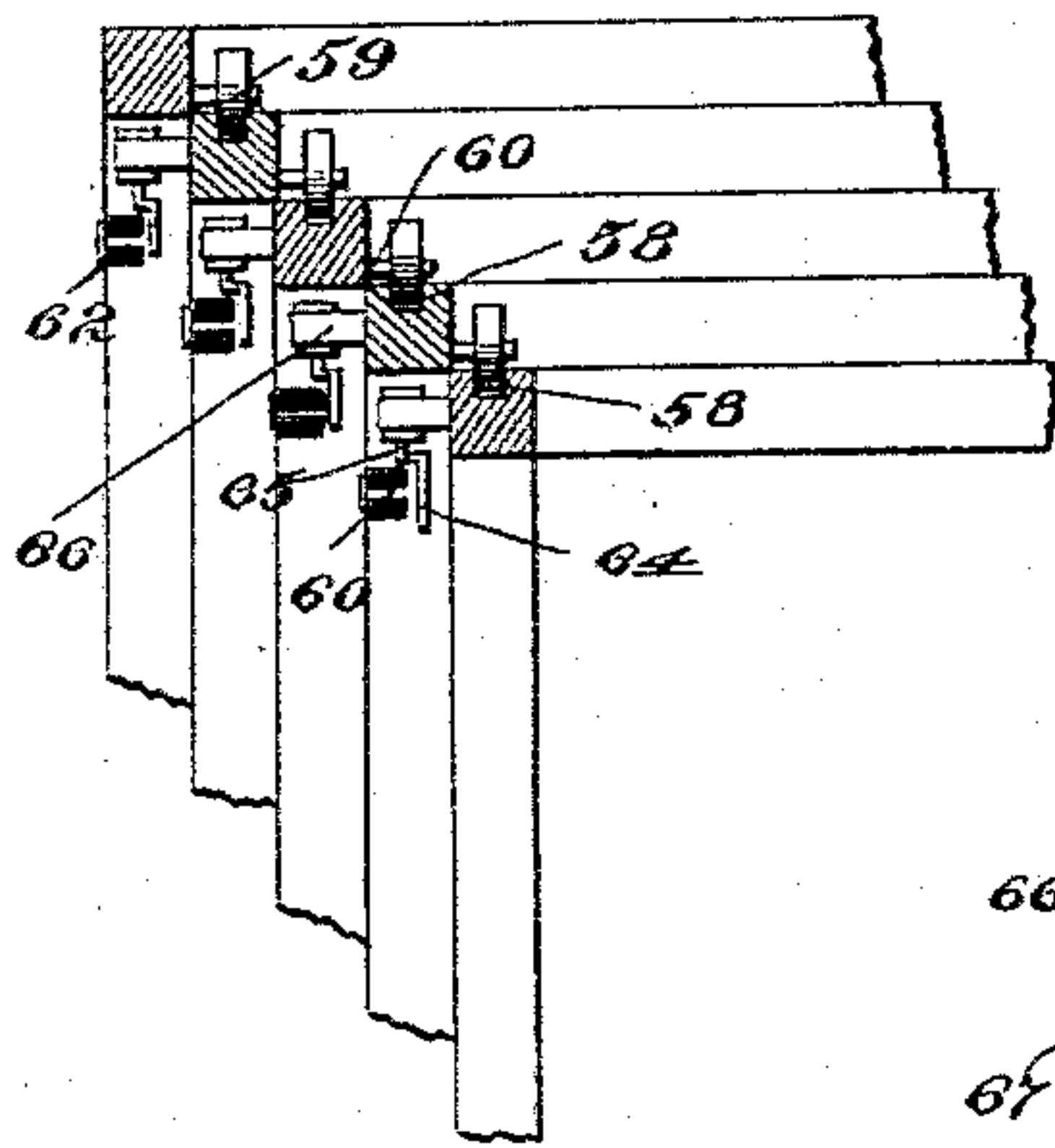
COMBINED WATER TOWER AND FIRE ESCAPE.

No. 533,597.

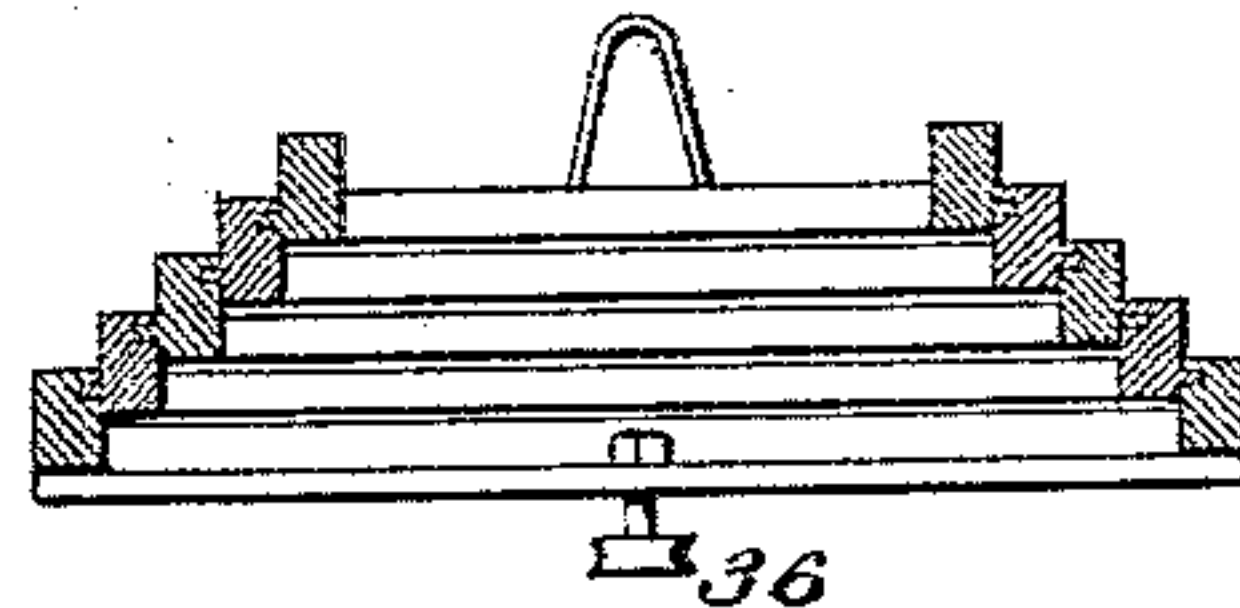
Patented Feb. 5, 1895.



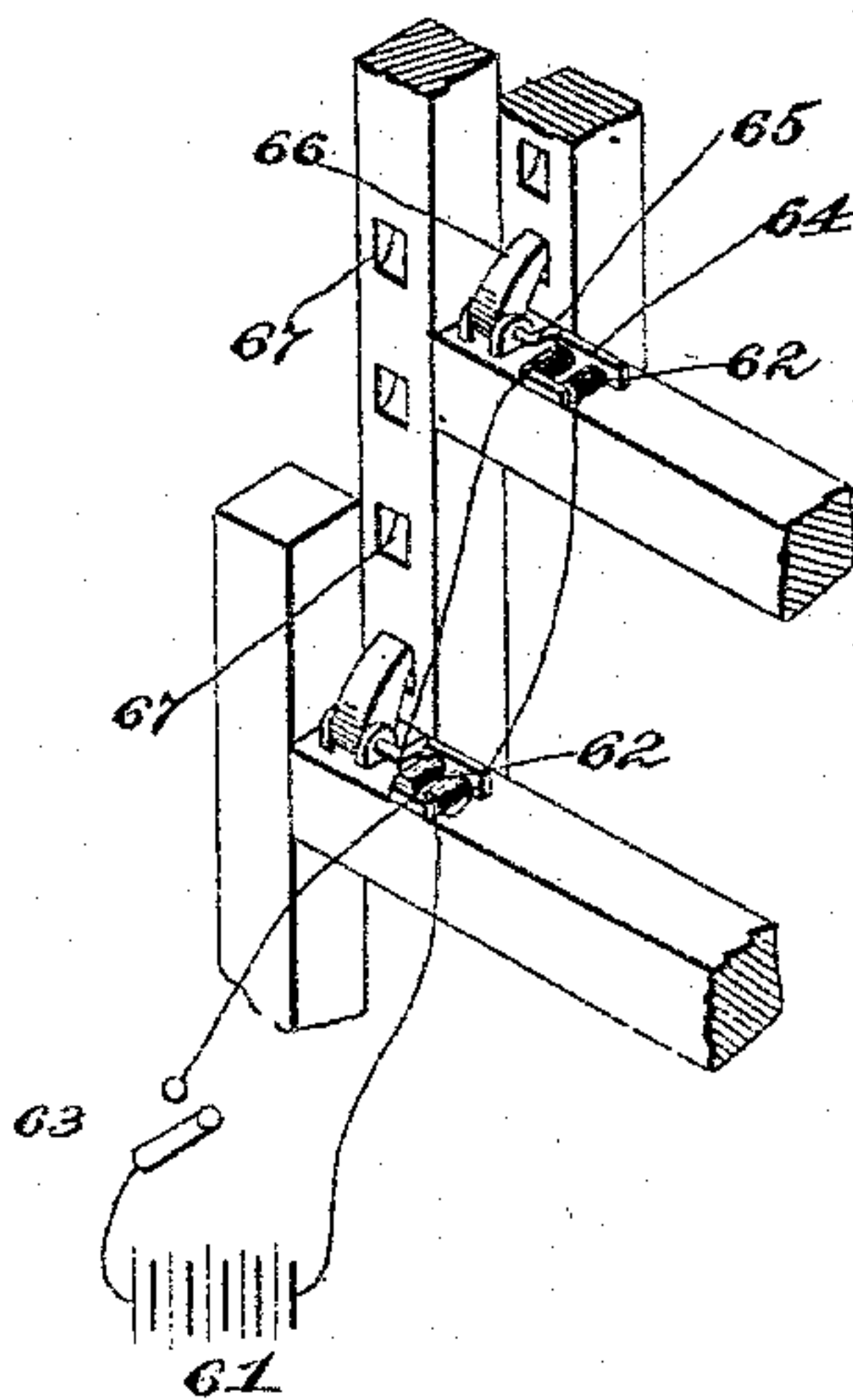
*Fig. 5*



*Fig. 6*



*Fig. 7*



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# UNITED STATES PATENT OFFICE.

FRANK M. C. HUGHES, OF MILFORD, MASSACHUSETTS.

## COMBINED WATER-TOWER AND FIRE-ESCAPE.

SPECIFICATION forming part of Letters Patent No. 533,597, dated February 5, 1895.

Application filed September 21, 1893. Serial No. 486,116. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK M. C. HUGHES, a citizen of the United States, residing at Milford, Worcester county, State of Massachusetts, have invented certain new and useful Improvements in Combined Water-Towers and Fire-Escapes; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in combined water-towers and fire-escapes.

The invention will first be described in connection with the accompanying drawings, and then particularly pointed out in the claims.

In the drawings—Figure 1 is a front view of the apparatus extended. Fig. 2 is a horizontal section on an enlarged scale, taken on the line  $x-x$ , Fig. 1. Fig. 3 is a longitudinal, vertical section, showing the tower partly raised, being more particularly intended to illustrate the mechanism for raising the tower; Fig. 4, a top plan view of the toggle-telescopic frame. Fig. 5 is a horizontal section of one corner of the tower folded. Fig. 6 is a cross section of the ladders in their closed position. Fig. 7 is a detail, perspective view of the electric pawl-operating device, showing the electric circuit and key.

Referring to the drawings, it will be observed that the device consists, primarily, of a tower composed of telescopic sections, which are so similar in construction and operation to those shown and described in my patent above referred to, as to require no specific description here. These sections are raised by means of cables and drums, in the same manner as in my aforesaid patent, with the exception, however, that the counterweights, instead of being located on the sides, are placed at each end, there being four weights, 1, instead of two, these weights, 1, moving between vertical rods,  $a$ , and being provided with chains or cables,  $b$ , which pass over pulleys,  $c$ , fixed to the top of the lower or base section, the ends of the cables being fixed to the bottom of the second section, as will be fully understood from the drawings.

Instead of depending entirely upon hand power for revolving the drums, I have changed the hoisting mechanism so that the team

which draws the machine to the place where it is to be raised, may be used to revolve said drums. This mechanism consists of a transverse shaft, 2, journaled on the base section at its center, and provided with two sprocket wheels, 3, which are connected by sprocket chains, 4, to the sprocket wheels, 5, on the main drum-shafts, 6, on which the drums, 7, and ratchet wheels, 8, are fixed, pawls, 9, attached to the framework, as shown, serving to prevent backward rotation of the drums. The central shaft has a gear wheel, 10, at each end, these gear wheels meshing into pinions, 11, fixed on a pinion-shaft, 12, which is provided at each end with hand cranks, 13, which may be used in lowering the tower, or when it is desired to hoist it by hand.

On the drums, 7, the main hoisting cables, 7', are wound, these cables passing over pulleys, 7<sup>2</sup>, and having their ends secured to the lower end of the second section, as fully shown in Fig. 3. To the bottom of each section are secured a series of cables or chains  $d$ ,  $d'$ ,  $d''$ , (Fig. 3) which pass over pulleys at the top of the next higher section and are attached to the lower ends of the next section but one. This construction and its method of operation are old and well known, and therefore will be plain without further description.

On the pinion-shaft, 12 are fixed, two large drums, 14, which I will designate as the power drums. Around each power drum is wound a cable, 15, the cables being attached at their front ends to the whiffletree, 16, which is secured to the tongue, 17, in the usual way, by a pin, 18. It is plain that, when this pin is removed and the team driven ahead, the cables will be drawn out and the power drums revolved, thus operating the hoisting drums and raising the tower.

On the central shaft, near each end, is fixed a secondary drum, 19, these drums serving to hoist the ladders, 20, by means of cables, 21, passing through sheave-pulleys, 22, secured to the base section, as shown, and over pulleys, 23, secured to the top of the lower ladders, as shown in dotted lines in Fig. 3. These cables then pass down to the bottom of the second ladders where they are fastened. The remaining ladders are connected by cables, 24, passing over pulleys, 25, in a manner similar to the way in which the sections of the tower



are connected by the cables  $d$ ,  $d'$ , &c., so that the manner in which they operate will be easily understood. By this construction, as the central shaft is revolved, the secondary drums also revolve, thus winding up the cables, 21, and raising the second ladders. These in turn raise the ladders above them, by means of the cables, 24, which pass over pulleys, 25, secured to the top of the ladders. This arrangement of the ladder-raising cables, being similar to the cables which raise the sections of the tower, will be fully understood from the drawings. In the closed position of the tower, these ladders are also closed and their cables extended, the end of each cable being secured to the respective drum by any suitable fastening device. When it is desired to elevate only those ladders on one side, the cable from the opposite side is unfastened from its drum, which may then revolve without hoisting its ladders.

To the bottom of each of the lower ladders is attached a pair of pins  $e$ , which are formed integral with a horizontal rod,  $e'$ , as shown, the pins entering eye-bolts,  $f$ , attached to the inside of the lower swinging frames or doors, 27, as will be plain from Fig. 2, where a sectional view of the lower end of one of the lower ladders is shown opposite the eye-bolt,  $f$ , the ladder-end being swung down to a horizontal position in order to clearly illustrate the pins  $e$ .

In the present machine, the reels for the hose may be located at any desired point in the base section, as, for instance at 26, Fig. 2.

Each section of the tower is provided on each side with swinging frames, 27, pivoted to their respective sections and normally pressed outward by springs, 28, as shown. When the tower is extended, these frames swing together and stand one above the other, as shown. To the bottom of each frame is secured a bolt device, which consists of a rod, 29, movable in boxes, 30, the top of each rod having a head, 31, bent at right angles and arranged to be turned beneath a pin, 32, attached to the frame. The top of each door is provided with a socket, 33, into which the lower end of the rod on the door above may enter. The lower set of doors are provided with rods, 34, which are longer than the others and may be run downward until they rest on the ground. It will be seen that, by this arrangement, the swinging frames are locked together, and have their outer ends carried by the rods at the bottom, which rest on the ground. Thus, these frames form a lateral support for the machine, and, to a large extent, prevent lateral vibration. Furthermore, each door or frame is provided with a series of rings or rounds, 35, thereby converting the swinging frames into a series of swinging ladders. When the frames are closed, they, if desired, may be fastened by the bolts, 29, which enter sockets secured to their respective sections.

The top ends of the lower ladders are pro-

vided, each with a single grooved pulley, 36, and these pulleys run on a track or rail, 37, (Fig. 3,) attached to the top edge of the base section. By this arrangement, the ladders, when closed, may be run around to either side or end of the machine, their hoisting cables, of course, being released from their drums. In the closed position of the tower, the ladders are preferably carried at the rear of the machine.

On each side of the base section is fastened a pair of hangers, 38, in which is movably journaled a small drum, 39, having a crank, 40. Two of these drums may be used, one on each side, or only one, which, being removably journaled, as before stated, can be readily transferred from one side to the other before the machine is raised. On this drum is wound a rope, 41, which passes over a pulley, 42, removably attached by a hook, or in any other suitable manner, to brackets, 43, secured to the tops of the upper ladders. At the end of the hoisting rope a receptacle, 44, is fastened, which permits children or other persons, unable to come down the ladders, to be lowered to the ground.

To the deck, 45, of the upper section, is secured a cross beam, 46, by means of bolts provided with thumb-nuts, 47, or in any other suitable manner. In the center of this beam is journaled a toggle screw, 48, having a right hand thread at one end and a left hand thread at the other end. This screw engages at each end an internal thread in blocks, 49, and is provided at either or both ends with cranks, one, 50, being shown in Fig. 4. To each block is hinged a pair of toggle braces, 51, by means of hinges, 52, having loose pintle pins, 53, which may be removed to permit the toggle braces, 51, to be taken away. The outer ends of the braces, 51, are hinged to the telescopic beams, 54, which are provided at their outer extremity with plates, 55, arranged to bear, one against the building on one side of the street and the other against the building on the other side. These telescopic beams may be adjusted to suitable lengths by pins, 56, entering holes, 57, in the respective beams, as will be fully understood from Fig. 4. By turning the toggle screw, the walls of a building may be forced inward, thus giving the firemen an opportunity to prevent danger to themselves arising from walls of burning buildings falling outward. Moreover, this toggle frame may be used simply to steady the whole tower.

By referring to Fig. 5, it will be seen that, in the present invention, the sections are rabbeted, as at 58, to receive the rollers, 59, which revolve on pins, 60, secured to the sections. This construction renders the sections more steady in operating.

In Fig. 7 is shown my improved device for operating the pawls by means of electricity instead of by a cord, as in the patent above referred to. The current from a battery, 61, which may be placed at any suitable point in



the base section, is turned on to the electro-magnets, 62, by a switch, 63, located in the base section. The electro-magnets, when energized, pull over their respective armatures, 64, which are attached to the cranked ends, 65, of the pivot pins, on which the pawls 66, turn, thereby withdrawing the pawls from the ratchets, 67. When the current is cut off, the pawls drop, by their own weight, into their normal position. While I have shown but two of these pawls, it is to be understood that all of the pawls which assist in retaining the sections in their elevated position, are united in one circuit, so that all may be operated simultaneously, and, instead of the current being conveyed through loose wires, special brass strips may be secured to the corner-posts of each section, and arranged to contact with those of the adjacent sections, the electro-magnets being in circuit with these strips, so that, when the tower is elevated, a complete circuit is made.

At 68, I have shown a roller on which is carried a fire-curtain, which may be unrolled to protect the machine, or the men, from the flames. These rollers and curtains may be located on all sides if desired.

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

1. In a telescopic tower, a series of sections, each provided with outward-swinging frames, and means for securing the frames of one section to those of the adjacent sections, substantially as set forth.

2. In a telescopic tower, a series of sections, each provided with a series of swinging frames, means for securing the frames of one section to those of the adjacent sections, and a supporting device attached to the lower section and resting on the ground.

3. In a telescopic tower, a series of sections, each provided with a series of outward-swinging frames, and a spring normally tending to press each frame outward, substantially as set forth.

4. In an elevating tower, a series of hoisting drums arranged to extend the tower, a central shaft, a pair of sprocket wheels on the shaft, means for communicating motion from the sprocket wheels to the hoisting drums, a pair of power drums, means for communicating motion from the power drums to the central shaft; a pair of cables coiled on the power drums, and a whiffletree to which the cables are secured, substantially as described.

5. In a telescopic tower, a series of sections, each provided with outward-swinging frames, and a series of rounds secured to each frame, substantially as set forth. 60

6. In a telescopic tower, a series of sections, a series of extension ladders attached to the base section, a hoisting device for elevating the sections, a similar device for raising the ladders, and means for simultaneously operating both hoisting devices, substantially as set forth. 65

7. In a telescopic tower, a series of sections, each provided with ratchets, a series of pawls secured to each section, except the top one, and engaging the ratchets of the sections above, a series of electro-magnets operating the pawls, a circuit in which all the electro-magnets are included, a battery for energizing the circuit, and a switch for breaking the circuit, substantially as set forth. 75

8. In a tower, the combination, with a removable cross-beam, means for securing the cross-beam to the tower, a toggle-screw journaled in the cross-beam, a pair of blocks threaded onto the toggle-screw, and a crank attached to the end of the toggle-screw, of a pair of toggle-braces attached to each block, and a series of telescopic beams actuated by the toggle-braces, substantially as described. 85

9. In a tower, a series of extension ladders, a roller on the lower ladder, and a track on which the roller runs, whereby the ladders may be moved to any side of the tower, substantially as set forth. 90

10. In a tower, a series of extension ladders, a drum removably attached to the side of the tower, a pulley removably secured to the top of the extension ladders, a cable passing over the pulley and wound on the drum, and a receptacle at the end of the cable, substantially as set forth. 95

11. In a tower, a pair of hangers secured on each side of the tower, a drum capable of being mounted in either pair of hangers, a series of extension ladders, a pulley removably secured to the top of the ladders, a cable arranged to be wound on the drum and passing over the pulley, and a receptacle secured to the end of the cable. 105

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

FRANK M. C. HUGHES.

Witnesses:

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C. A. BLAISDELL.