

(No Model.)

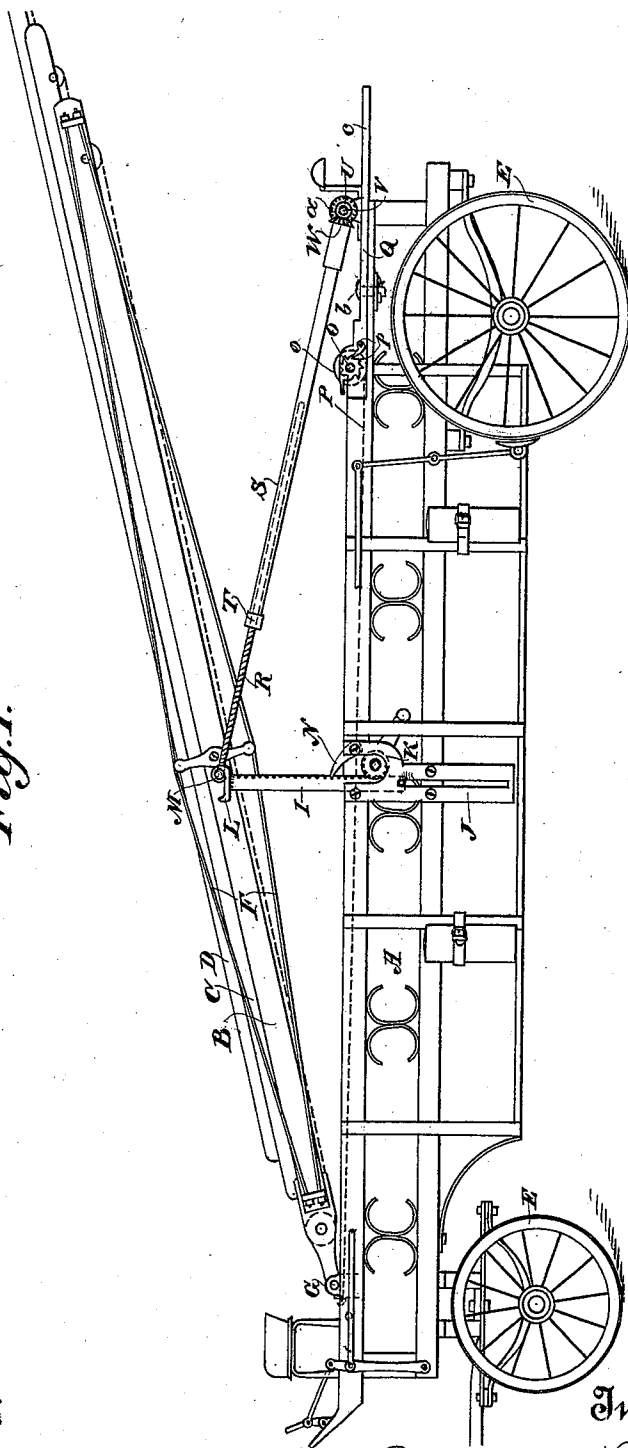
2 Sheets—Sheet 1.

A. B. CAIRNES.
EXTENSION FIRE LADDER AND TRUCK.

No. 545,643.

Patented Sept. 3, 1895.

Fig. 1.



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Fig. 4.

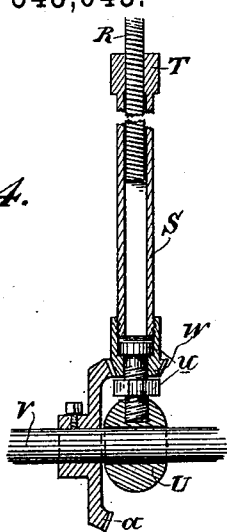


Fig. 2.

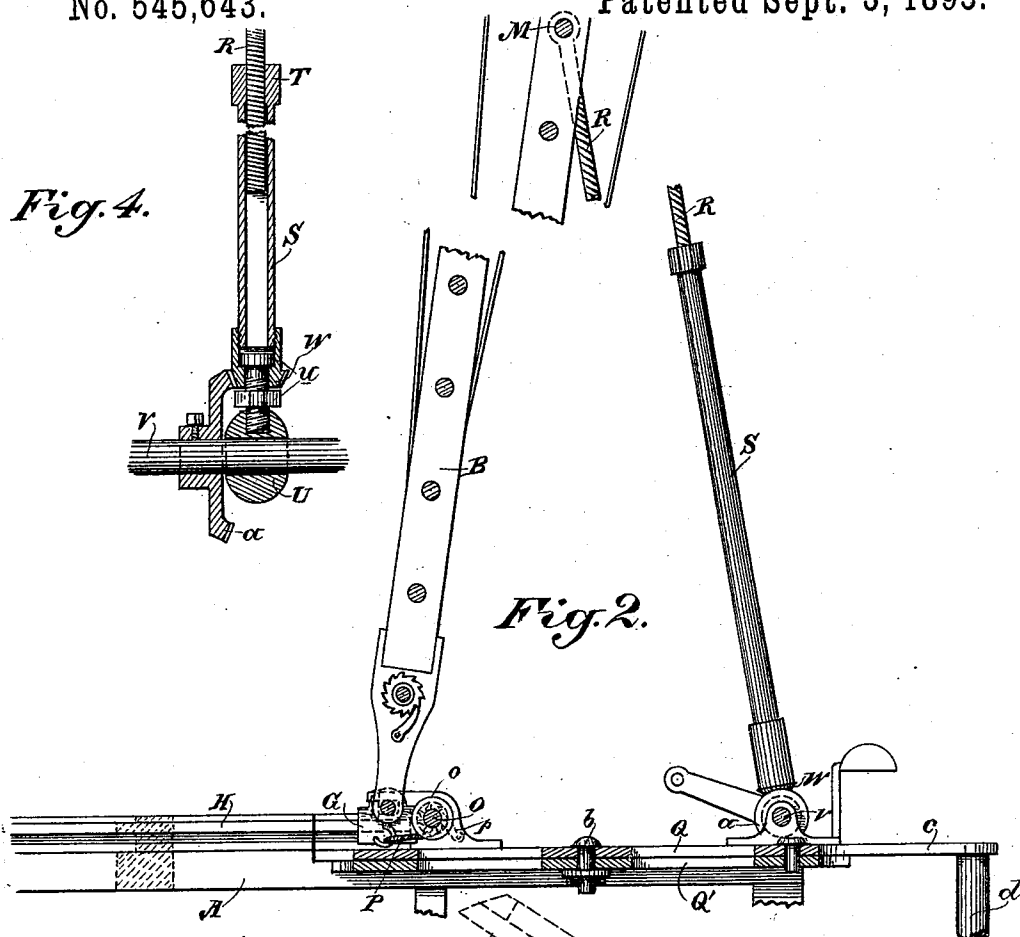
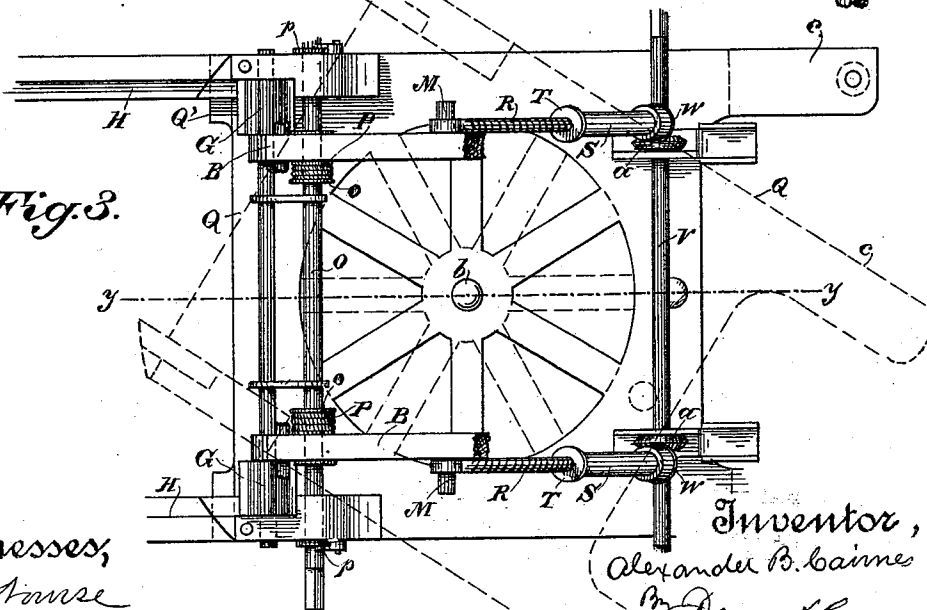


Fig. 3.



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UNITED STATES PATENT OFFICE.

ALEXANDER B. CAIRNES, OF SAN DIEGO, CALIFORNIA.

EXTENSION FIRE-LADDER AND TRUCK.

SPECIFICATION forming part of Letters Patent No. 545,643, dated September 3, 1895.

Application filed January 2, 1895. Serial No. 533,609. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER B. CAIRNES, a citizen of the United States, residing at San Diego, county of San Diego, State of California, have invented an Improvement in Extension Fire-Ladders and Trucks; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to improvements in extension-ladders and the trucks upon which they are conveyed, such as are usually employed by fire-departments.

It consists in certain details of construction, which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of the truck, showing the ladders partly raised and a mechanism for raising them. Fig. 2 is a section through the turn-table on the line *yy* of Fig. 3. Fig. 3 is a plan of the same. Fig. 4 is a detail section of the braces and connections.

The object of my invention is to provide a ladder which is capable of being raised to any desired angle between the horizontal and perpendicular, and it may be extended to any practicable distance by means of two or more supplemental ladders slidable upon the lowermost one, a mechanism by which they are raised, extended, and turned about so as to reach any point with relation to the original position of the truck without changing the ladder, and also means for more rapidly performing these operations and steadying and bracing the ladders after they have been raised and turned to the desired position.

A is the frame of my apparatus, made of sufficient length to properly support the ladders B, C, and D, which are carried and operated thereon. This frame is mounted upon wheels E, properly arranged to turn to place the truck wherever it is desired. The ladders are preferably braced by truss-frames F, which strengthen and steady them against vibration. The foot of the lowermost ladder is pivoted to blocks G, which are slidable horizontally in a guide H, so that when the ladders are to be raised the sliding blocks will move along this guiding-track until the foot of the ladder is brought upon the turn-table, as will be hereinafter described.

In order to first raise the ladders from their horizontal position to stand at such an angle that they may be afterward brought to a vertical position by the proper mechanism, I have shown vertical racks I, which are slidable in guides J, fixed upon the sides of the truck-frame at a suitable point with reference to the foot of the ladders when they are lying flat. In the present case the racks and guides are somewhat nearer to the front of the frame and foot of the ladder than the rear.

K are pinions fixed upon a shaft suitably journaled across the frame, and these pinions engage the racks I. Upon the upper ends of the racks I are forks or crotches L, and when the racks are raised these crotches engage stout projecting pins M upon the sides of the ladder, and thus raise the ladder about its foot as a fulcrum-point until it stands at a considerable angle with the horizontal, the foot of the ladder moving back along the guides. The pinion-shaft is operated by means of a socket wrench or handle, which is applicable to all the shafts that are to be turned during the operation of setting the ladders, and when the racks are raised they are retained at any point by means of a pawl N, which engages the teeth.

O is a shaft, having upon it drums o, about which ropes or cables P are adapted to wind, and also pawl and ratchet-wheels, as shown at p. This drum-shaft is journaled upon a turn-table Q, which is pivoted to turn in a horizontal plane at the rear end of the truck-frame. In its normal position this turn-table is in line with the guides H, so that when the foot of the ladder has been moved to the rear to a sufficient distance to bring the foot of the ladder to an approximately vertical position the foot of the ladder will then be upon the turn-table and clear of the stationary tracks upon the main frame. The ropes or cables P, which coil upon the drums of the drum-shaft, have their opposite ends connected with eyebolts suitably fixed to the lower end of the ladder B or the movable blocks G. After the racks I have been raised and the rear end of the ladder partially raised in this manner the socket-wrench is transferred to the end of the shaft O, and by turning this shaft and coiling the ropes P upon

it the foot of the ladder is drawn toward the rear, and finally transferred to the turn-table, when the latter may be rotated so as to place the ladders in any desired position. The
 5 braces which hold the ladder while the foot is thus being drawn toward the rear consist of screws R, the upper ends of which are connected with the pins M upon the sides of the ladder. The screw-threaded portion of
 10 these shafts enter long tubular sleeves S, and these sleeves have upon their upper ends nuts T, within which the screws are turnable. The lower ends of the tubes S are pivoted to turn upon stout eyebolts U, which
 15 enter corresponding sockets in the lower ends of the tubes, and have nuts or collars u, which prevent end motion, but allow the tubes to turn freely about them. The bolts U have eyes at the lower end, and these eyes
 20 fit loosely upon a horizontal shaft V on the rear end of the turn-table, so that the tubular shafts S may be raised or depressed about this shaft V, while being turnable upon their own axis around the bolts U.

25 To the foot of each of the tubular shafts S is fixed a pinion W, and upon the shaft V are fixed corresponding bevel-gears a, which engage with the bevel-pinions W, so that by transferring the socket-wrench to the end of
 30 the shaft V the latter and the bevel-gears a may be rotated and thus turn the tubes S. This operation is not performed until after the ladders have been raised into an essentially vertical position by means of the cables,
 35 as before described, the screw-shafts R and tubes S serving up to this time as braces to raise the ladders into that position, while the foot of the ladders is being drawn rearwardly until it arrives upon the turn-table. The
 40 braces and ladders then being entirely upon the turn-table, the angle of the ladders is regulated to suit requirements by turning the shaft V, and through the bevel-gears a and W the tubes S are rotated, so that the nuts T
 45 will advance the screw-shafts R to lengthen or shorten the braces and thus adjust the position of the ladders to the desired angle. They may thus be moved from nearly forty-five degrees on one side to beyond a perpen-
 50 dicular on the other side, the screws being right and left threaded. The turn-table Q has a stout central king-bolt b, by which it is united to a lower plate Q', which is permanently fixed upon the truck-frame and serves
 55 as a bed about which the upper table Q is turnable. The upper table has arms c, projecting to the rear, and these serve as handles by which it may be turned around, so as to place the ladders at any desired angle with
 60 the position of the truck. This may be done after the ladders are first raised into their essentially vertical position, and the adjustments by the screw-shaft R may be made after the ladders are turned to stand in the proper
 65 direction, so as to allow them to rest against the building or other desired point of support.

When the ladders are in this position and turned to some angle with the truck, I employ legs d, which are fixed in the extensions c and adapted to rest upon the ground. These
 70 legs serve to extend the base of the turn-table and thus steady the apparatus when the ladders have been turned to an angle with the truck-frame and relieve the frame. The ladders may be extended after having been raised
 75 to the vertical position, as shown in my former patent, No. 527,942, or in any other suitable or desired manner.

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

1. In an extension ladder, a wheeled truck frame having guides extending horizontally along it, a ladder adapted to normally lie in
 85 a horizontal position on the truck frame, with its foot end provided with blocks or travelers adapted to engage and move upon the guides, vertical guides on the sides of the truck frame
 90 at a point between the opposite ends of the ladder, when the latter is in its normal position, rack bars movable in said guides and supporting the ladder upon their upper ends and pinions engaging the racks whereby the
 95 ladder are moved in vertical planes to lift the ladder out of its normal horizontal position to an inclined position to permit its being subsequently moved into a vertical or approximately vertical position, substantially as described.

2. In an extension ladder, a frame mounted
 100 upon wheels having longitudinal guides upon it, a ladder having blocks or travelers connected with its foot and movable in said guides, a vertically moving rack by which
 105 the ladders are raised to an inclined position about said travelers, a drum shaft journaled across the turn-table, ropes adapted to coil upon the drum having their opposite arms connected with the foot of the ladder, and
 110 braces having the lower ends fulcrumed upon the turn-table, and the upper ends connected with the ladder at points above its base whereby the moving of the foot of the ladder along the guides will raise it into an approximately vertical position.

3. In an extension ladder, the truck frame
 115 having longitudinal guides, blocks or travelers upon the foot of the ladder movable on said guides, a means comprising vertically movable rack bars at the sides of the truck
 120 frame and engaging the ladder at points between its extremities for first raising the ladders to an angle, winding drums and cables extending therefrom to the foot of the ladders and braces connected with the ladder so
 125 as to raise it to a vertical position when the foot is drawn toward the braces, a turn-table pivoted upon the opposite portion of the truck frame having the winding drum shaft journaled across the front end of it, said table
 130 having tongues continuous with the guides upon the main frame whereby the foot of the

ladder may be transferred from the main frame to the turn-table when it has been raised to the vertical position.

4. In an extension ladder, a truck frame
5 having longitudinal guides, a ladder having
blocks or travelers at its lower end movable
upon said guides, a turn-table pivoted at the
opposite end of the frame having tracks
adapted to stand in line with the guides of
10 the main frame, a drum shaft journaled
across the turn-table, cables extending from
the drums to the foot of the ladder, a mechanism comprising vertically movable rack
bars engaging the ladder at points between
15 its ends and pinions for actuating the bars
by which the ladder is first raised about said
blocks or travelers to an angle with the truck
frame, means for rotating the drum shaft so
that the foot of the ladder and its connected
20 blocks or travelers are drawn along the guides
and transferred therefrom to the turn-table,
braces fulcrumed upon a shaft at one end,
having the other ends connected with the
ladder so as to raise it when the foot is moved
25 toward the turn-table, said braces consisting
of screw-shafts extending into tubular sleeves,
with nuts which advance the screw shaft in
either direction when the sleeves are rotated,
means for rotating the sleeves consisting of
30 bevel pinions fixed to their lower ends and

corresponding bevel gears fixed upon the shaft
journaled upon the turn-table, and engaging
the pinions, so that the rotation of the shaft
will turn the tubes, and thus advance the
screw shafts in either direction to lengthen 35
or shorten the braces and change the angle of
the ladder.

5. In an extension ladder, a truck frame
having longitudinal guides, travelers connected
with the foot of the ladder and movable 40
on the guides, a turn-table pivoted to the
opposite end of the frame with braces attached
thereto and connected with the ladders,
winding drums upon the turn-table and
ropes extending therefrom to the foot of the 45
ladder, whereby the latter may be drawn upon
the turn-table and raised by the braces into
a vertical position, said turn-table being revolvable
about its central king bolt so as to
change the position of the ladders with reference 50
to the truck after they have been transferred
to the turn-table, and extension arms
or braces extending from the turn-table to the
ground as herein described.

In witness whereof I have hereunto set my 55
hand.

ALEXANDER B. CAIRNES.

Witnesses:

L. O. MIX,

JNO. P. BURT.