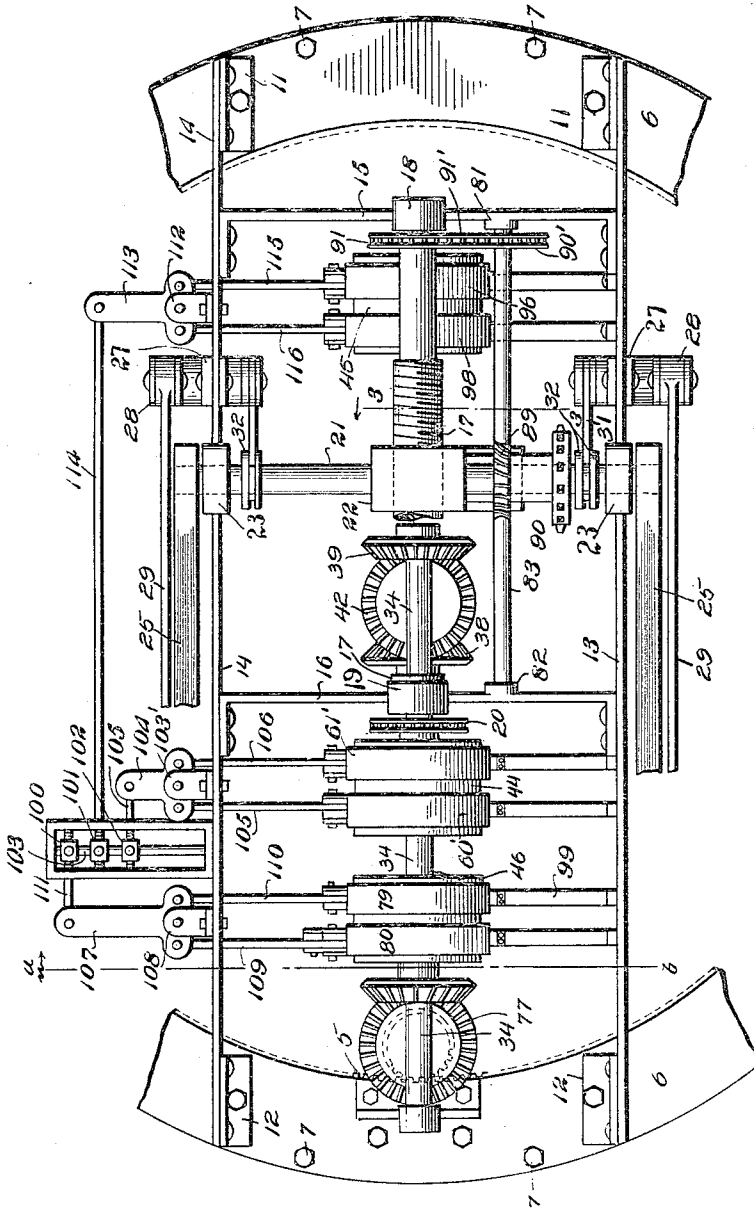


E. F. DAHILL & G. R. BARTLETT.
AERIAL APPARATUS.
APPLICATION FILED DEC. 31, 1910.

1,127,411.

Patented Feb. 9, 1915.
3 SHEETS—SHEET 1.

Fig. 1.



Witnesses
J. Adolph Bishop
John A. Donagan.

Inventors
Edward F. Dahill
and G. R. Bartlett.

By Foster Freeman, Watson & Co. Attorneys

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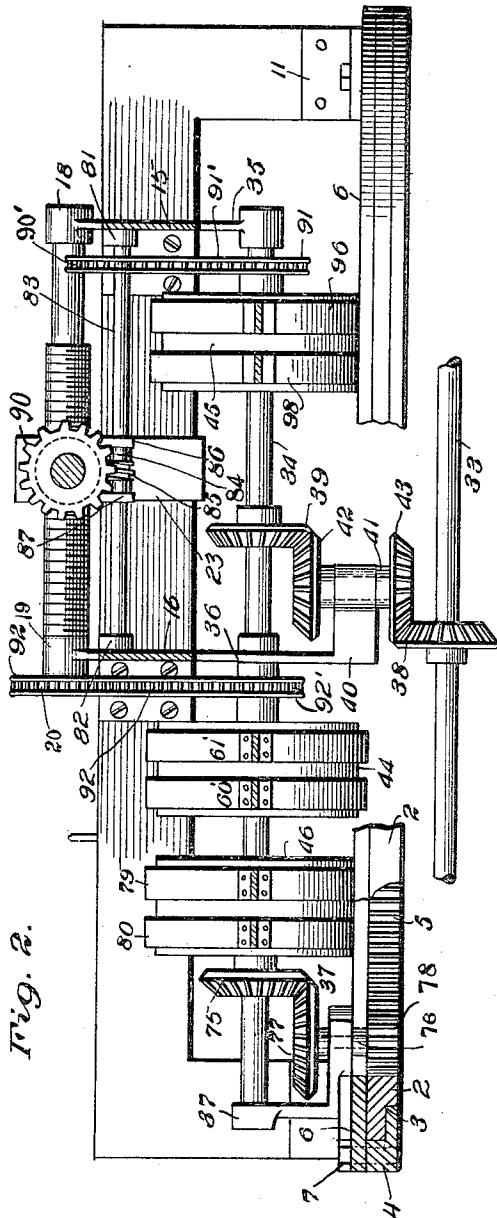


Fig. 2.

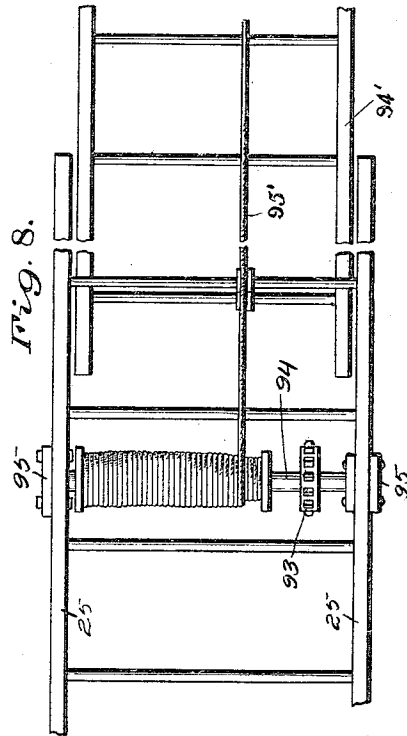


Fig. 8.

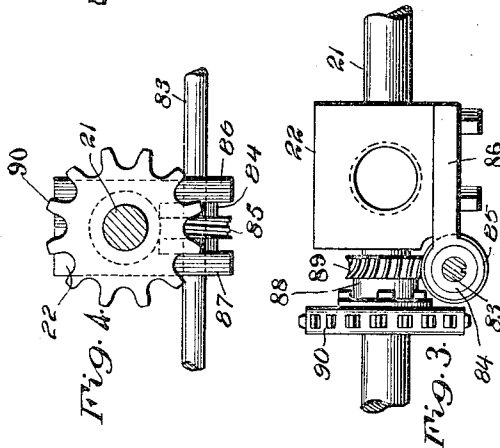


Fig. 3.



Fig. 4.

Witnesses
J. Adolph Bishop
John A. Donegan

Inventors
Edward F. Dahill
G. R. Bartlett

By Foster, Freeman, Watson & Co. Attorneys

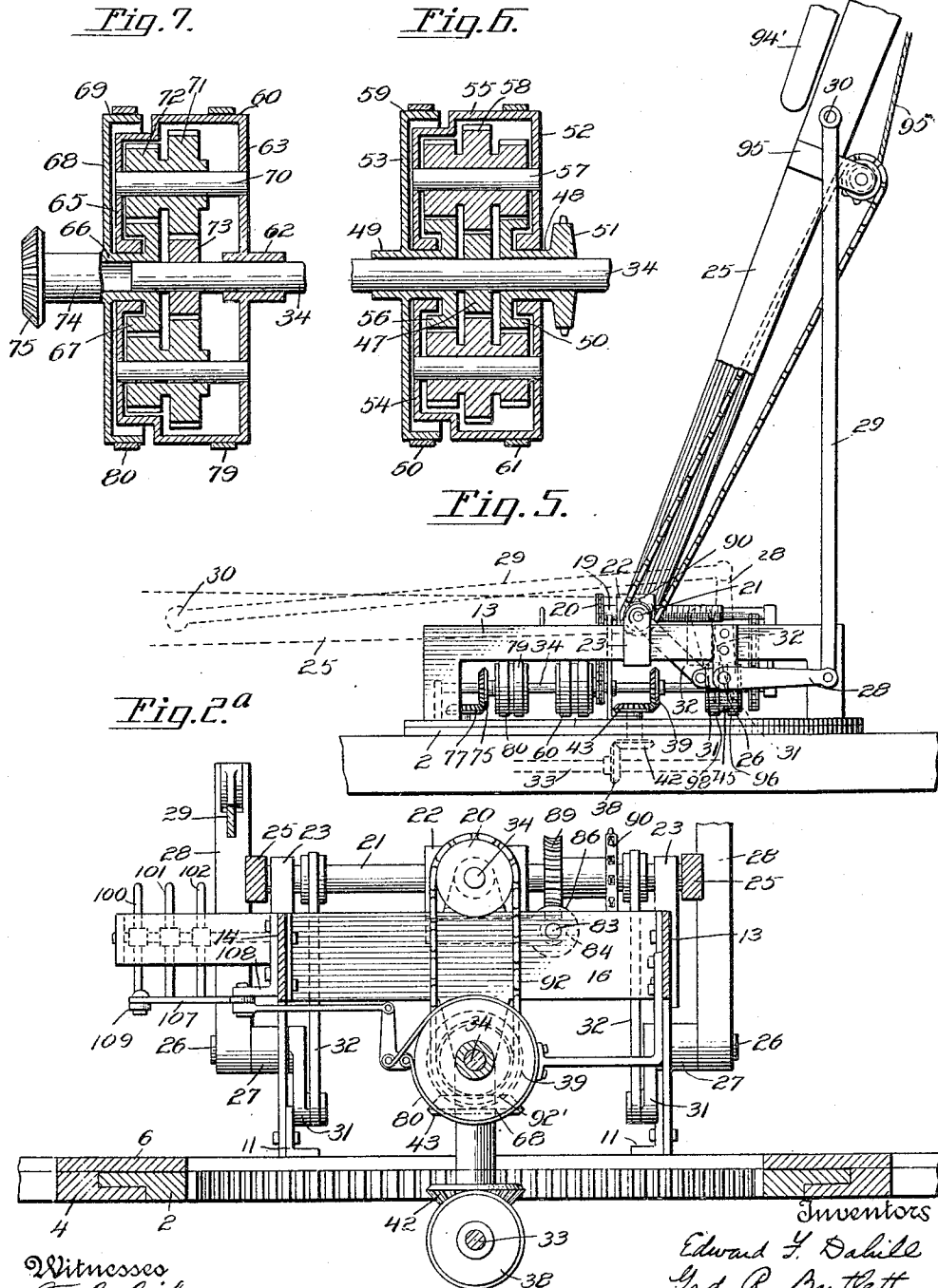
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3 SHEETS—SHEET 3.



Witnesses
J. C. Gibson.
B. M. Kent.

Inventors
Edward F. Dahill
and G. R. Bartlett
by Foster Freeman Watson & Co.
Attorneys

UNITED STATES PATENT OFFICE.

EDWARD F. DAHILL, OF NEW BEDFORD, AND GAD R. BARTLETT, OF PLYMOUTH,
MASSACHUSETTS.

AERIAL APPARATUS.

1,127,411.

Specification of Letters Patent.

Patented Feb. 9, 1915.

Application filed December 31, 1910. Serial No. 600,359.

To all whom it may concern:

Be it known that we, EDWARD F. DAHILL and GAD R. BARTLETT, citizens of the United States, and residents of New Bedford, county of Bristol, and Plymouth, county of Plymouth, respectively, State of Massachusetts, have invented certain new and useful Improvements in Aerial Apparatus, of which the following is a specification.

10 This invention relates to aerial apparatus and has reference to mechanism for elevating and lowering fire-fighting apparatus such as ladders and water towers. The broad features of the mechanism for raising and lowering the ladder and fly-ladder are embodied in our prior application, Serial No. 572,901, filed July 20, 1910.

20 The primary object of the present invention is the provision of planetary transmission mechanism for connecting the driving apparatus to the ladder and fly-ladder, whereby the same may be raised and lowered by a continuous movement of the driving mechanism.

25 Other objects will be apparent from the following description taken in connection with the accompanying drawings in which:—

30 Figure 1 is a fragmentary plan view of a turn-table of a fireman's truck showing our improved device with parts thereof broken away for the sake of clearness, the parts being shown with the ladder in the horizontal position; Fig. 2 is a side elevation, partly in section, of the construction shown in Fig. 1, the links and arms for moving the ladder and the ladder itself being omitted for clearness; Fig. 2^a is a section on the line *a—b* of Fig. 1; Fig. 3 is an enlarged detail end elevation on the line 3—3 of Fig. 1, the screw being removed; Fig. 4 is a side elevation of the construction shown in Fig. 3; Fig. 5 is a side view of a part of a fireman's truck including our improved means for elevating the ladder, the ladder being shown in elevated position; Fig. 6 is a detail vertical section taken through the casing of one of the planetary transmission devices for actuating the ladders; Fig. 7 is a similar view of the transmission device for actuating the turn-table; Fig. 8 is a detail front elevation of the ladder and fly-ladder.

In Fig. 5 is shown one of the side bars or

supports carried by a wheeled vehicle or truck. This member is designated by the numeral 1, and its companion (not shown) is arranged paralld thereto and located on the opposite side of the vehicle or truck. Mounted on these bars is a circular support 2, best shown in Fig. 2, which has at its outer edge on the under side, an annular peripheral recess 3 in which fits the circular ring-like member 4; the inner surface of the member 2 being provided with teeth 5. The ring-like member 4 constitutes one part of the turn-table and is provided on its upper surface with a ring 6, the parts 4 and 6 being secured together by any suitable means such as the screws. The aerial device, which in this instance is shown as a ladder, is mounted on the turn-table, and the elevating mechanism for the ladder is also carried by the turn-table.

Mounted on the plate 6 of the turn-table are brackets 11 and 12 which carry the track-ways 13 and 14, the latter being elevated somewhat above the top of the turn-table. These track-ways are connected by the cross-bars 15 and 16, which serve as braces and strengthening members. A screw-threaded shaft 17 is mounted in bearings 18 and 19 in the center of these cross-bars. One end of the shaft 17 extends beyond the bearing 19 and has secured thereto a sprocket wheel 20. A cross-bar 21 has a central screw-threaded bearing 22 engaging the threads of the shaft 17, and this bar is carried by slide blocks 23 which slide on the track-ways 13 and 14, as shown in Fig. 1. The lower ends of the side bars 25 of the ladder are pivotally connected to the ends of the cross-bar 21 outside of the tracks 13 and 14.

It will be observed from the above construction that the cross-bar 21 constitutes a sliding member which carries with it the lower end of the ladder and that the rotation of the screw 17 will move the bar 21 horizontally along the track-ways 13 and 14 so as to carry the lower end of the ladder in a straight line. Rock shafts 26 are mounted in the depending bearings 27 carried by the track-ways 13 and 14, and have secured thereto the arms 28 and 31. The arms 28 are pivotally connected with the links 29 which have their upper ends pivotally connected

at 30 with the side bars 25 of the ladder. The arms 31 are pivotally connected with links 32 which have the upper ends pivotally connected with the cross-bar 21, so that as the latter is moved along the track-ways 13 and 14 the shafts 26 will be rocked and thereby move the ladder. The above construction is fully described and claimed in our prior application, No. 572,901, above referred to. The arms 28, normally stand in an upright position when the ladder is horizontal, as shown in Fig. 1, and when these arms are turned to a horizontal position by moving the bar 21 along the ways 13 and 14, the ladder is raised from the horizontal through an arc of about 110°, and therefore passes the vertical and assumes the inclined position shown in Fig. 5, where it is rigidly supported. The advantages gained by the employment of the mechanism just described for handling the ladder, are fully set forth in our prior application above mentioned.

We have shown, as means for operating the elevating mechanism, a driving shaft 33, which is mounted in any suitable manner on the truck frame and driven by a suitable motor (not shown), also positioned on the truck. A shaft 34 is journaled in hangers 35 and 36 depending from the central portions of the cross-bars 15 and 16. One end of the shaft 34 extends considerably beyond the hanger 36 and is journaled in an angular bracket 37 which is mounted on the turntable. Secured on the driving shaft 33 is a bevel gear 38, and secured on the driven shaft 34 between the hangers 35 and 36 is a bevel gear 39. Journaled in a horizontal extension 40 at the lower end of the hanger 36, is a short shaft 41, the opposite ends of which are provided with bevel gears 42 and 43 which mesh with the bevel gears 38 and 39 respectively so as to turn the shaft 34 in the same direction as the driving shaft 33.

Arranged on the driven shaft 34 are a plurality of planetary transmission devices for actuating the ladder, fly-ladder and turn-table, the casings of these devices being designated respectively, by the numerals 44, 45 and 46. In Fig. 6 we have shown one of these devices in section, the same being intended for use in actuating the ladder or fly-ladder. As usual with devices of this kind, there is secured to the shaft 34 a pinion 47 and loosely arranged on the shaft and on either side of the pinion are sleeves 48 and 49. The sleeve 48 is provided at its inner end with a gear wheel 50 and at its outer end with a sprocket 51. The web 52 of the casing loosely receives the sleeve 48 and the web 53 of the reverse casing is integral with the sleeve 49. Positioned between the webs 52 and 53 and in juxtaposition to the web 53 and bearing on the sleeve 49, is a wall 54, connection between the wall 54 and web 52 being established by means of the usual

annular side wall 55. The inner end of the sleeve 49 is provided with a gear wheel 56 formed integral with or otherwise secured to the said sleeve. The web 52 and wall 54 are further connected by a plurality of shafts 57, upon each of which three gear wheels 58 are arranged, these gear wheels meshing with the gears 47, 50 and 56. The web 53 of the reverse casing is at its periphery provided with an inwardly extending flange 59. The flange 59 and side wall 55 form bearing surfaces for band brakes 60 and 61 by which the mechanism is actuated for moving the ladder. With this construction, when the band brake 61 is applied to the wall 55, the latter will be held stationary, whereby the gear wheels 58 will be rotated by the pinion 47 and rotary motion in one direction will be imparted to the gear 50 and sprocket 51. When the brake band 61 is released from the wall 55 and the brake band 60 applied to the flange 59 the casing will rotate bodily and at the same time the gears 58 will rotate on their axles 57, whereby rotary movement will be imparted to the sprocket wheel 51, but in a direction opposite to that previously described.

In Fig. 7 we have shown a transmission device corresponding in principle to that just described, but differing therefrom in the respect that the reversing mechanism is dispensed with and in lieu thereof there is provided a brake 79 for holding stationary whenever desired, the element driven by this mechanism. In this device there is loosely arranged on the driven shaft 34, a sleeve 62 having formed integral therewith the web 63 of a casing. The circumferential wall of this casing is designated by the numeral 64 and the end wall, arranged opposite to the web, by the numeral 65. The sleeve 66 loosely receives the driven shaft 34 and is arranged so as to form a bearing for the end wall 65. The inner end of this sleeve is provided with a gear wheel 67, and the sleeve is further provided with an integral web 68 having an inwardly extending flange 69. Supported by the webs 63 and 65 are a plurality of shafts 70, each having thereon a pair of gears 71 and 72, the latter of which meshes with the gear wheel 67, and the former of which meshes with a pinion 73 secured to the driven shaft 34. Formed integral or otherwise secured to the outer end 74 of sleeve 66 is a bevel gear 75. By reference now to Fig. 2 it will be seen that the horizontal portion 37' of the angular bracket 37 has journaled therein a vertical shaft 76 to the upper end of which is secured a bevel gear 77 which meshes with the bevel gear 75. Secured to the lower end of the shaft 76 is a spur gear wheel 78, the teeth of which mesh with the teeth 5 of the ring-like member 2 of the turn-table.

Surrounding the wall 64 of the planetary

transmission casing is a band brake 79, and surrounding the flange 69 is a band brake 80. With this construction it will be manifest that when the band brake 79 is applied to its casing the latter will be held stationary, so that the gear wheel 72 will rotate the gear wheel 67 and likewise the bevel gear 75 and turn the parts connected thereto. When the band brake 79 is released and the band brake 80 applied to the flange 69 the gear wheel 75 and the parts connected thereto will be held against turning movement.

By reference now to Figs. 1 and 2 it will be seen that bearings 81 and 82 are provided on the cross pieces 15 and 16, respectively, laterally of the bearings 18 and 19. The bearings 81 and 82 carry a shaft 83 on which is splined a barrel 84, the outer surface of which is provided with a worm 85. The opposite ends of the barrel 84 are journaled in bearings 86 and 87 which are fixedly secured to the lower side of the screw-threaded bearing 22. Journaled on the cross-bar 21 and between the bearing 22 and adjacent trackway 13 is a sleeve 88, one end of which is provided with a worm gear 89 meshing with the worm 85, and the opposite end of which is provided with a sprocket wheel 90. A sprocket wheel 90' arranged on one end of the shaft 83 is driven from the sprocket wheel 91 of the transmission casing 45 by means of a sprocket chain 91'. The sprocket wheel 20 on the screw 17 is driven from the sprocket wheel 92' of the casing 44 by means of a sprocket chain 92. The sprocket wheel 90 is in alinement with a sprocket wheel 93 arranged on a drum shaft 94 carried by a pair of brackets 95 secured to the sides 25 of the latter. As shown in Fig. 8, the drum on the shaft 94 carries a rope 95' which may be trained over a pulley at the upper end of the ladder and secured to the lower end of the fly-ladder 94' for the purpose of moving the fly-ladder.

With this construction it will be manifest that when the brake band 61' on the casing 44 is applied rotary movement in one direction will be imparted to the screw 17, whereby the bearing 22 and the parts connected thereto will move longitudinally of the screw, and if, at the beginning of movement the ladder be in a horizontal position and the movement permitted to continue until the member 22 reaches the opposite end of the screw, the parts will assume the position shown in Fig. 5. By next applying the brake band 96 to the casing 45 rotary movement will be imparted to the shaft 83 and sprocket 90. The sprocket 90 is connected to the sprocket 93 by means of a sprocket chain 97 so that as the sprocket 90 rotates rotary movement will be imparted to the

drum shaft 94, whereby the rope will be wound thereon and the fly-ladder raised. By applying the brake band 60', it will be seen that the screw and member 22 will move to their original positions; likewise by applying the brake band 98 the fly-ladder will be lowered; this reverse movement of the parts being accomplished without the necessity of changing the movement of the driving shaft 33 or driven shaft 34.

By reference now to Fig. 1 it will be seen that each of the brake bands is supported by an arm 99 connected at one end to the trackway 13, and suitably secured at its opposite end to the medial portion of the band.

For contracting and releasing the brake bands we provide three levers designated by the numerals 100, 101 and 102, these levers being fulcrumed on a shaft 103 extending outwardly from the track-way 14, the upper ends of the levers being within easy reach of the operator. Secured to the outer side of the track-way 14 is a bracket 103' to which is secured a horizontally disposed T-shaped lever 104. The stem of the lever 104 is connected to the lower end of the lever 102 by means of a link 105, and the opposite ends of the cross-bar of the lever are operatively connected with the brake bands 60' and 61' by means of connecting rods 105 and 106. It will, of course, be understood that the brake bands are all of well-known construction, the adjacent ends of each band being provided with a suitable device which when actuated to move in one direction by one of the rods will contract the band and when moved in the opposite direction will expand the band. A T-shaped lever 107 is secured to a bracket 108 arranged on the trackway 14. The cross-piece of the lever 107 is connected to the brake bands 79 and 80 by means of connecting rods 109 and 110, the stem of the lever 107 being connected to the lever 100 by means of a link 111. A bracket 112 supports a T-shaped lever 113, the stem of which is connected to the lever 101 by means of a link 114, the cross-piece of the lever 113 being connected to the brake bands 96 and 98 by means of connecting rods 115 and 116. From the foregoing, it will be seen when the operating levers are moved in the required directions the various operations before described, will be performed.

Having thus described the invention, what we claim is:—

In an apparatus of the class described, the combination of a support, a horizontally slidable member mounted on said support, a main ladder pivoted to said member, a screw for moving said member, a rock shaft, means operatively connecting said member and said rock shaft, an arm on said rock shaft, means pivotally connecting said

arm with said ladder whereby the movement of said member is adapted to raise and lower said ladder, a constantly rotating power shaft mounted on said support, and
5 means operatively connecting said power shaft and said screw and adapted to rotate the latter in either direction.

In testimony whereof we affix our signatures in presence of two witnesses.

EDWARD F. DAHILL.
GAD R. BARTLETT.

Witnesses:

M. M. WEBSTER,
J. P. DORAN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."