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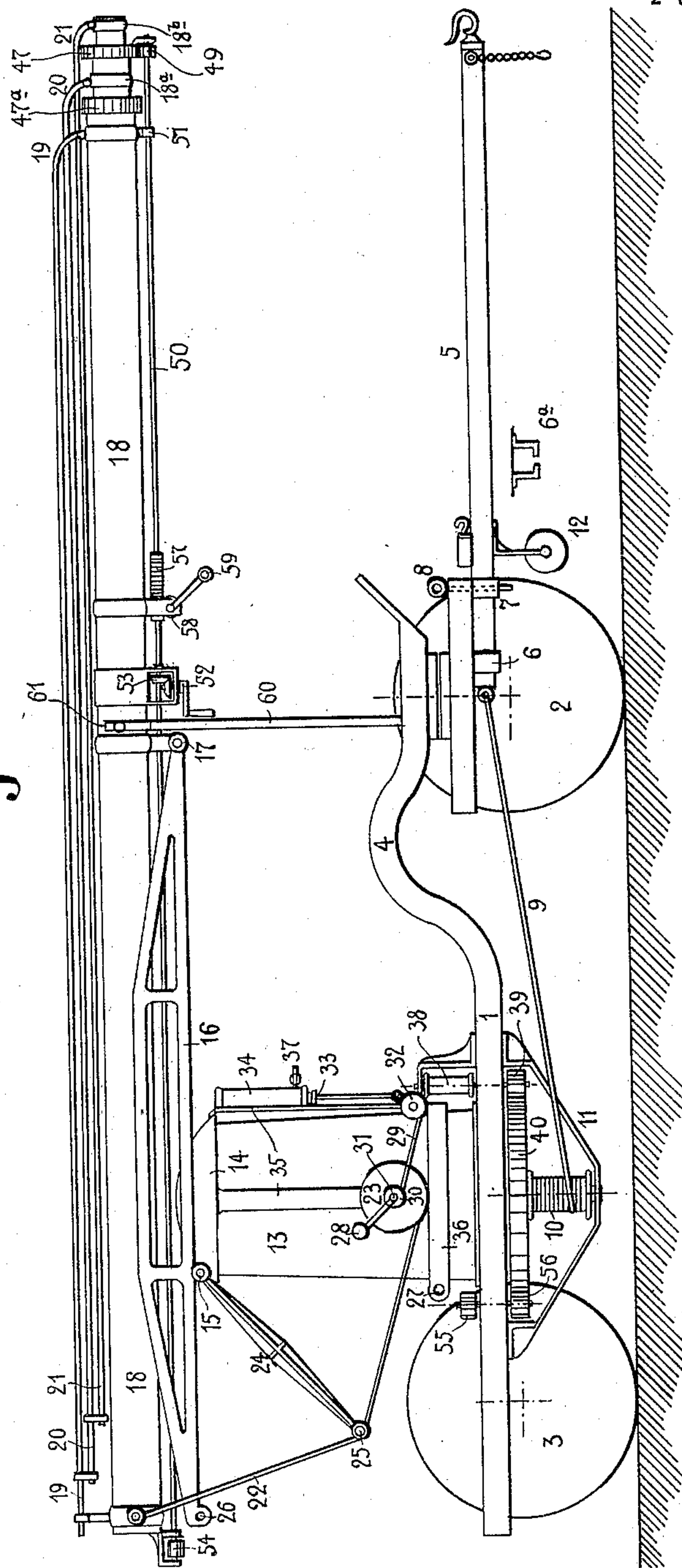
R. SCHAPLER.
FIRE ESCAPE LADDER.

(Application filed May 1, 1897.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.



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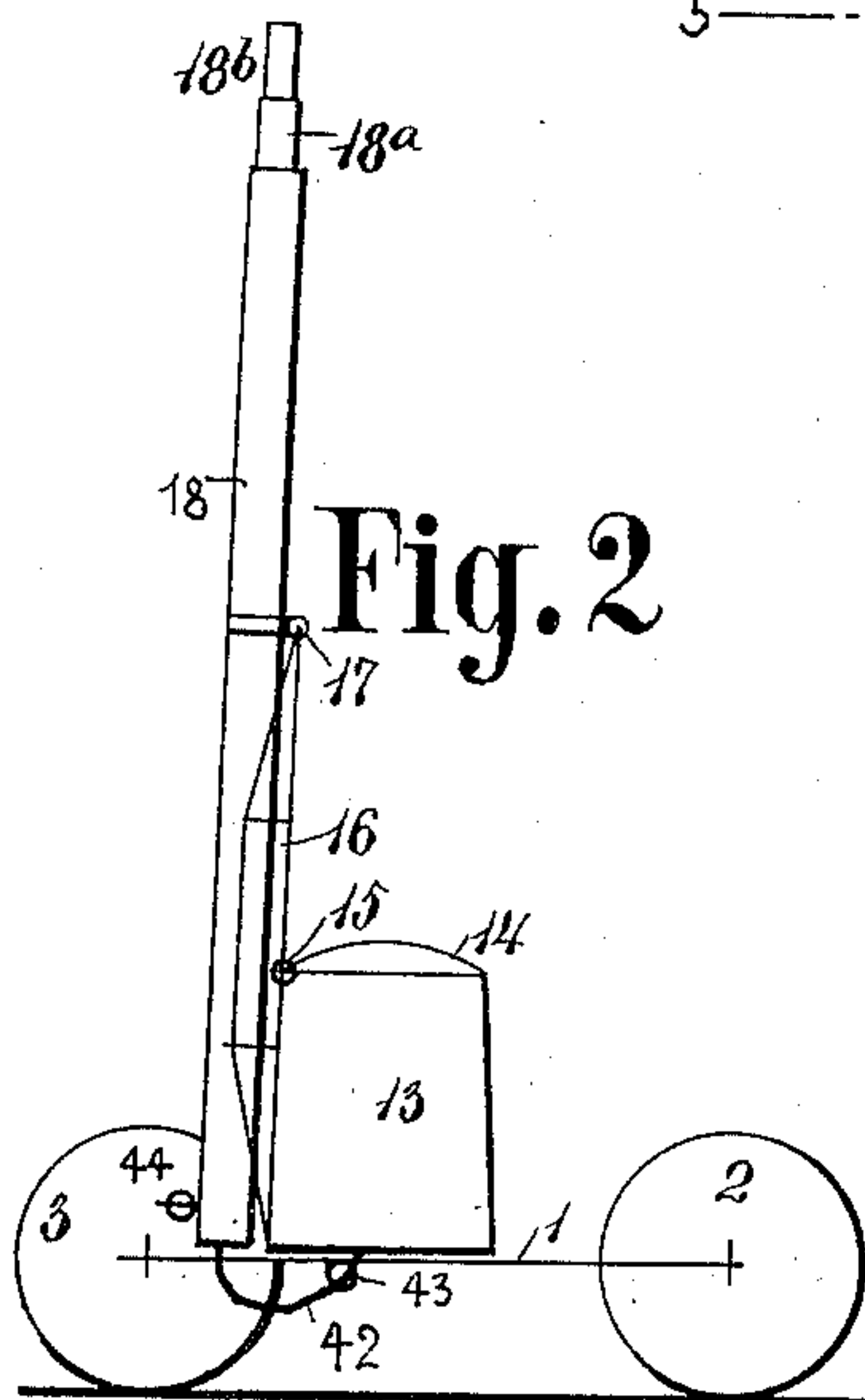
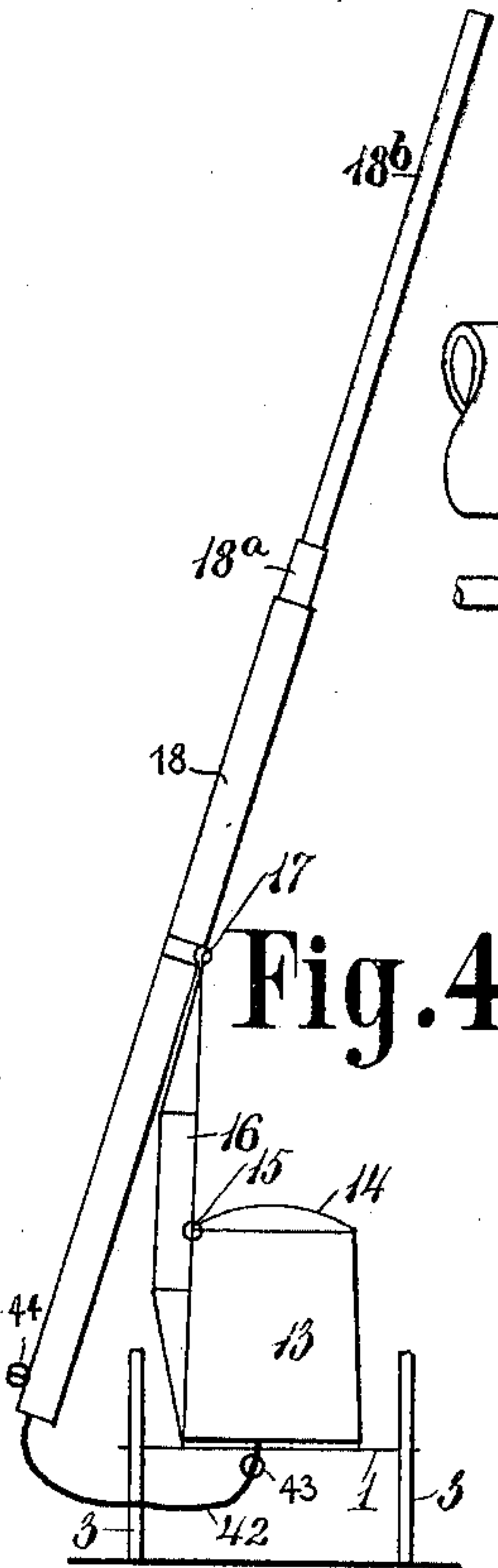
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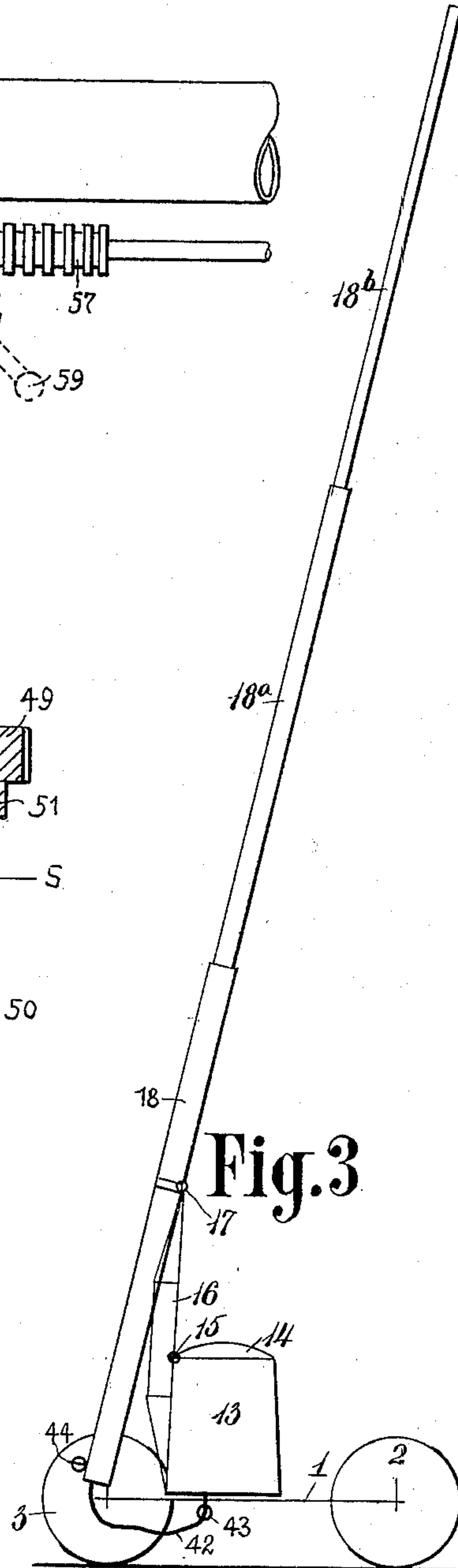
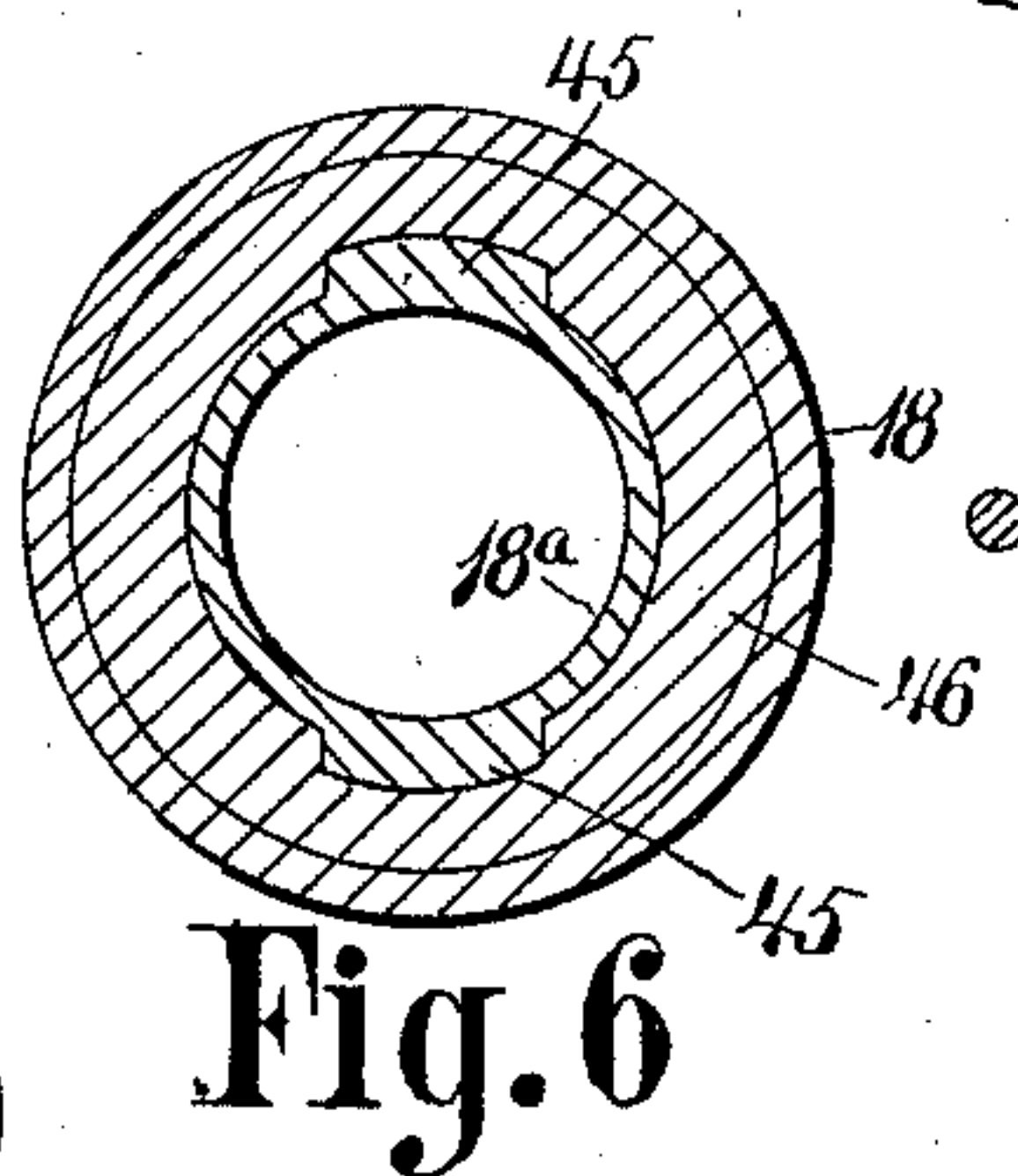
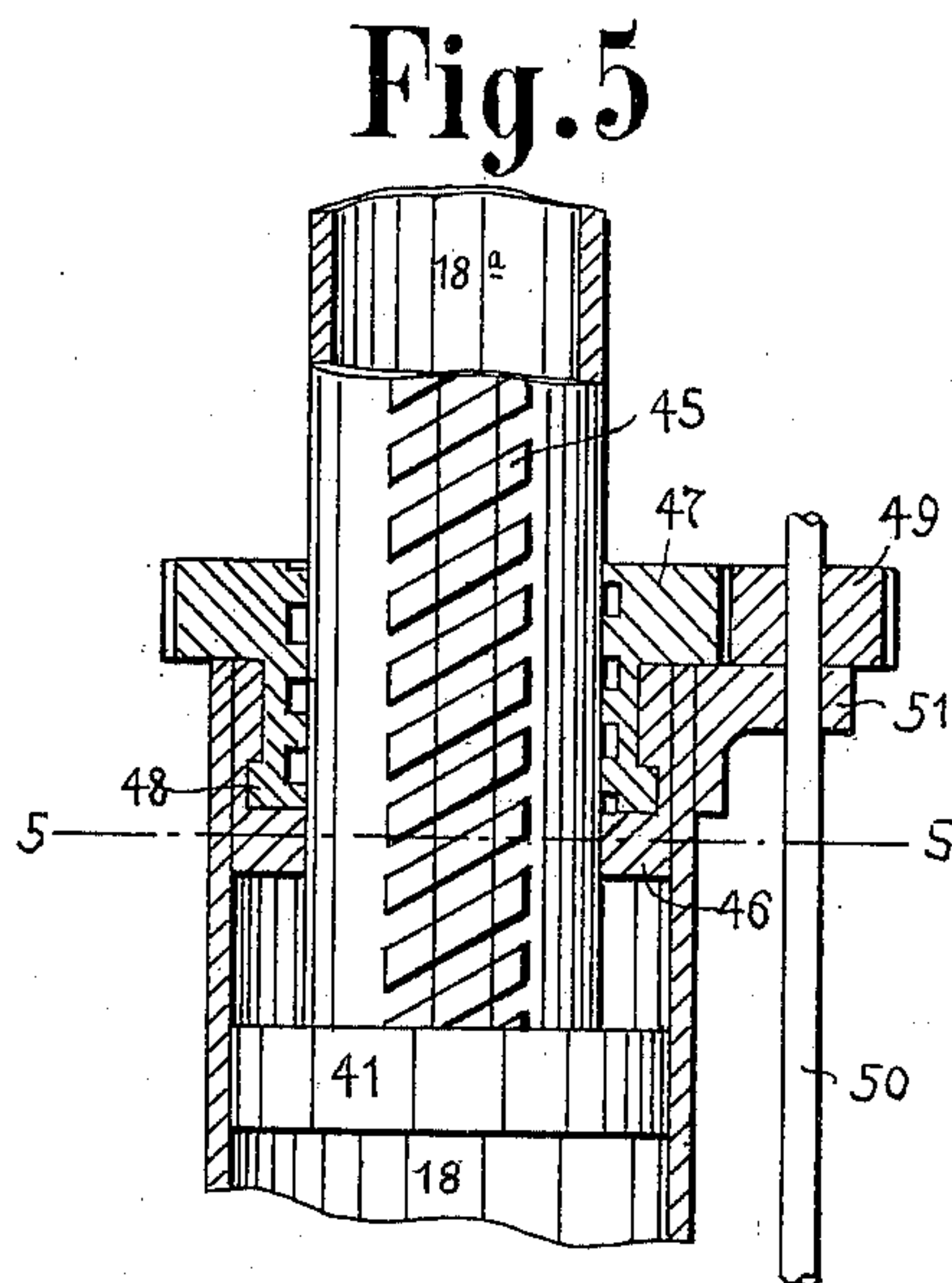
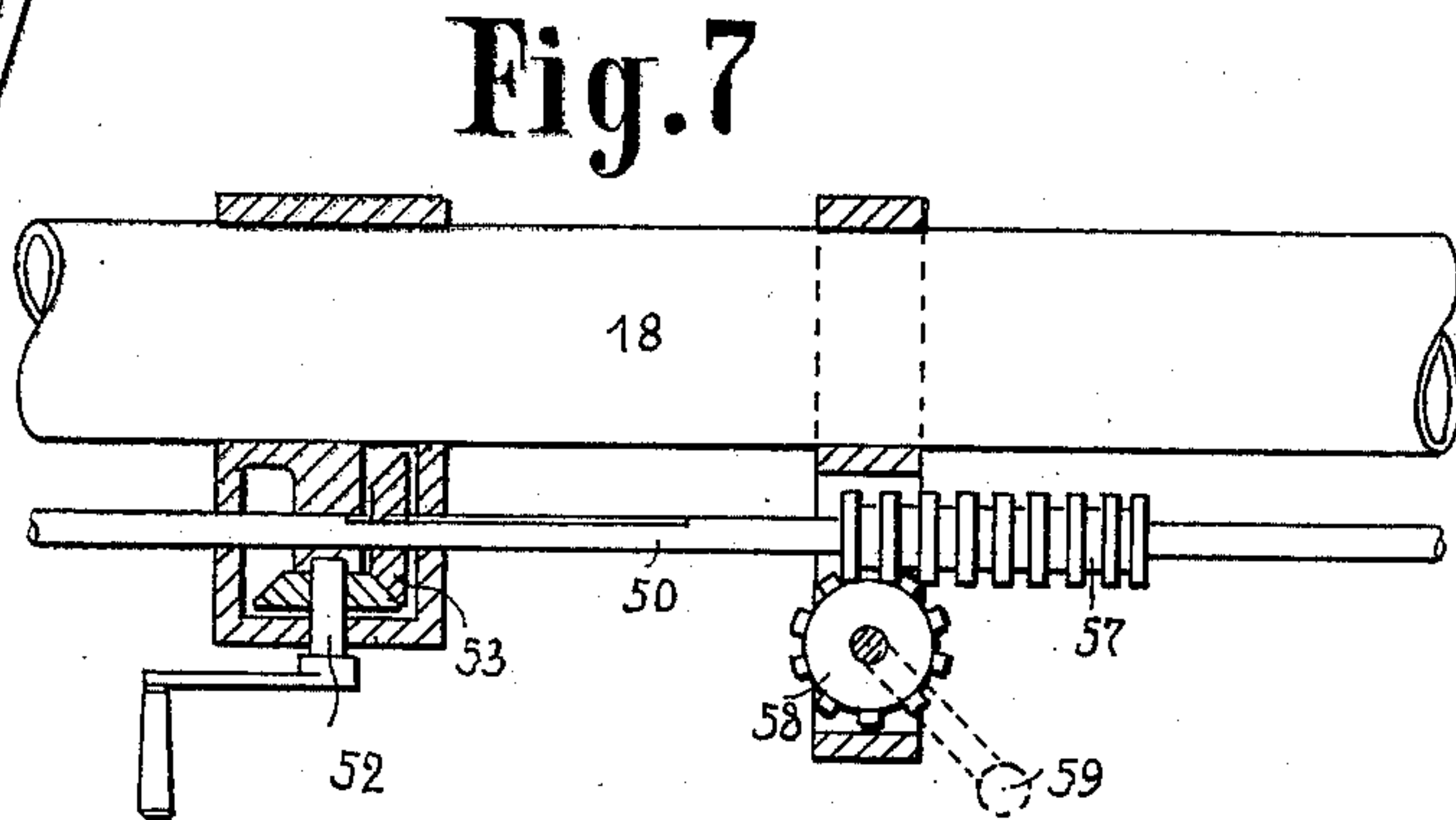
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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

RICHARD SCHAPLER, OF FRANKFORT-ON-THE-MAIN, GERMANY.

FIRE-ESCAPE LADDER.

SPECIFICATION forming part of Letters Patent No. 610,692, dated September 13, 1898.

Application filed May 1, 1897. Serial No. 634,759. (No model.)

To all whom it may concern:

Be it known that I, RICHARD SCHAPLER, a subject of the Emperor of Germany, and a resident of Frankfort-on-the-Main, in the Kingdom of Prussia, Germany, have invented certain new and useful Improvements in Fire-Escape Ladders, of which the following is a specification.

This invention relates to a ladder mounted upon a suitable vehicle and with self-contained means whereby the ladder may be erected, extended, rotated, and adjusted in inclination at will, the means for accomplishing these various purposes being operated by compressed gas or fluid or by horse-power or by hand.

The invention consists in certain novel features of construction hereinafter fully described, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 represents a side elevation of the complete apparatus folded in condition for transportation. Fig. 2 is a view on a smaller scale representing the apparatus in a position of erection and ready to be extended and shifted to different positions for use. Fig. 3 is a view similar to that shown in Fig. 2, in which the ladder is shown extended and slightly inclined. Fig. 4 is a rear view of the apparatus, in which the ladder is shown shifted to a position on one side of the vehicle. Fig. 5 is a detail view, on an enlarged scale, showing the construction of a portion of the pipe system with one of the contained pistons through which the ladder is extended by compressed gas or fluid and also the rack-and-screw device through which the ladder may be extended by hand. Fig. 6 is a section on the line 5 5, Fig. 5; and Fig. 7 is a detail view of a portion of the hand elevating mechanism.

The vehicle comprises a suitable platform 1, with front wheels 2 and rear wheels 3, said vehicle preferably being made with a cut-under 4 to permit the front axle to turn completely around.

5 is the draft-tongue, secured in clips 6 7 by means of a bolt 8 and adapted to be released by the removal of bolt 8. The tongue carries at its rear end a rope or cable 9, which

is wound about a windlass 10, supported beneath the vehicle by a frame 11, and by means of which the tongue is adapted to do certain work to be hereinafter referred to, and said tongue has a wheel 12 suspended therefrom, upon which it may travel when removed from the vehicle. The clips 6 and 7 are slotted on their lower sides, as shown at 6^a, in order that the rope or cable 9 may drop through the clips as the tongue is drawn away by the horses in manipulating the apparatus by horse-power, as will be hereinafter described.

The vehicle carries a tower or pressure-receiver 13, surmounted by a revoluble cap or turn-table 14, upon which is pivoted at 15 a carriage 16. The carriage 16 has pivoted to it at 17 telescoping pipe-sections 18 18^a 18^b, which carry, respectively, ladder-sections 19, 20, and 21, and the pipe-sections are telescopic in order that said ladder-sections may be extended one above the other to form a continuous ladder.

22 represents a rope or cable connected to the lower or outer pipe-section 18, and this rope is wound upon a drum 23 in order that the pipe-sections may be erected at will. To maintain the efficiency of the pull imparted from the drum 23 through the rope or cable 22 to the pipe-sections, I employ a deflecting-arm 24, hinged at 15 and having at its outer end a guide 25, through which the rope or cable 22 passes. When the drum 23 is wound, the carriage 16, with the parts carried by it, is moved to an erect position, after which the carriage is fixed in said position by a bolt or pin passed through an eye 26 at the lower or rear end of the carriage and an eye 27 on the tower-like receiver 13. The carriage is thus rigidly secured in erect position; but the inclination of the pipe-sections, and consequently of the ladder-sections, may then be adjusted at pleasure by unwinding the drum 23. The drum 23 may be operated either by a hand-crank 28 or by means of a winding-cord 29, connected at one end to small pulley 30 on the end of shaft 31 of the drum 23, the other end of which winding-cord passes around a guide-pulley 32 to a piston-rod 33 of a piston (not seen) in a cylinder 34, suitably mounted upon and receiving pressure

from the tower-like receiver 13. The drum 23, the eye 27, and the cylinder 34 are suspended from the rotating cap or turn-table 14 by means of hangers 35 and ring 36, so that these parts necessarily rotate with said cap or turn-table and maintain constant operative relation with the carriage 16 and with each other.

37 represents an outlet which may be opened after communication between the receiver 13 and cylinder 34 has been cut off and the pressure in cylinder 34 therefore allowed to escape and the winding-cord 29 released to permit unwinding of drum 23 and the inclination of the pipe-sections changed or lowered entirely at will.

In order to provide for operating the wheel 23 by horse-power, I employ a winding-drum 38, which will take the winding-cord 29, and the lower end of the shaft of which winding-drum carries a gear-wheel 39, which meshes with the large wheel 40 on the windlass 10, mounted on the frame 11, hereinbefore described. With the parts connected as described and the bolt 8 removed the horses may be driven off a limited extent to impart rotation to the windlass 10, and the operation will follow, as described. Suitable ratchets may be employed for holding the rotating parts to any position to which they may be adjusted.

Obviously any desired number of telescoping pipe-sections may be employed. I have shown three pipe-sections, and each of the inner ones 18^a 18^b carries a piston 41, which works in the pipe surrounding it. The result is that when pressure, either fluid or gas pressure, is introduced into the lower end of pipe-section 18 through a flexible hose 42, as shown in Figs. 2, 3, and 4, the inner pipe-sections 18^b 18^a will be successively projected into the position shown in Fig. 3. The parts will remain in this position until the pressure is released, which may be accomplished by cutting off communication with the receiver at 43 and then opening an escape-cock 44 at the lower end of the outer pipe-section 18.

As a further means for projecting or extending the ladder each pipe-section is provided with screw-threads 45, which work through a diaphragm 46 on the end of the surrounding pipe-section, which diaphragm also carries a nut 47, threaded to mesh with the screw-threads 45. The screw-threads engage with the diaphragm 46 to prevent rotation of the pipe-section which carries said screw-threads, and the nut engages with said diaphragm by a flange 48 to prevent longitudinal displacement of the nut. If therefore rotation is imparted to the nut, the pipe-section engaged by said nut is necessarily forced outward or inward, according to the direction of rotation of the nut. To impart such rotation to the nut, I employ a pinion 49, carried upon the end of the shaft 50, which is journaled at 51 in one of the diaphragms,

and this shaft is adapted to be rotated by hand through the medium of the bevel crank-gear 52, (see Figs. 1 and 7,) meshing with the bevel-wheel 53, which is keyed upon the shaft 50, or said shaft may be rotated by horse-power by causing a pinion 54 on the inner end of said shaft, adjacent to the lower end of the outer pipe-section 18, to engage with a corresponding wheel 55 on the platform of the vehicle when the carriage and pipe-sections are brought into erect position and then imparting rotation to the pinion 53 from the windlass 10 through the medium of large wheel 40 and a wheel 56, which meshes with said large wheel 40 and which is on the same shaft with the wheel 55.

In order that the shaft 50, with its gear-wheel 49, may be made to successively rotate the pinion 47 and the pinion 47^a, said shaft may slide longitudinally in the bevel-gear 53 and pinion 54 while being fixed against relative rotation in said parts, and said shaft carries a cylindrical rack 57, which is engaged by a pinion 58, carried on the outer pipe-section and rotated by a crank 59. By this means when the inner section 18^b of the pipe-sections has been extended the pinion 49 may be shifted through the pinion 58, rack 57, and shaft 50 until said pinion 49 engages with the lower nut 47^a on the outer end of the lower or outer pipe-section, and the second or intermediate pipe-section 18^a may then be extended. The pitch of the screw-threads 45 and of the threads in the nuts 47 is such that the parts will remain in any position to which they may be adjusted.

60 represents a prop or support hinged at 61 to the outer pipe-section and adapted to rest upon the platform of the vehicle when the parts are in position for transportation.

By employing two different hinging-points 15 and 17 the work is greatly facilitated, the stability of the apparatus is increased, and the length over all is reduced when the apparatus is in position for transportation.

It is not intended that the various devices for operating the apparatus shall be mere alternative appendages, as it may be convenient and desirable to have in one apparatus a number of the different means for manipulating. While the fluid or liquid pressure is preferable to horse-power, it might be necessary to use the apparatus repeatedly without opportunity intervening for renewing pressure within the receiver 13, and it would then be necessary to use the horse-power. Moreover, while the horse-power is preferable to and quicker than manipulation by hand it might be necessary to use the apparatus when horse-power is not available, and in that event the hand-power would have to be used.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. A fire-escape apparatus comprising a

platform, a tower pressure-receiver, a turn-table mounted on the tower pressure-receiver, a carriage surmounting the tower pressure-receiver and pivoted to the turn-table, the
 5 telescopic pipe-sections mounted on the carriage, the outer pipe-section being pivoted to the carriage, means for oscillating the carriage with the pipe-sections, and for oscillating the pipe-sections on the carriage, and a
 10 hose connecting the tower pressure-receiver with the telescopic pipe-sections for erecting the latter; substantially as described.

2. A fire-escape apparatus comprising a platform, a tower pressure-receiver, a turn-
 15 table mounted on the tower pressure-receiver, a carriage surmounting the tower pressure-receiver and pivoted to the turn-table, the telescopic pipe-sections mounted on the carriage, the outer pipe-section being pivoted to
 20 the carriage, means for oscillating the carriage with the pipe-sections and for oscillating the pipe-sections on the carriage connected with the tower pressure-receiver, and means for erecting the pipe-sections; sub-
 25 stantially as described.

3. A fire-escape apparatus comprising a tower, a turn-table mounted on said tower, a carriage pivotally secured to the turn-table, telescopic pipe-sections pivoted to an end of
 30 the carriage distant from the pivot of said carriage on the turn-table, and means for erecting the carriage and pipe-sections and for locking the carriage in erected position while the pipe-sections are manipulated; sub-
 35 stantially as described.

4. A fire-escape apparatus comprising a tower, a turn-table mounted on the tower, a carriage surmounting the tower and pivoted to the turn-table, the telescopic pipe-sections,
 40 the outer pipe-section being pivoted to the carriage, the flexible connection for erecting the carriage with the pipe-sections and the pendent guide secured to the pivot of the carriage for deflecting the flexible connection
 45 and maintaining the direction of pull at an efficient angle to the pipe-sections; substantially as described.

5. A fire-escape apparatus comprising a receiver, the cap rotatably mounted on said
 50 receiver, the pipe-sections and means for erecting the pipe-sections, and the hangers and ring suspended from the rotatable cap whereby the erecting means are supported; substantially as described.

6. A fire-escape apparatus comprising a tower pressure-receiver, a turn-table mounted
 55 on the tower pressure-receiver, a carriage surmounting the tower pressure-receiver and pivoted to the turn-table, the telescopic pipe-sections mounted on the carriage, the outer
 60 pipe-section being pivoted to the carriage, a drum, a rope or cable connecting the drum with the pipe-sections, the pulley for turning the drum, the cylinder having connections
 65 with the tower pressure-receiver for supply-

ing pressure to it, a cylinder piston-rod, and a cord connecting the pulley with the piston-rod; substantially as described.

7. A fire-escape apparatus comprising a platform, a tower, the pipe-sections pivotally
 70 mounted on the tower, the winding-drum mounted on the tower, the rope or cable connecting the winding-drum on the tower with the pipe-sections, the winding-drum mounted
 75 on the platform and connected with the winding-drum on the tower, a windlass having working connections with the winding-drum on the platform, and means for hitching a
 80 draft-animal to the windlass; substantially as described.

8. A fire-escape apparatus comprising a platform, a tower, the pipe-sections pivotally
 mounted on the tower, the winding-drum mounted on the tower, the rope or cable con-
 85 necting the drum with the pipe-sections, the winding-drum mounted on the platform and connected with the drum on the tower, a windlass having working connection with the wind-
 90 ing-drum on the platform, the clips secured to the platform, the releasable tongue mounted in the clips, and the rope or cable connecting the tongue with the windlass; substan-
 95 tially as described.

9. The combination of the operating-windlass, the draft-tongue connected to the rope
 100 of said windlass, and the clips 6 and 7 for receiving the tongue slotted on their under sides to permit the windlass-rope to drop through them as the tongue is removed; substantially as herein explained.

10. The combination of the operating-windlass, the tongue detachably secured to the
 105 vehicle and connected with the rope of said windlass, and the ground-wheel 10 carried by the tongue; substantially as herein explained.

11. The combination of a platform, a tower, the pipe-sections, the parts to be operated
 110 pivoted upon the tower, the windlass, the gear-wheel on the platform rotated by said windlass, and the gear-wheel carried by the pipe-sections and adapted to be brought into
 115 engagement with the gear-wheel on the platform by the erection of the pipe-sections; substantially as herein explained.

12. The combination of the telescoping
 120 pipe-sections, the screw-threads carried by the inner sections, the nuts carried by the outer ends of the sections and engaging the screw-threads, the shaft running longitudinally of the pipe-sections, means for rotating the shaft,
 125 and means for imparting rotary movement from the shaft to the nuts; substantially as described.

13. In combination with the pipe-sections; of an apparatus substantially as described,
 130 the nuts by which the pipe-sections are extended, the shaft running longitudinally of the pipe-sections and having means for rotating it, a pinion carried by the shaft for imparting movement to the nuts, and means

for moving the pinion on the shaft into engagement with the nuts successively; substantially as herein explained.

14. The combination of a suitable tower,
5 a carriage hinged upon the the tower, a pipe-section hinged to the carriage, the flexible connection, means for locking the carriage in erected position, and means for manipulat-

ing the flexible connection to change the angle of the pipe-section after the carriage is fixed; substantially as herein explained. 10

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