

(No Model.)

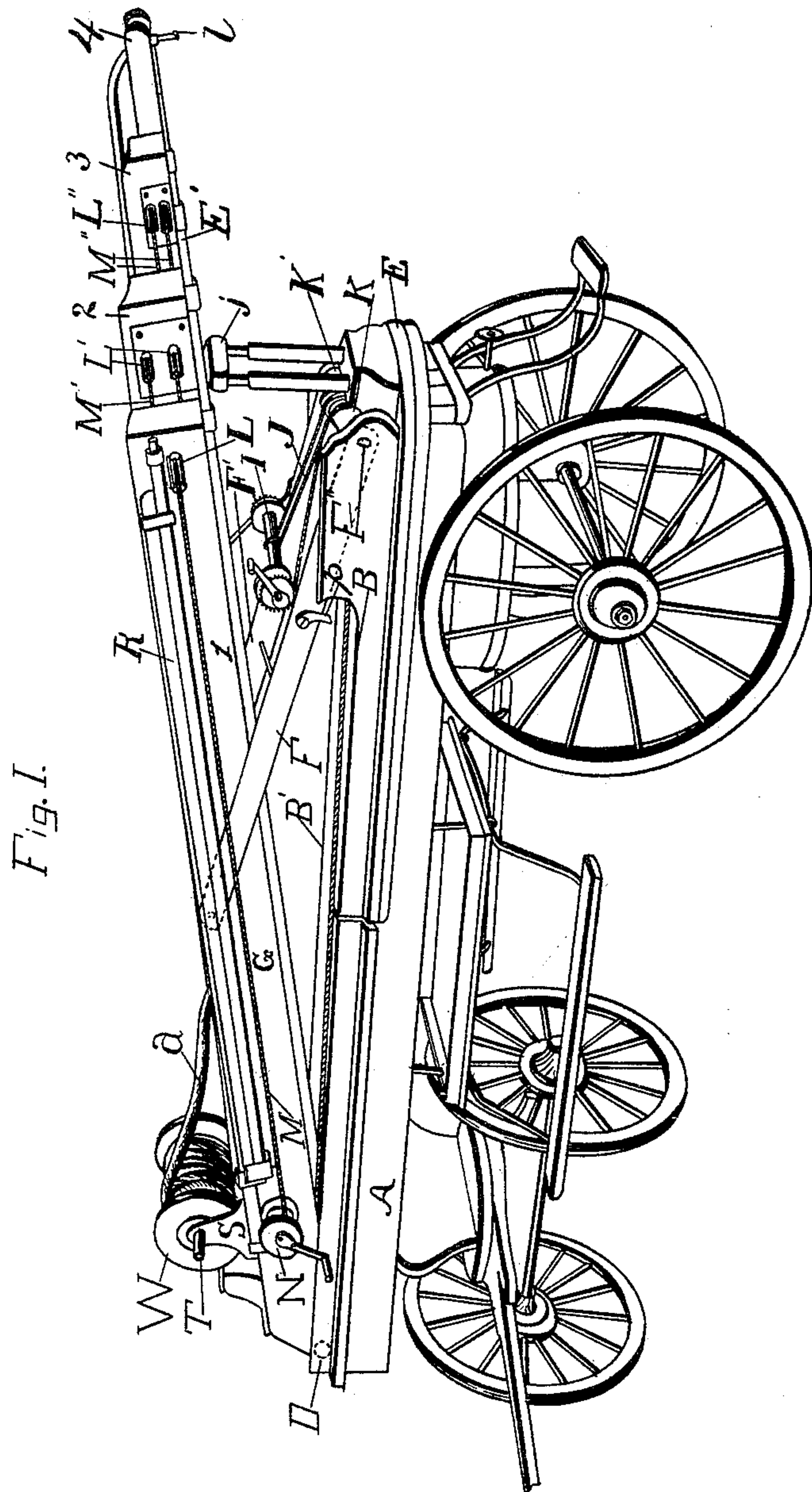
3 Sheets—Sheet 1.

W. S. ODLE.

PORTABLE EXTENSION LADDER.

No. 405,969.

Patented June 25, 1889.



Witnesses  
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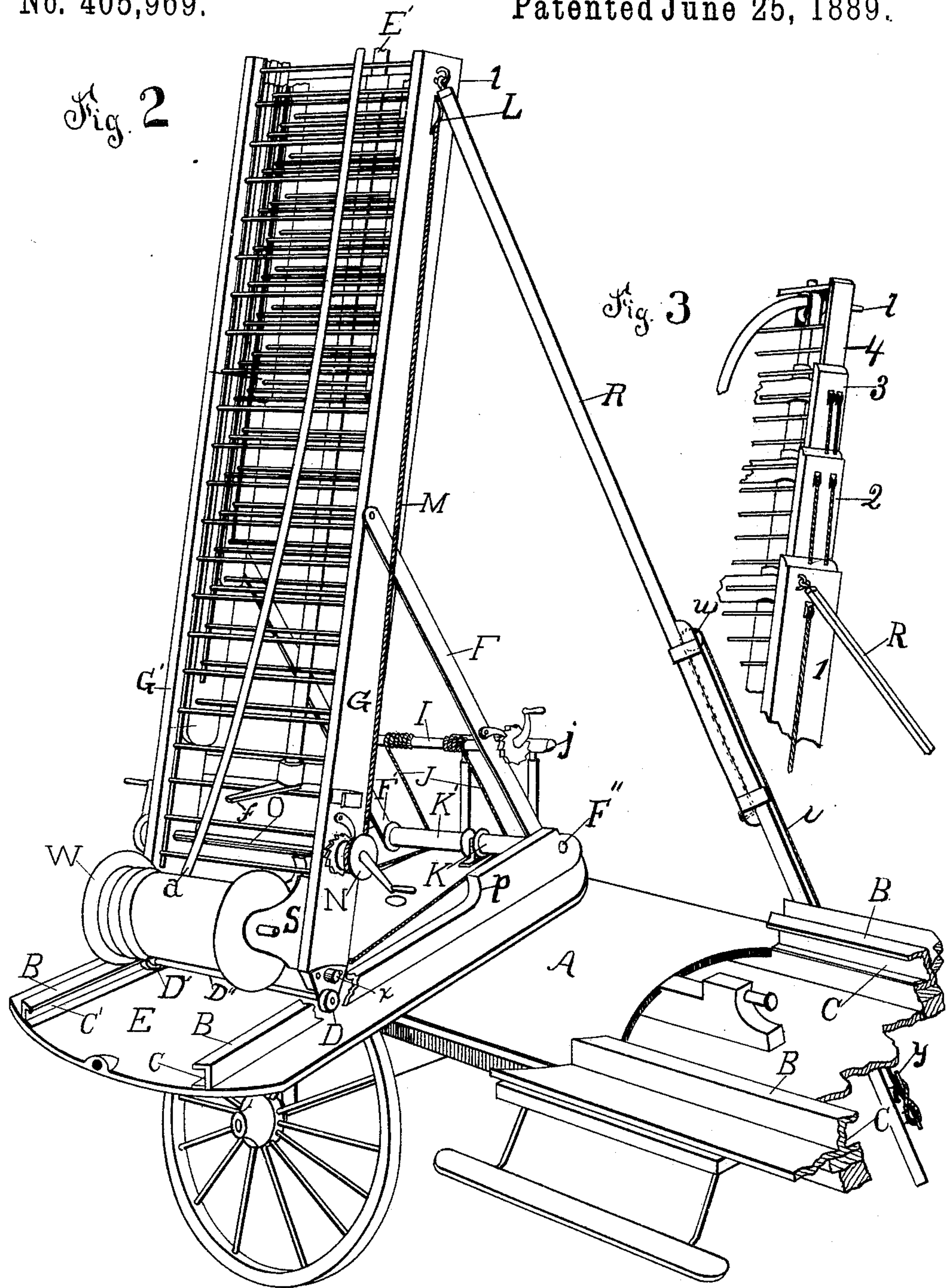
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3 Sheets—Sheet 2.

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Witnesses  
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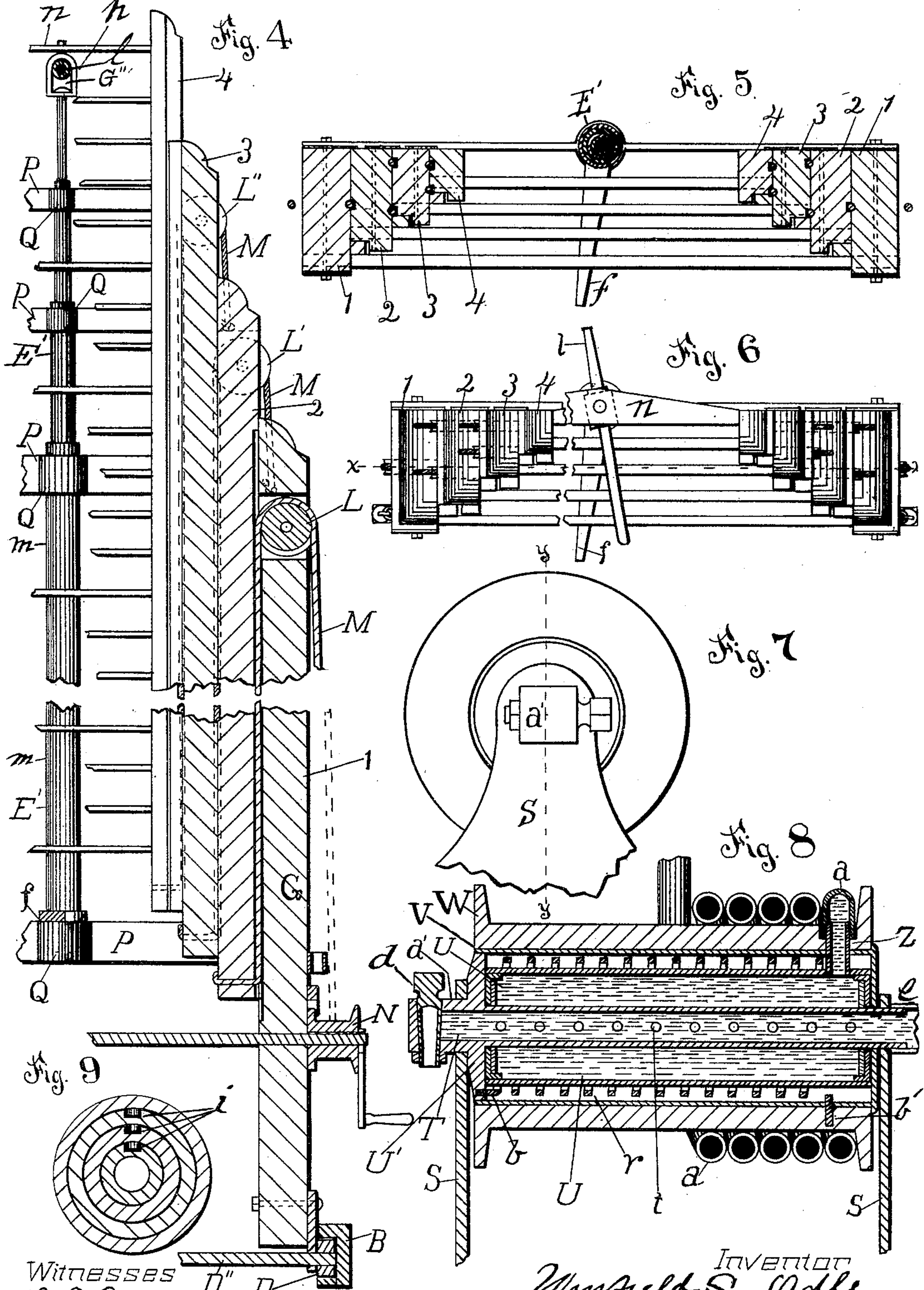
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# UNITED STATES PATENT OFFICE.

WINFIELD S. ODLE, OF LOS ANGELES, CALIFORNIA.

## PORTABLE EXTENSION-LADDER.

SPECIFICATION forming part of Letters Patent No. 405,969, dated June 25, 1889.

Application filed January 14, 1889. Serial No. 296,370. (No model.)

*To all whom it may concern:*

Be it known that I, WINFIELD S. ODLE, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful improvements in portable extension-ladders and appurtenances thereof for rescuing persons in burning buildings and for extinguishing fires, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to certain improvements in combined extension-ladders mounted and operating on a truck or carriage platform and furnished with a water-receiver, a fire-hose, and reel, and connected with suitable mechanism for auxiliary purposes and for operating the same, constituting an apparatus to be used as a fire-extinguisher and as a means of escape for persons in burning buildings.

One prominent object of my invention is to provide for the purpose proposed sets of connected hinged and adjustable ladders working one within another, like the sections of a telescope, and which may be quickly adjusted horizontally, elevated above a platform or turn-table that is mounted upon a carriage or truck, and extended to any desired elevation by the use of windlasses and cranks connected with the ladders by means of cords, wire ropes, or chains running upon pulleys.

An important object of the invention is to elevate the hose for the water to the full height to which the ladders may at any time be extended, and by the same means by which and at the same time in which the ladders are extended.

In reducing my invention to a tangible and practical form or condition I have provided means for handling the ladders and water-hose and the other operative elements subsidiary thereto with the greatest possible facility, quickness, and precision, which may be done without detaching the team from the carriage, and thereby avoid any delay should an emergency arise for speedily removing the entire apparatus from too near proximity with the burning building or a falling wall.

There will be described herein as included with the various combinations of mechanism

I have devised substantial lateral-hinged extension-braces to be employed as occasion may require to give side support and maintain firmness and stability to the whole apparatus when the same is in use; second, an extensible axially-adjustable shaft to serve as a ladder-support, provided at its lower end with a hand-lever and at the top with a swiveled pulley and yoke or bridle to hold the end of the hose and its nozzle, by means of which extensible and axially-adjustable support, its lever and bridle, the hose-nozzle may be quickly adjusted by a fireman at the foot of the ladders to any desired horizontal position, and thereby direct the course of the jet of water issuing therefrom; third, a hollow cylinder mounted as a hose-reel upon brackets projecting from the side rails of the hinged base-ladder (to which they are fastened) and provided with a perforated tubular fixed axle extending entirely through said cylinder to admit water to enter therein from an engine and having an interior packed cylinder of greater diameter than the tubular axle to receive the water; with said water-receiving-cylinder the end of the hose communicates; also provided with a retracting-spring coiled within the hose-reel between it and the water-cylinder, to automatically wind up the hose as it descends with the extension-ladders when they are lowered to their position of rest; fourth, grooved lateral ways formed in the inner sides of the side pieces of the carriage-platform (a portion of which is a turntable) in which lateral ways or grooves friction-wheels journaled to the ends of the side pieces of the hinged or base ladder work, to carry and guide the movements of the ladders as they are in a body caused to travel back or forth on the truck or carriage, and, fifth, a pair of rear braces pivoted to the outsides of the two rails of the hinged or base ladder and extending rearward to the side pieces of the carriage-platform, where they are also pivoted, upon which braces a windlass with cranks and a shaft provided with spools are mounted and used to move and elevate by connecting cords or chains the set of ladders preparatory, if need be, to the extension and use thereof.

In the drawings, Figure 1 represents a side elevation, slightly in perspective, of my in-



vention, exhibiting the entire apparatus as folded in place for transporting upon the streets. Fig. 2 represents a perspective view of a portion of my apparatus, exhibiting the turn-table adjusted transversely of the carriage, the ladders partly broken away and in partial elevation, part of the guideways traversed by the wheels of the ladders, one of the extension-braces set upon the ground, and the principal parts of the operating mechanism. Fig. 3 is a perspective view representing one side of the upper parts of the ladders and their cylindrical extension-brace and hose-support mounted with its pulley and bridle to receive and hold the hose and its nozzle and exhibiting the cords and pulleys employed in extending the ladders. Fig. 4 represents the four rails forming one side of the combined ladders in elevation and mostly in section, taken at line  $x x$  of Fig. 6, and exhibits the connection of the ropes or chains for actuating the ladders, the pulleys upon which they run, the cylindrical ladder-brace, with the hose-nozzle in its bridle at the top thereof, and the hinged connection of the outer or base ladder-frame with the journaled wheels at the foot thereof. Fig. 5 represents a transverse horizontal section of the ladders, exhibiting the cords in their runways, the metal plates secured to the rails to form the grooves or guideways in which the ladders work, and the metal cylindrical extensible brace which strengthens the ladders, and the hand-lever by which the cylindrical brace may be partially revolved to adjust the hose-nozzle at the top of said brace. Fig. 6 represents a top view of the ladders, and shows the broad top rung of the topmost ladder, to which the yoke or bridle of the hose-nozzle is swiveled. Fig. 7 represents an end view of the cylindrical water-receiver and hose-reel with its spool-like flange, also the bracket to which the perforated fixed cylindrical axle on which the hose-reel revolves is secured. Fig. 8 represents a central longitudinal section of the water-receiver and its perforated axle with its faucet at one projecting end and adapted to receive the hose from an engine at its other end, the interposed coiled retracting-spring, the hose reel or cylinder, and the hose wound thereon. Fig. 9 is a transverse section of the tubular brace serving as a ladder-support and hose-ladder, capable of both longitudinal and axial adjustment, and exhibits the feathers and grooves which govern the movements of its sections.

In the accompanying drawings, A denotes the truck or carriage bed or platform, provided with a track along its side pieces formed of rail B, having longitudinal grooves C C' in their inner faces, in which anti-friction wheels D D' work, said wheels being journaled to the axle-shaft D'', which is journaled in metal plates fastened to and extending below the bottom of the hinged or outside ladder-rails G, to support the set of ladders when being moved back and forth over the

platform. This grooved track B B is made in two sections, one of which is fixed on frame or bed A, the other being fixed upon the turn-table E, which is pivoted to the platform A directly over the center of the axle of the rear wheels of the carriage.

The extension-braces R, for supporting the ladders laterally, are hinged one at each side of the outside or hinged ladder and adapted to be extended to reach the ground, whether higher or lower in relation to the carriage, and the cord V, connecting the upper section of the brace to the lower section, is secured to the bottom of the former, passes up and over a pulley  $w$  in the other section, thence down, and may be fastened to the cleat  $y$ , secured upon the last-named section, and by this means the brace is not only held in a rigid condition, but is strengthened. Two braces F F' are pivoted at their respective ends to the turn-table E and to the side rails G G' of the outside or hinged ladder 1. The axle I, provided with cranks, ratchet-wheels, and pawls, is journaled on the braces F F', and the axle on which the spools K K' work serves as the hinge-joint or journal for the said braces F F' and connects the braces to the turn-table. Cords or chains J, attached to the bottom of the outside of ladder-rails G G', respectively, extend rearward and around spools K K', thence up to the axle of shaft I, to which they are securely fastened near the middle thereof, so that the revolving of axle-shaft I will wind upon it the ropes J, drawing the set of ladders rearwardly, and as the set of ladders is pivoted to the hinged braces F F' near their center this rearward movement of the set of ladders will necessarily cause their free ends to be elevated, passing through a curved line or course as they ascend.

The set of ladders in the present case consist of four arranged to work one within another, like the sections of a telescope; but a greater or less number may be connected and operated in the same manner and by the same means employed in this instance.

I employ a system of ropes or chains and pulleys connected with the set of ladders to actuate them and effect their extension. The first ropes or chains are attached to windlass N (one at each end thereof) and extend along the outsides of the rails of hinged ladder 1 and pass over pulleys L L, thence down in grooves made in the rails of ladder 2 to the bottom thereof, where they terminate, and are securely fastened to the bottoms of the rails of the second ladder.

The second ladder is connected to the third ladder in the same manner that the first is to the second, there being, however, two ropes and two pulleys L', instead of one of each, at each side of the second ladder, and these ropes M' are fastened to the tops of the rails of ladder 1. In other words, the ropes M' pass over pulleys L' and through grooves to the bottoms of the rails of the third ladder, to which their opposite ends are permanently



fastened, and in precisely the same manner the third ladder is connected with the fourth ladder. Each of the three ladders 2, 3, and 4 works freely in sash-grooves formed in the rails of the ladder next thereto—namely, ladder 2 has its runways in the rails of hinged ladder 1, and ladder 3 has its runways in the rails of ladder 2, and ladder 4 has runways in the rails of ladder 3. By this method of uniting the set of ladders the movement of extending the ladders is accelerated greatly, for it will be seen that ladder 4 must receive the aggregate movement of the two ladders 2 and 3 in addition to the movement due to its own immediate connection with ladder 3, and also will ladder 3 receive the movement of ladder 2 additional to that due to its own immediate connection with ladder 2.

The water-receiving cylinder U revolves with the reel W upon the stationary hollow perforated axle T, supported in brackets S on hinged ladder 1. Axle T is provided with faucet *d* at one end and adapted to receive the end of a hose connected to an engine at the other end.

Spool W, which serves as a hose-reel, is journaled upon axle T at one end and on head or flange U' at the other, so as to revolve around them as journals, and is connected on its interior at *b'*, by means of the coiled retracting-spring *r*, with the stationary head or fixed flange U' at *b*, so that it will act when the hose is slackened or out of use to cause it to be wound upon reel W. The axle-tube T is provided at one end with a circular flange U', and is fixed to one of the brackets S. The angular projection *a'* supports this whole structure at one end upon the bracket S. The other bracket S supports the opposite end of the structure upon the hollow axle T, which rests directly on said bracket. The reel W revolves with the water-receiving cylinder U around the fixed axle T at one end, and the stationary head or flange U' serves as its journal at the opposite end.

The water-cylinder U is provided with a short tube Z, projecting through the reel W, and has the end of the hose *a* connected therewith, as seen in Fig. 8.

The use of the faucet *d* at one end of hollow axle T will serve at any moment to check the flow of water through the hose *a* without stopping the working of the engine which forces the water into the receiver, and thus damage by water may often be avoided. The cylindrical lining V of spool-reel W forms a smooth surface against which the coiled retracting-spring will freely work without friction. The extensible supporting-brace E' is provided with hand-lever F near the platform A, and in convenient position for use to adjust the brace E' on its axis and direct the hose-nozzle at the top thereof. The grooves and feathers *i* (shown in Fig. 9) serve to cause all the sections of the hollow brace E' to move uniformly in a vertical line and to move axially together when the lever F, attached to

the bottom of section *m*, is moved or adjusted laterally to govern the position of the hose-nozzle.

G'' denotes the sheave or pulley in yoke or bridle *h*, rigidly secured at its bottom to the top of the upper section of brace E' and swiveled at its top to the topmost broad rung *n* of the ladder 4.

The hose-nozzle *l*, attached to the hose *a*, is held up by the bridle and may be grasped by a fireman, and by this means the attached hose may be drawn to a considerable extent through the yoke *h* and directed by such fireman mounted upon the ladder toward the windows or other openings of a building; or it may be drawn within the building to be used as occasion may require.

The extensible and axially-adjustable ladder-brace and hose-support E' is firmly secured in its relation to the ladders by means of the metal ties P, respectively connecting the rails of the ladders severally. At the middles of these ties collars are formed to embrace and hold the several sections of brace E'. These sections of the brace E', with the ties P holding them, move with the ladders to which they are respectively connected by the tie. The collars Q, formed in the ties P, do not impinge so tightly upon the cylindrical adjustable brace E' as to prevent the several sections of the brace from being adjusted on the longitudinal axis thereof by means of lever *f*. At the rear of the turn-table E the spring-rest *j* is secured to support the set of ladders when let down thereon. Vertical projections *p p* on the side pieces B of the turn-table serve as stops to limit the rearward movement of the foot of the ladders. The side rails G G', or the V-shaped metal shoes, to which the friction-wheels D are journaled, are provided with projections *x*, standing out laterally partly over the side pieces B and adapted to come in contact with the projections *p p* when the ladders are moved rearward to the extreme limit. These stops are so located that when the ladders are brought against them the braces F will hold the ladders in nearly a vertical position.

In the foregoing description of my invention it is made apparent that its operations in using it are simple and easy, as will now be briefly recited. When the carriage is backed up to the curbstone of a street or in suitable nearness to a burning building in the condition as shown in Fig. 1, two firemen will grasp the two cranks of windlass I, while other two firemen will grasp the cranks of windlass N at the foot of the ladders, and both windlasses will be simultaneously operated, the former to draw the ladders rearward upon the friction-wheel D, running in the grooves or lateral ways C C', and the latter windlass forcing, through ropes or chains M M' M'', the extensions of sections 2, 3, and 4 of the ladders, and as the sections of the vertically-adjustable brace E' are respectively connected to the ladder-sections 1 2 3 by ties P



the brace E' will necessarily be extended and elevated with the ladders, carrying the hose and its nozzle up at the same time, and one or more firemen seated upon the end of section 4 of the ladders may be carried to any desired elevation in readiness to manipulate nozzle *l* and direct the water to the locality of the fire, although, as has been observed above, the nozzle of the hose *a* may be directed through the movement of the hand-lever *f*, axially-pivoted brace E', and yoke or bridle *h*, actuated by a fireman at the foot of the ladders.

The water will be forced from an engine through a hose connecting it with the end of hollow axle T, thence through the perforations *t* in axle T into water-receiving cylinder U, thence through outlet to Z into the hose *a*, a part of which may remain coiled around reel W after the ladder is fully extended and the hose is in use.

The manner described of thrusting the ladders rearward while at the same time they are elevated and extended enables them to pass under and inside of obstructions—like telegraph-wires—which may occupy a position above the street-gutters or curbstones, and this capability will often be found a saving of time, and will avoid the necessity of cutting and removing such obstructions in front of buildings.

It must be observed that the hose, the water-receiver, and reel may be used while the ladders remain at rest, as in Fig. 1, that part of the hose not drawn out through the yoke by the manipulator of the nozzle remaining coiled on the reel. The turn-table E, which supports the set of ladders, enables the ladders to be used at the side or end of a building, where the carriage could not be placed at right angles to such building, but may approach it by being drawn along at the side thereof, as in a narrow space or alley, where there is merely sufficient room to adjust the turn-table to a right-angular position to the carriage or its platform.

My invention may be modified so as to render it useful for numerous purposes, among which may be mentioned the running of elevators in buildings, relieving persons on stranded vessels which life-boats would be unable to approach, for elevating building materials, and other uses where great certainty and celerity are desirable.

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

1. A set of extension-ladders mounted upon a carriage and provided with ropes and windlass N for extending them, seated at the foot of the outer ladder in lateral grooves or runways extending along in side pieces B of platform A to and upon turn-table E, in which ways supporting and carrying wheels D, attached to the rails of the outer ladder G G', run, in combination with hinged braces F, provided with ropes J, and windlass-shaft I for moving the ladders rearward, substantially as described.

2. A set of extension-ladders organized as described, in combination with a windlass or equivalent power mechanism, a hose and hose-reel, a water-receiver, and a hose supporter or bridle for elevating the hose, substantially as set forth.

3. A set of extension-ladders organized as described, in combination with an extensible and axially-adjustable sectional brace connected by cross-ties and collars with the ladders and working uniformly with said ladders, substantially as described.

4. The axially-adjustable sectional extension-ladder brace having a hand-lever attached thereto at the bottom, in combination with a water-hose and nozzle held by a yoke or bridle rigidly fastened to the top thereof and swiveled to the upper broad rung of the topmost ladder, substantially as and for the purpose specified.

5. The hose-reel, in combination with a rotary water-receiver and fixed perforated axle and a retracting-spring, substantially as described.

6. The combination of the hose-reel, the retracting-spring located between the hose-reel and the water-receiver, and the perforated fixed axle provided with ingress-orifices at one end and the faucet at the opposite end, substantially as and for the purpose specified.

7. The set of extension-ladders organized as described, movable in runways connecting platform A with turn-table E, provided with stops *p p*, in combination with windlass-shaft I on braces F, and ropes J, connected to the foot of the ladders and passing around spools K K aligned horizontally with the runways and foot of the ladders, substantially as described.

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