(No Model.) 3 Sheets—Sheet 1.

L. SMITTER & P. DUHAMEL.

TELESCOPIC SCALING OR FIRE ESCAPE LADDER.

No. 445,720. Patented Feb. 3, 1891.

Fig. 1.

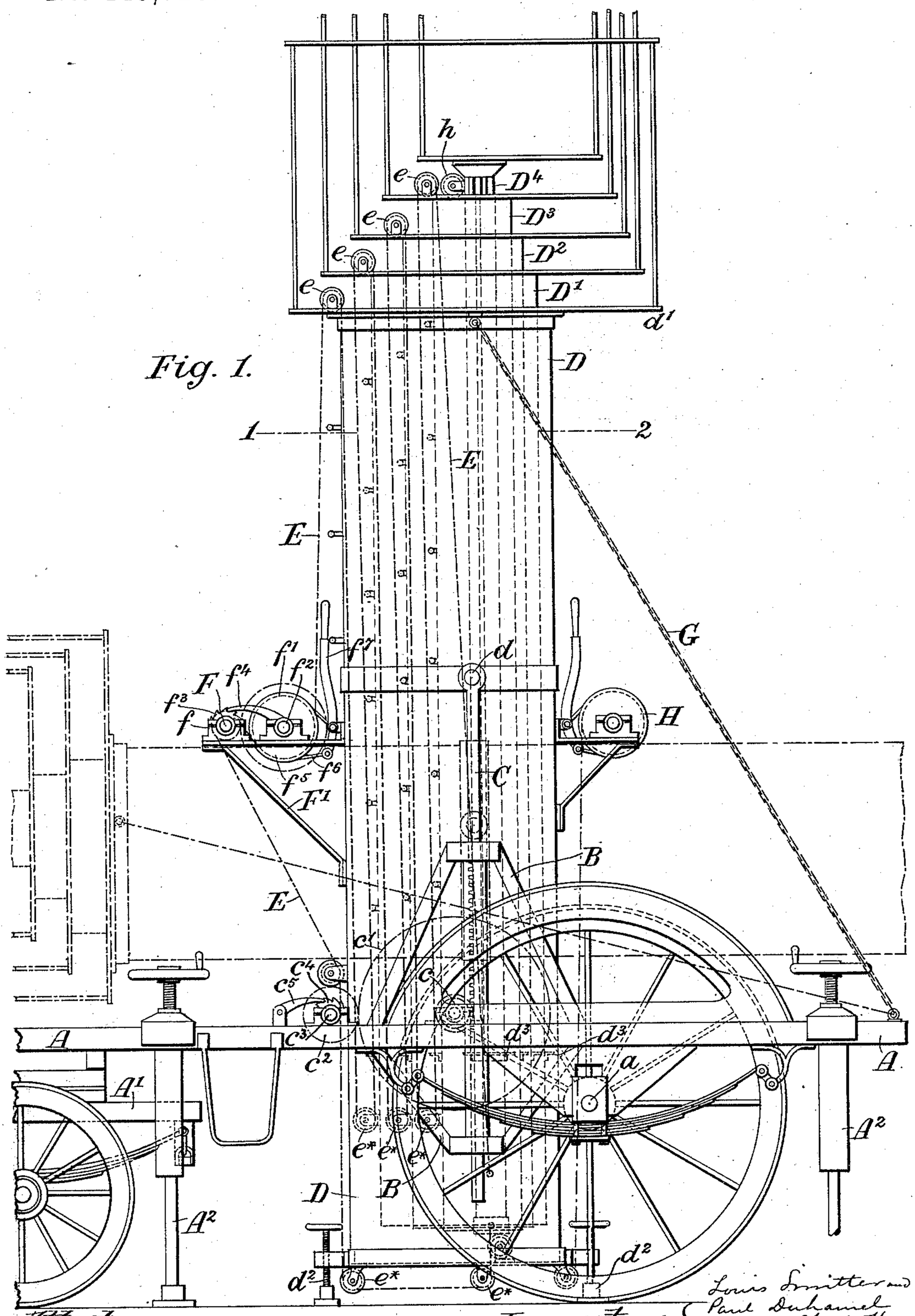

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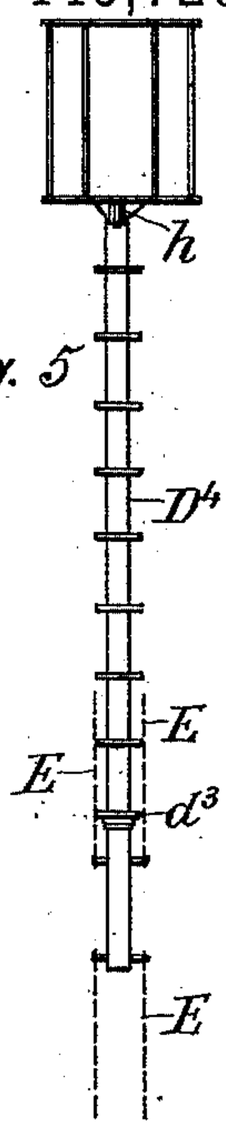
Fig. 5



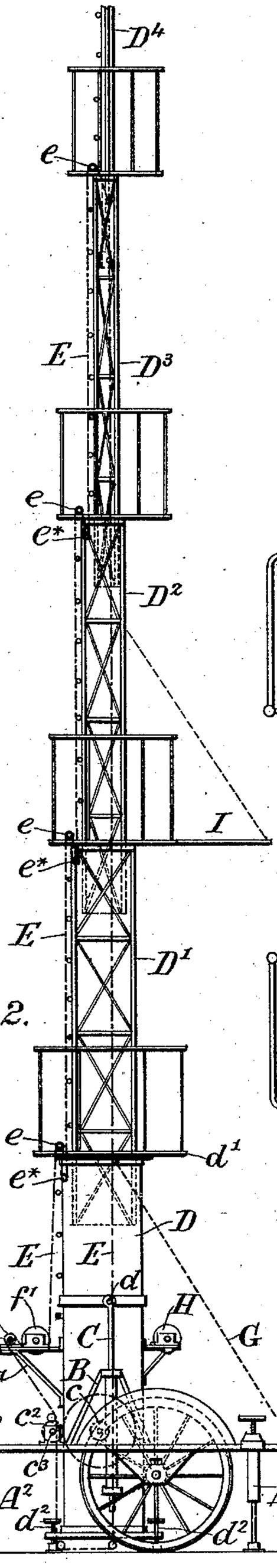


Fig 2.

Fig. 4.

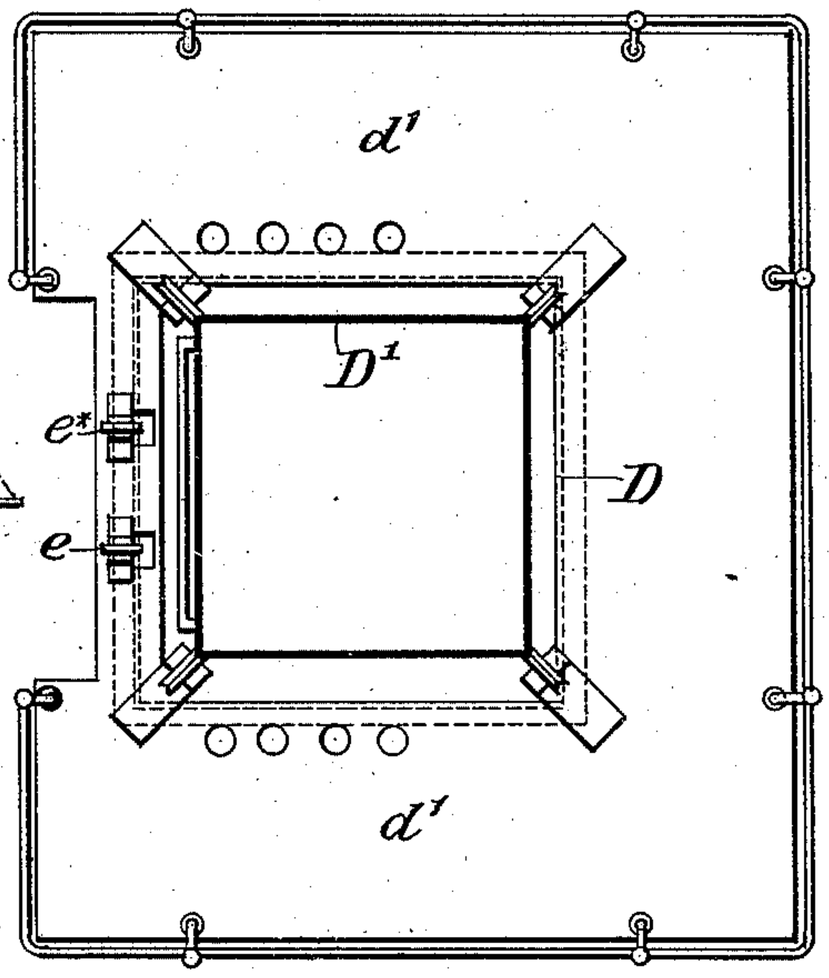


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Fig. 6.

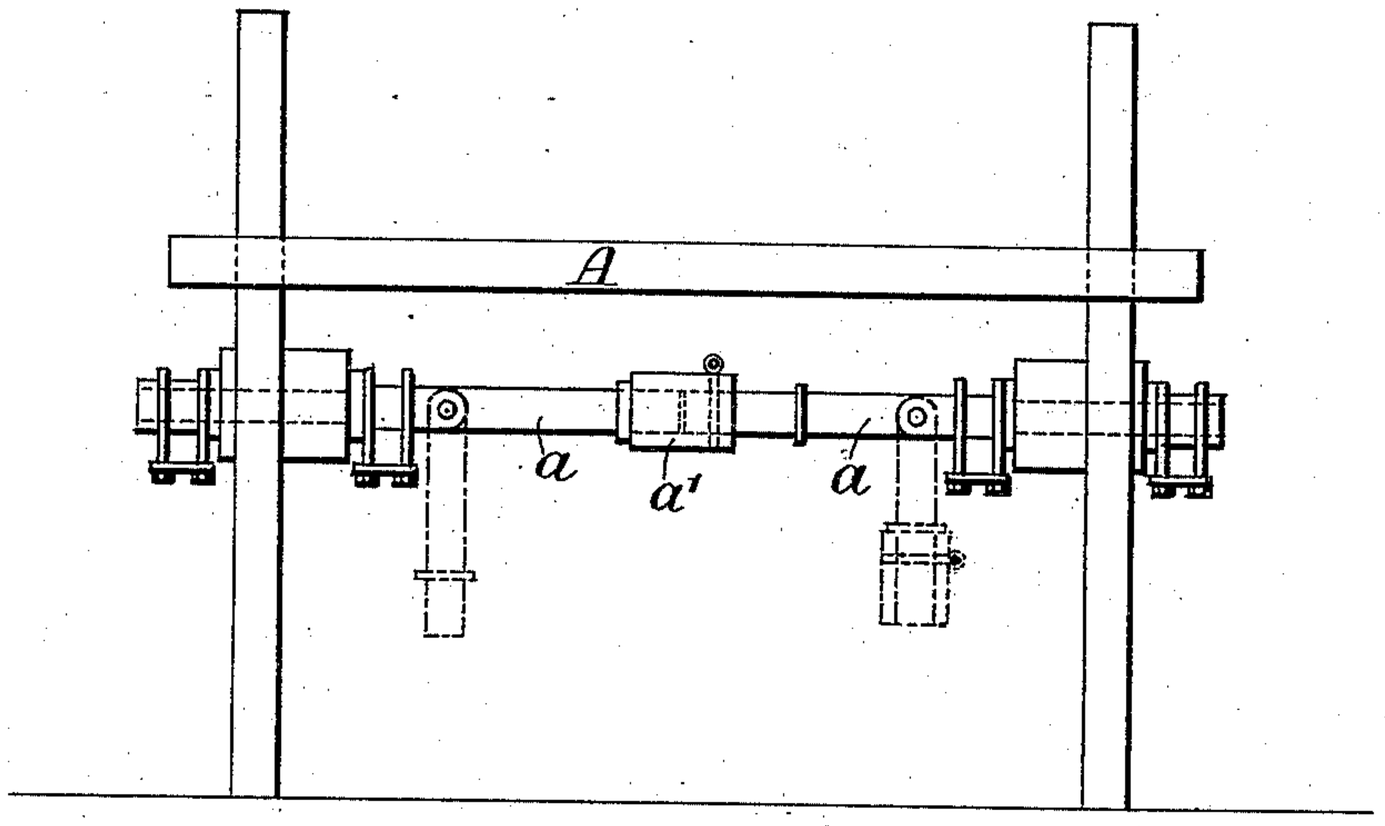
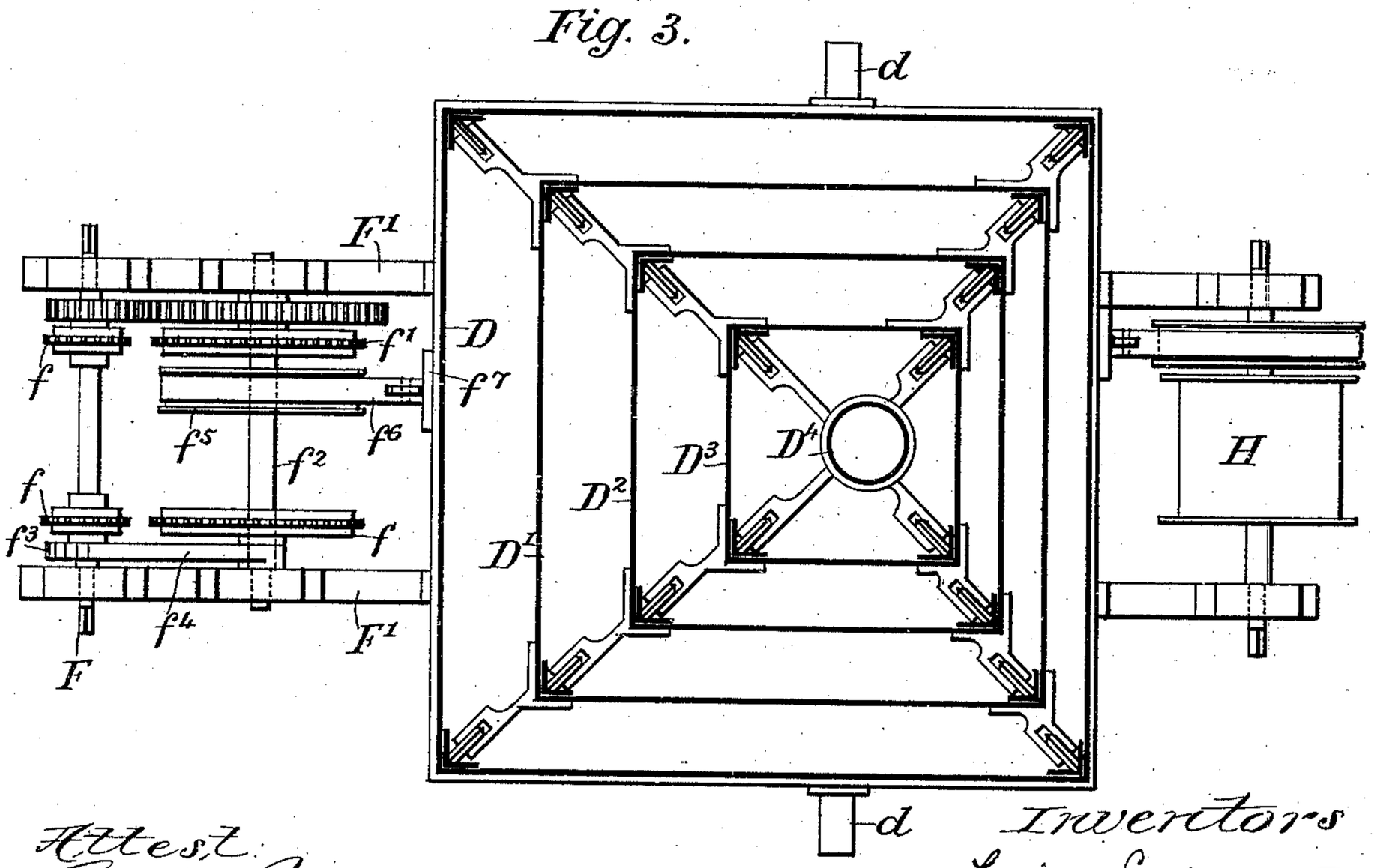


Fig. 3.



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UNITED STATES PATENT OFFICE.

LOUIS SMITTER AND PAUL DUHAMEL, OF PARIS, FRANCE.

TELESCOPIC SCALING OR FIRE-ESCAPE LADDER.

SPECIFICATION forming part of Letters Patent No. 445,720, dated February 3, 1891.

Application filed February 24, 1890. Serial No. 341,579. (No model.) Patented in Belgium January 23, 1889, No. 84,732; in France January 26, 1889, No. 195,645, and in England January 30, 1889, No. 1,679.

To all whom it may concern:

Be it known that we, LOUIS SMITTER, of 48 Rue Labat, and PAUL DUHAMEL, of 54 Rue Lepic, both of Paris, in the Republic of France, having invented certain new and useful Improvements in Telescopic Scaling or Fire-Escape Ladders and Apparatus Connected Therewith, (for which patents have been obtained as follows: in Belgium, No. 84,732, dated January 23, 1889; in France, No. 195,645, dated January 26, 1889, and in England, No. 1,679, dated January 30, 1889,) of which the following is a specification.

This invention relates to improved apparatus to be used in extinguishing fires and in scaling or ascending heights inaccessible with ordinary apparatus. To this end we mount upon a wheel-carriage a telescopic ladder consisting of a series of tubes capable of being drawn one within the other to contract the height of the apparatus when not in use. Each of these tubes is fitted at the top with a landing-stage fenced by a hand-rail. The lowest or outside tube is pivoted in vertically-adjustable bearings carried by strong standards or frames attached to the sides of the carriage, so that the telescopic ladder when contracted can be tipped to a horizontal position for better transport.

In the accompanying drawings, Figure 1 shows in side elevation our improved apparatus complete, the telescopic ladder being in a vertical and closed position. Fig. 2 is a side elevation of the apparatus, the telescopic ladder being extended to its full height. Fig. 3 is a sectional plan, on an enlarged scale, of the telescopic ladder, taken on the line 1 2 of Fig. 1, illustrating the details of its construction. Fig. 4 shows in plan view one of the several platforms attached to the ladder. Fig. 5 shows the central tube detached; and Fig. 6 is an elevation of the back end of the carriage, showing the mode of constructing the jointed axle to which the hinder traveling wheels are fitted.

A A is the carriage-frame, the front end of which is covered by a platform. This frame is fitted with a fore carriage A′ for the steering-wheels and a divided axle *a* for the hinder wheels. Bolted to the opposite sides of the carriage A are strong vertical frames B B, in which are suitably mounted vertically-sliding rack-bars C C, having each at their upper end an eye serving as a bearing for the trunnions *d d* of the telescopic ladder. This ladder is composed of a series of metallic tubes D D′ D^2, &c., five being shown in the drawings, having open ends, and taking, preferably, a rectangular form. The tube D, which is the outermost of the series, is made of steel angle-bars connected together at top and bottom by a rectangular frame and closed on all sides by sheet-iron. The front of this tube is fitted with ladder-rungs for the ascent of the fireman. It is to the sides of this tube D that the trunnions *d d* are fitted, a strong metal strap made fast to the angle-bars serving to carry the trunnions which are intended to bear the whole weight of the ladder and its load.

Gearing into the teeth of the rack-bars C are pinions *c*, mounted on short axles on the carriage A. To these axles are also keyed spur-wheels *c′* in gear with a pair of pinions c^2, carried by a transverse shaft c^3. This shaft turns in bearings on the carriage and is fitted with a pair of ratchet-wheels c^4, into the teeth of which pawls c^5 (pivoted to the carriage) enter for locking the shaft c^3. The ends of the shaft c^3 are squared to receive winch-handles, by turning which the gearing just described is caused to raise or lower, as desired, the rack-bars C C, and with them the telescopic ladder, which they carry. The use of this vertical movement of the rack-bars will be hereinafter explained.

At the top of the tube D is fitted a platform *d′*, which is surrounded on three sides by a hand-rail for the protection of the firemen. This platform is made to carry lengths of fire-engine hose for conveying water upward to the top of the ladder.

D′ D^2 D^3 are tubes constructed substantially like that just described, but with lattice sides instead of sheet-iron. These tubes are made of gradually-decreasing capacity for the purpose of fitting the one within the other, as shown in the section, Fig. 3. The innermost tube D^4 (shown detached at Fig. 5) is made, preferably, of a cylindrical form, rungs

being fitted thereto, as is the case with all the sliding tubes. These tubes are also fitted with platforms, like the tube D, and they each carry a length or lengths of hose for coupling up with the lengths of hose carried by the platform of the tube D and capable of being put in communication with adjacent fire-engines or hydrants. To provide for the sliding of these tubes freely the one within the other, they are each fitted at bottom with four V-edged pulleys for entering the angles of their respective surrounding tubes, as is clearly shown in Fig. 3. The tubes D D′ D^2 D^3 are also fitted at top with hollow V-pulleys (see Fig. 4) to take the angles of the sliding tubes. As, however, the innermost tube D^4 is cylindrical, it is fitted with feathers to enter the guide-pulleys of the tube D^3.

For the purpose of raising the inner tubes from the closed position of Fig. 1 to the extended position of Fig. 2 and returning them to their depressed position a pair of steel chains E E is provided. These chains are each threaded over and under a series of guide-pulleys, in order to connect the several tubes together and bring them under the control of a winch F, mounted on a pair of bracket-supports F′, carried by the main tube D. (See Fig. 3.) The opposite ends of the pair of chains E E are connected, respectively, to cross-rods carried by the central tube D^4, as is clearly shown at Fig. 5. Fitted to the rectangular tubes at top and bottom are guide-pulleys e e^* to receive the chains and guide them in their course to and from the winch F. The course of the chains is indicated by dotted lines in Fig. 1. Thus, starting from the lower cross-bar, the chains pass under guide-pulleys e^*, fitted to the tube D, and thence up to chain-wheels f, mounted loosely on the winch-spindle F. Passing over these wheels the chains are led under a pair of wheels f', keyed to a spindle f^2, which is in gear with the spindle F. The chains next pass up to the guide-pulleys e, mounted on the platform of the tube D, and are led thence downward to guide-pulleys e^*, fitted to the lower end of the tube D′. From these pulleys the chains pass upward to pulleys e, fitted to the platform of the tube D′, thence downward to guide-pulleys e^* on the lower end of the tube D^2, and so on until they reach the second or upper transverse bar of the tube D^4, to which they are secured. For the purpose of transmitting motion to these chains, and thereby enabling them to raise and lower the sliding tubes, the winch-spindle F is squared at its ends, like the shaft C^3, to receive a winch-handle, by which rotary motion is imparted through the spur-gearing to the chain-wheels f' in gear with the chains.

The height of the winch F is such that it is readily accessible to the attendants from the platform of the carriage when the ladder is in a position to be elevated, and keyed to the winch-spindle is a ratchet-wheel (or it may be a pair of ratchet-wheels) f^3, into which take pawls f^4, pivoted to the brackets F′. These ratchet-wheels and pawls are for the purpose of maintaining the tubes when elevated in their raised position, and they may, if thought desirable, be assisted in this work by means of spring-catches fitted to the inner face of the tubes. A brake-wheel f^5 is keyed to the spindle f^2 for the purpose of checking the descent of the tubes when released from the drag of the chains, and a friction-band f^6, operated by a hand-lever f^7, serves to control the movement of the brake-wheel.

Attached to the platform of the tube D is a pair of guy-chains G, which connect the tube D with fixed points at the rear end of the carriage A. These guy-chains serve to secure the verticality of the tube D when in its raised position; but when it is desired to bring it to the horizontal position (shown in dots at Fig. 1) the rack-bars are by means of the winch c^3 drawn down, when the tube, having a bias toward the front of the carriage, will tip forward, checked in its descent by the guy-chains, until it assumes the dotted position. On reversing the movement of the rack-bars these guy-chains will, in rising with the tube D, rock it again into a vertical position.

Fitted to the bottom of the tube D are screws d^2, the lowering of which when the tube has reached its vertical position will enable the weight of the telescopic ladder to be transferred from the carriage to the ground.

A^2 A^2 are screw-jacks fitted to the carriage A for the purpose of giving the carriage a fixed bearing upon the ground when the apparatus is brought to a position for use.

To provide for the tipping of the telescopic tubes into the dotted position of Fig. 1, the axle a, which carries the hinder wheels of the carriage, is constructed as shown at Fig. 6—that is to say, it is divided at the middle of its length, and the parts of the axle within the frame are hinged to the outer parts, which latter are affixed to the carriage-springs. A sleeve a', connected to one division of the axle and formed to slide thereon, serves to couple the two hinged parts together and give rigidity to the divided axle.

When the telescopic ladder is drawn down to its contracted position, as at Fig. 1, and it is desired to transfer the apparatus to a new position, the divided axle a is dropped into the dotted position of Fig. 6, and thus a free space is left for the telescopic ladder to take the horizontal position on the carriage. Each sliding tube is provided with a stop d^3 for the purpose of limiting the rise of the several tubes when acted upon by the elevating-chains E. The inner tube D^4 is provided at top with a pulley h, over which may be passed a chain leading up from a winch H, fitted in bracket-bearings on the rear side of the tube D. A basket suspended from this chain may be utilized on occasion for saving life or the rescue of property from a burning building.

I is a detachable bridge capable of being

fitted to the platforms of the tubes and lowered by means of chains to establish communication between a building on fire and the telescopic ladder.

It is obvious that instead of the chains E, heretofore described, for raising and lowering the sections of the ladder, there may be employed ordinary ropes. In case of such substitutes the chain or sprocket-wheels for driving the chain will of course be omitted, and a drum, pulley, or other driver be employed for driving the ropes. It is therefore to be understood that the term "chain" and "chain-wheels" used in this specification and in the following claims include such obvious equivalents of the construction shown.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is—

1. In a telescopic ladder trunnioned upon a carriage in vertically-moving bearings therein, the combination of a chain or chains passing between the sections of the ladder and connected to the innermost section, guide-pulleys upon each section for guiding said chain or chains, and mechanism for actuating said chain or chains to raise the sections of the ladder, substantially as described.

2. In a telescopic ladder trunnioned upon a carriage in vertically-moving bearings therein, the combination of a chain or chains passing between the sections of the ladder and connected at each end to the innermost section, guide-pulleys on each section for guiding said chain or chains, mechanism for actuating said chain or chains to raise and lower the sections of the ladder, and a brake and connections between said brake and chain or chains for controlling the descent of the sections, substantially as described.

3. A tubular telescopic ladder trunnioned in vertically-moving bearings on a wheel-carriage, the outermost tube of such telescopic ladder carrying on brackets a winch and chain gear for actuating chains which are led over and under guide-pulleys carried by the outer tubes, each of such chains having its extremities made fast to the innermost tube and serving as the chain-wheels are rotated to raise or lower the sliding tubes, as desired.

4. In a telescopic ladder, the combination of a carriage upon which the ladder is trunnioned, a rack-bar pivoted to the ladder, a guide upon the carriage for guiding the rack-bar vertically, a pinion journaled in the carriage and engaging said rack-bar, and connections for operating said pinion to raise the ladder from a horizontal to a vertical position, or vice versa, substantially as described.

5. A tubular telescopic ladder mounted on a wheel-carriage and fitted with trunnions and mounted in bearings carried by rack-bars, which slide in vertical guides at the sides of the carriage and are in gear with pinions keyed to a winch-spindle, in combination with guy-chains or their equivalent attached to the upper end of the outermost tube and to the wheel-carriage, as and for the purpose above set forth.

6. In combination with a tubular telescopic ladder mounted on a wheel-carriage and capable of turning in its bearings to permit of its tipping from a vertical to a horizontal position, a divided wheel-axle with jointed coupling-pieces, and a sleeve, constructed as and for the purpose above set forth.

7. In combination with a tubular telescopic ladder mounted in rising and falling bearings fitted to a traveling carriage, the adjustable screws of the main tube, and the screw-jacks of the carriage for fixing the position of the apparatus and relieving the carriage from the weight of its load while the telescopic ladder is in use.

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PAUL DUHAMEL.

Witnesses:
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R. J. PRESTON.