3 Sheets—Sheet 1.

R. GILCHRIEST.

Fireman's Ladder.

No. 209,250. Patented Oct. 22, 1878.

Fig. 1.

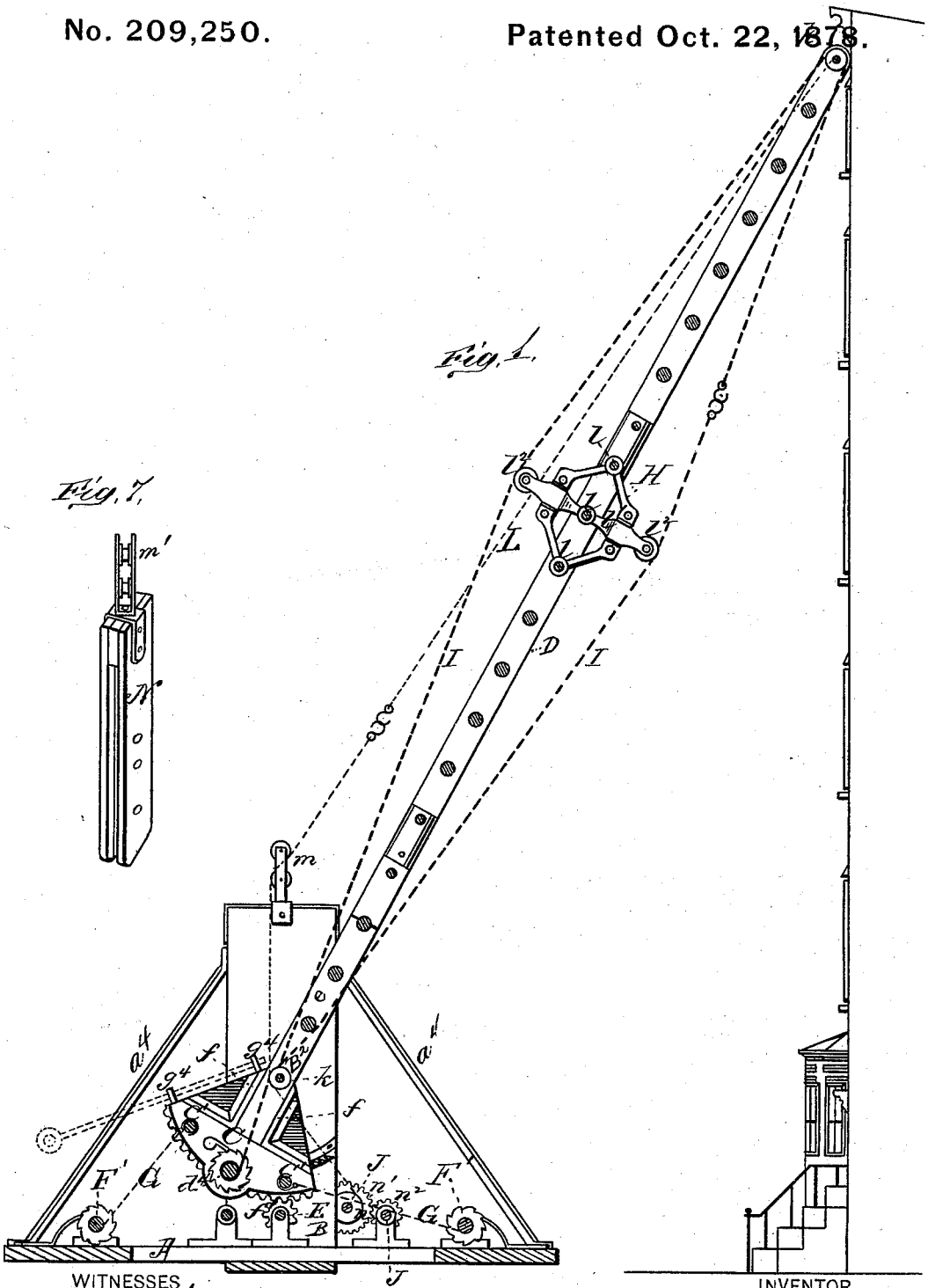

Fig. 7.

WITNESSES

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3 Sheets—Sheet 2.

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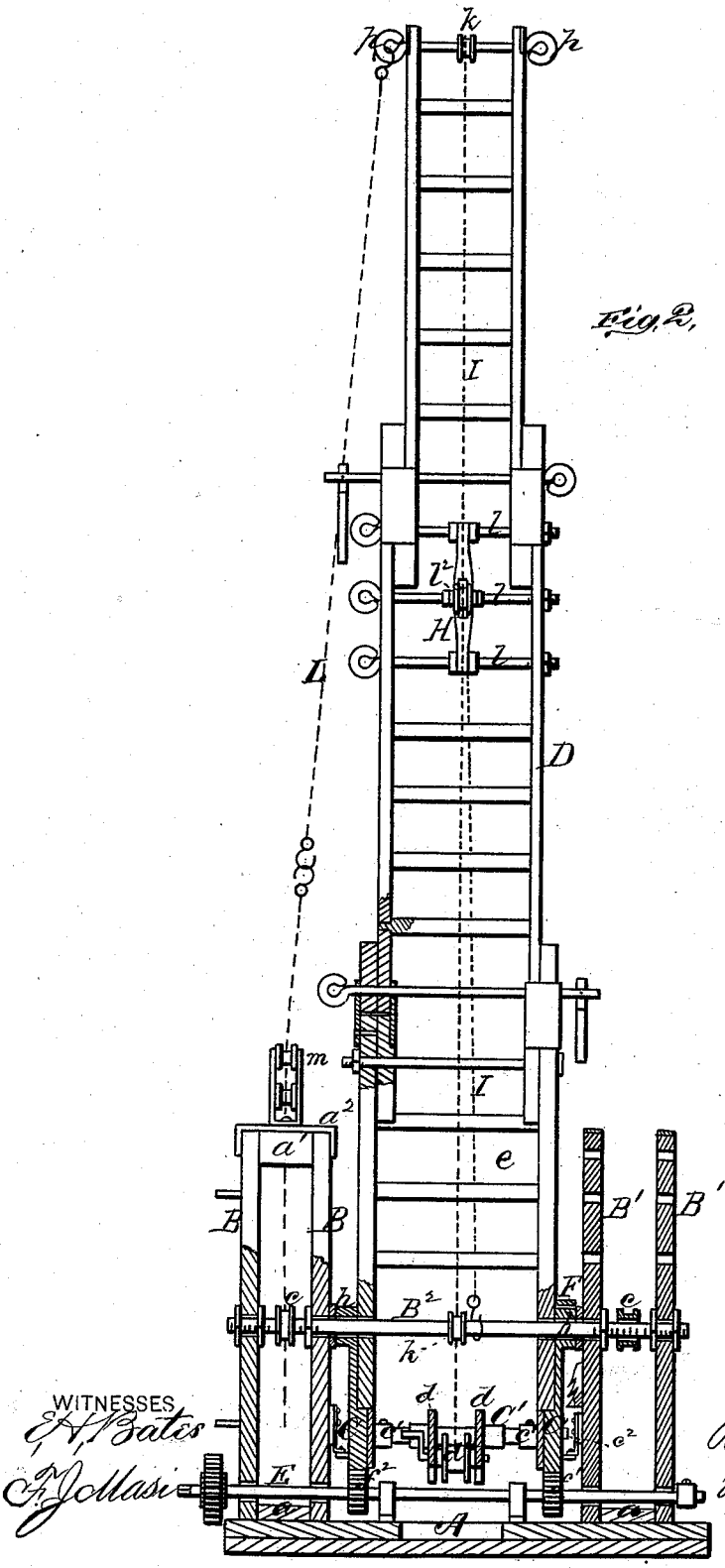
Fig. 2.



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3 Sheets—Sheet 3.

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Fig. 3.

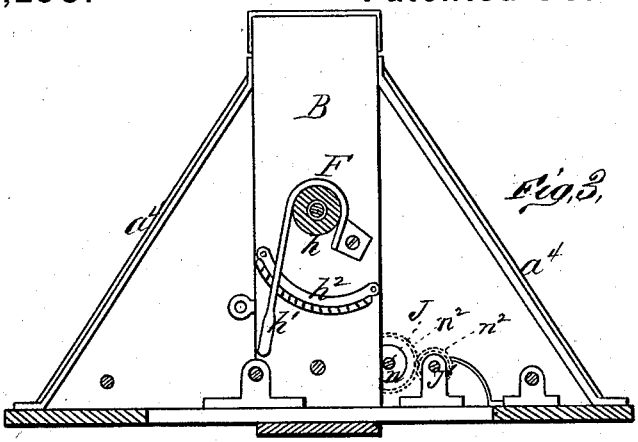


Fig. 4.

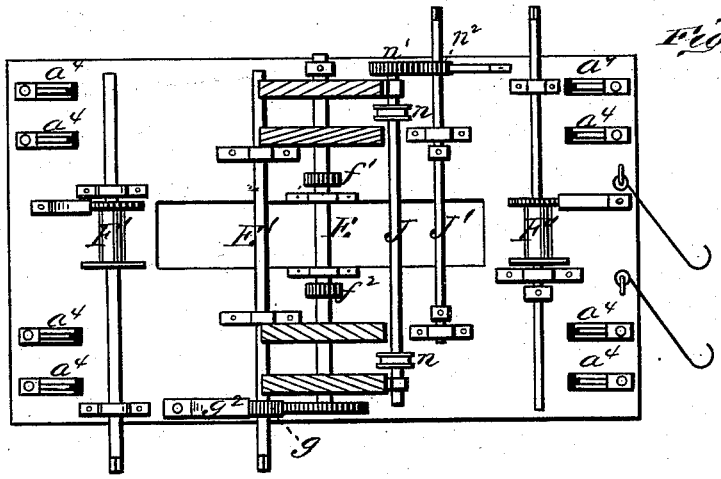
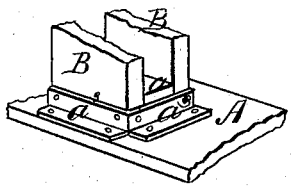


Fig. 5.



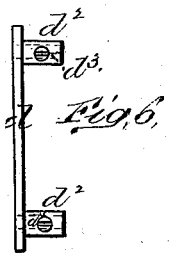


Fig. 6.

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UNITED STATES PATENT OFFICE.

ROBERT GILCHRIEST, OF LOUISVILLE, KENTUCKY.

IMPROVEMENT IN FIREMEN'S LADDERS.

Specification forming part of Letters Patent No. **209,250**, dated October 22, 1878; application filed January 5, 1878.

To all whom it may concern:

Be it known that I, ROBERT GILCHRIEST, of Louisville, in the county of Jefferson and State of Kentucky, have invented a new and useful Improvement in Ladders; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, and to the figures and letters of reference marked thereon.

Figure 1 of the drawings is a longitudinal vertical section of my improved ladder. Fig. 2 is a front view thereof, partly in section. Fig. 3 is a detached sectional view of the ladder-base. Fig. 4 is a top view of the ladder-base, with the spaced uprights in section; and Figs. 5, 6, and 7 are detail views.

This invention has relation to improvements in ladders for firemen's use and for other purposes.

The nature of the invention consists in the arrangement and novel construction of the parts of the ladder, as will be hereinafter more fully set forth.

In the annexed drawings, the letter A designates the ladder-base, at each side of which are erected the double-spaced uprights B B^1. Between each pair of uprights is a block of wood, *a*, bolted to the frame and crosswise to the said uprights. At the top of these uprights is another block, a^1, of wood or iron, and a metallic U-plate, a^2, straddling the same, and secured thereto by through-bolts. The bottom of the uprights is further secured to the frame by means of the angle-irons a^3, Fig. 5, bolted to each edge thereof and their tops by means of the metallic braces a^4. The uprights are thus rendered very stable, and are prevented effectually from all lateral vibration.

B^2 represents a strong iron shaft, extending horizontally through the uprights B B^1, and upon which the ladder swings. This shaft has upon each end nuts, which, being set up, effectually brace the said uprights; and in the spaces between the latter are sheaves *c c*, vibrating upon the shaft B^2; and secured to the foot of the ladder are two spaced metallic sectors, C, having cogged perimeters, and made heaviest nearest the same, in order to remove the weight thereof to the point farthest from their centers of rotation. The object of this construction is that the weight at the perimeter of the sectors may balance the weight of the ladder D, secured to the said sectors at the opposite end thereof.

The sectors are connected together by means of metallic rods C′, having thereon, inside of the said sectors, the adjustable collars c^1, and outside thereof the clamp-nuts c^2, which, being set up, effectually prevent the said sectors from spreading.

The brace-rods C′ are connected together by means of two spaced metallic plates, *d*, having collars d^2, and proper set-screws d^3 passing through the same; and in the space between the plates is a winding-drum, d^4, the object of which will be hereinafter set forth.

The lower section, *e*, of the ladder is bolted to the inner face of the sectors between the spaced ribs *f*, cast thereon, and the shaft B^2 extends through its side rails, as shown in Fig. 2.

Should the weight of the sectors be insufficient to balance the ladder, I attach removably thereto additional weights of corresponding form by means of suitable bolts or otherwise.

E represents a horizontal iron shaft, passing through the uprights and journaled in pillow-blocks in the central line thereof. Upon this shaft are keyed or otherwise secured the pinions f^1 f^2, that engage the sectors C, underneath the same, when the ladder is partly raised.

Motion is given the shaft E by means of a crank, directly or indirectly, through the medium of a gear or gears, *g*, upon a second shaft, E′, having its bearing in pillow-blocks upon the base, and controlled by a pawl, g^2.

When shaft E is rotated, its pinions being engaged with the sectors aforesaid, the ladder will be raised to a vertical position, or at any angle that may be required, this elevation being materially aided by means of handspikes, that are engaged in sockets or eye-bolts g^4 upon the radial edges of the said sectors.

At the outside and upper end of the sec-

tors, one or both, is a hub, *h*, extending to or nearly to the uprights B B^1, over which passes a friction-spring, F, which, when its handle end h^1 is engaged with a stop, h^2, upon the upright, bears upon the said hub and effectually prevents the ladder from jerking or vibrating while being raised.

Near each end of the base is arranged a drum, F′, operated by a crank or system of geared wheels, to each of which is secured a strong rope or chain, G, having upon its free end a hook or other equivalent device, which is engaged with the brace-rod C′ at each side of the sectors. By actuating these drums additional power is obtained for raising the ladder. Each drum is provided with a ratchet, with which a pawl engages and prevents backward rotation.

Each of the ladder-sections is provided at its upper end with a metallic socket, and at its lower end with a step adapted to be received in the socket of the section next below, the said sections being removably connected together by means of key-bolts extending through the sockets and seats, as shown in my Letters Patent No. 191,953, June 12, 1877.

The upper round of the top section and the lower round of the bottom section are provided each with a sheave, *k*, and an intermediate section, with three successive metallic rounds, *l*, upon which is secured a quadrilateral metallic bridle, H, having a diagonal brace, l^1, which is supported by the central one of the metallic rounds *l*, and carries at each a sheave, l^2.

A rope, I, secured at one end to the drum *d* of the sectors, is passed around the lower sheave, *k*, thence upward over one of the pulleys l^2 of the bridle, thence upward over the upper sheave, *k*, thence downward around the remaining sheave, l^2, of the bridle, and then downward to the fulcrum-shaft B^2, to which it is then hooked or otherwise removably secured.

By winding up this rope upon the drum the branches thereof are drawn taut and form a brace, that draws the joints of the ladder together and gives the ladder unusual rigidity, binding its sections together with great force. The drum d^4 is prevented from backward rotation by a suitable pawl-and-ratchet attachment.

Upon the upper end of the standards B B^1 is arranged a double revolving block, *m*′, and at the base thereof a shaft, J, carrying at each end between the spaced uprights a drum, *n*, and having at its end or ends a gear-wheel, n^1, that engages a pinion, n^2, upon a second shaft, J′, to which motion is given by a suitable crank.

The upper section of the ladder has at its upper ends eyes *p*, to which are secured the ropes L by means of a hook or other detachable coupling. These ropes are extended downward between the sheaves of the blocks *m* under the pulleys *c*, and are secured to the drums *n* aforesaid. These drums, when actuated during the raising of the ladder, sustain the same against lateral displacement.

Should it be desired to increase the height of the standards, I use an extension, N, that is inserted in the space between the uprights B B^1, and is secured thereto by means of knuckle-bolts. This extension in this case carries at its upper end the double block *m*′.

When the ladder-sections are disconnected and the lower section is lowered into parallelism to the base, the said section is supported by a knuckle-bolt extending through eyes upon the uprights B B^1, or by means of blocks placed under the ladder, between it and the base. When thus lowered the said ladder is held steady by means of metallic hooks, that are secured to the base and engaged with the rounds of the ladder.

In practice the ropes I L are made in sections, in order to their more convenient manipulation, and to suit ladders of different lengths.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a fireman's ladder, the combination, with the uprights B B^1 and the fulcrum-shaft B^2, of the counterbalancing spaced cogged foot-sectors C, the ladder D, secured thereto, and the shaft E, having under pinions $f^1 f^2$, engaging the said sectors, substantially as specified.

2. The combination, with a vibrating ladder, D, of the spaced counterbalancing foot-sectors C and a shaft having under pinions adapted to engage said sectors, substantially as specified.

3. In combination with a swinging ladder, D, and a winding-drum at the lower part thereof, a four-sided bridle, H, secured to said ladder, and provided with the pulleys l^2 and a guy-rope, I, extending from said drum around the ladder from end to end thereof, engaging the said pulleys and secured to the lowest round of the ladder, to draw the joints together and increase the rigidity of the ladder, substantially as specified.

4. The combination, with a swinging ladder and its sectors C, connected by the rods C′, of the windlasses F′ at each end of the ladder-base, and the flexible connections G, secured at one end to the said windlass and at the other to the sector-braces, substantially as specified.

5. The combination, with a swinging ladder, of the sectors C, having hubs *h*, and the flexible brake-lever F, adapted to bear upon the said hub, substantially as specified.

6. In combination with a frame, its uprights, and a ladder swinging thereon, and provided with eyes at its upper end, of the rotating double block *m* at the upper end of the said uprights, the pulleys *c* between the said uprights, the winding-drums *n*, and the lateral guys L, secured to said drums, extending

around the pulleys *c*, between the sheaves of blocks *m*, upward to the said eyes, substantially as specified.

7. The combination, with the spaced uprights B and B^1 and a swinging ladder journaled therein, of the extension N, having the double block *m'* at its upper end, and adapted to be secured to the said uprights, substantially as specified.

In testimony that I claim above I have hereunto subscribed my name in the presence of two witnessses.

ROBERT GILCHRIEST.

Witnesses:
EDW. KAISER,
ROBT. E. RYAN.