(No Model.)

W. MOELLER.

FIREMAN'S LADDER.

No. 414,237. Patented Nov. 5, 1889.

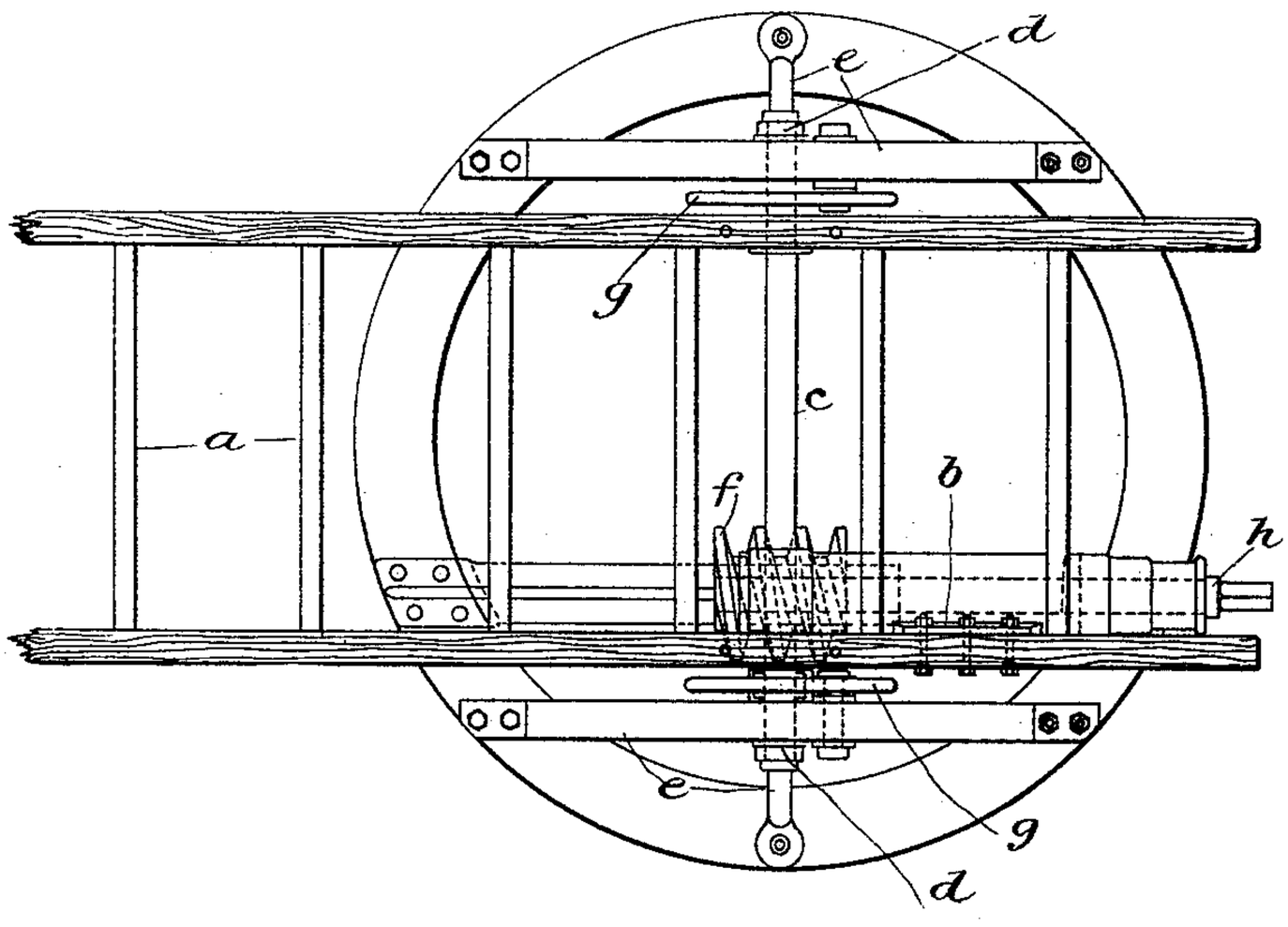

Fig. 1.

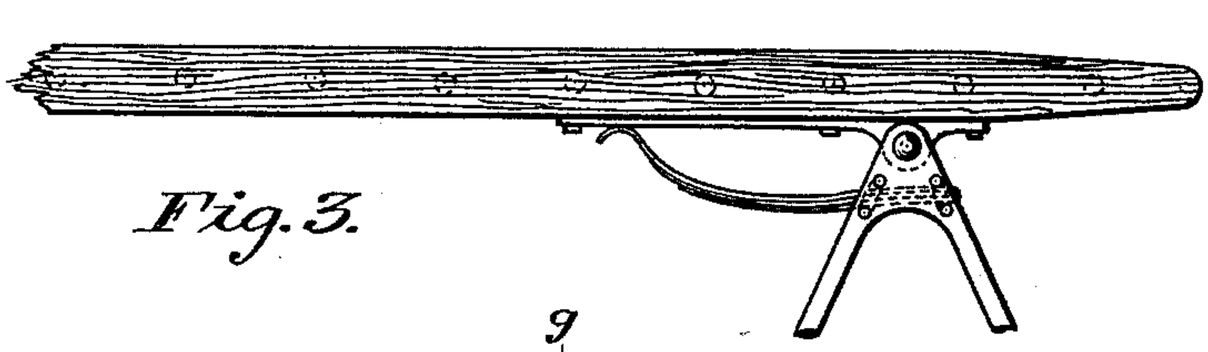

Fig. 3.

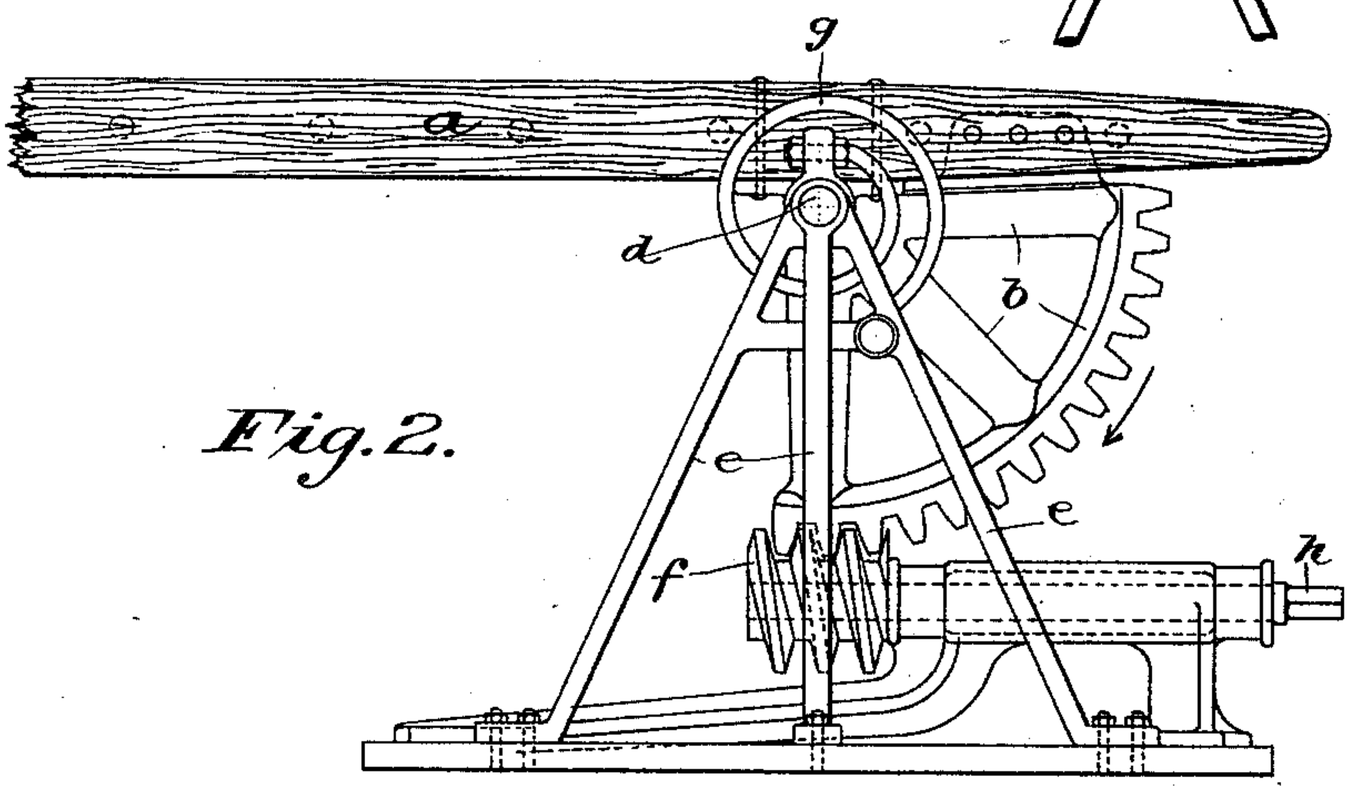

Fig. 2.

Witnesses
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UNITED STATES PATENT OFFICE.

WILLIAM MOELLER, OF CHICAGO, ILLINOIS.

FIREMAN'S LADDER.

SPECIFICATION forming part of Letters Patent No. 414,237, dated November 5, 1889.

Application filed May 27, 1889. Serial No. 312,276. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM MOELLER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Firemen's Ladders, (Case 1,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to firemen's ladders; and its object is to provide for readily erecting the same, as required. These ladders are usually extension-ladders mounted upon a truck, so that they may be carried to the location required and then erected vertically. The lower section of the ladder may be quite heavy, while the movable sections are made lighter and arranged so as to be extended one above the other after the lower section, upon which the extensible sections are usually carried, has been placed in vertical position.

My invention relates more particularly to the means for mounting the ladder upon its frame and for bringing the same into vertical position when required, and is designed as an improvement upon the device set out and described in the patent granted L. Swenson, April 21, 1885, for fire-escape ladder, and the patent granted L. Harris, April 16, 1889, (fire-ladder,) for elevating the ladder.

My invention consists in a quarter-segment gear, with which the worm provided upon the crank-shaft engages, said quarter-segment being secured rigidly to the lower ladder-section, in combination with helical counterbalance-springs, so arranged about the pivot or axle upon which the section of the ladder is mounted as to tend to raise the same in conjunction with the worm-gear.

In the drawings, which are illustrative of my invention, Figure 1 is a plan view showing the lower ladder-section mounted upon the frame or circle, which may be carried upon the truck. Fig. 2 is a side elevation thereof. Fig. 3 shows a modification of the spring.

Like parts are indicated by similar letters of reference throughout the different figures.

The ladder-section *a*, it will be seen, is bolted to the segment-gear *b*, the axle *c* of this segment-gear serving, so to speak, as trunnions for the ladder-section. The bearings *d* may be provided, as shown, in the iron or steel end pieces *e*, which end pieces are of sufficient height to give room for the worm-gear below the pivotal point. The worm-gear consists of the quarter-segment *b*, secured rigidly to the ladder, as before stated, and the worm *f* upon the crank-shaft *h*. I have not deemed it necessary to show the crank upon this shaft for turning the worm.

The springs *g* may be of steel, and may consist of any suitable number of convolutions. These springs are secured to the end pieces *e* at one end and to a lug rigidly connected with the pivot or axle at the other end. When the ladder is down in the position shown, these springs are at their greatest tension, tending to expand, so as to tend to lift the ladder-section to its vertical position. A flat spring may be used, if desired, as shown in Fig. 3 in place of the helical spring of Figs. 1 and 2; but I consider the helical form of spring much better adapted to perform the functions required of a spring in my device. Whichever form of spring is employed it is necessary to accomplish my purpose that it shall be free from contact with everything its entire length, and where the helical form is used I attach the ends of the spring in such a manner to the trunnion and to the end pieces forming the support for the trunnion and so wind the spring that the several convolutions or leaves thereof shall not come in contact with each other. The principal purpose in thus forming the spring is to obtain a varying force in the spring as the ladder is turned up or down upon its trunnion or supports.

The operation of my lifting mechanism is briefly as follows: The crank-shaft is turned in a direction to carry the segment-gear in the direction indicated by the arrow in Fig. 2. The springs, being at their greatest tension when the section of ladder is in its horizontal position, aid the work most at first, their tension being gradually lessened as the section of ladder is raised toward its vertical position. The balance-springs therefore assist in the raising of the ladder most at the time when the load or work to be done is heaviest. This method of operation of the spring cannot be attained where the several leaves forming a helical spring are allowed to come in contact, as in the ordinarily-wound clock form of heli-

cal spring. It will be found, too, that where a flat spring is employed to assist in raising the ladder it will assume substantially the helical form when the ladder assumes the elevated position.

I have not deemed it necessary to illustrate the truck upon which the frame is to be mounted nor the extensible portions of the ladder. These may be of well-known construction and operate in the usual manner.

My invention admits of various modifications, which would readily suggest themselves to those skilled in the art, and I therefore do not limit myself to the construction shown.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

The combination, with the worm-gear consisting of the worm upon a crank-shaft and a quarter-segment gear secured rigidly to the ladder-section, of the helical counterbalance-springs secured about the common pivot or axle of the ladder-section and segment-gear, and adjusted to aid in lifting the ladder-section when the crank-shaft is turned, such spring being so arranged that the several convolutions thereof will not come in contact with each other, substantially as and for the purpose specified.

In witness whereof I hereunto subscribe my name this 23d day of May, A. D. 1889.

WILLIAM MOELLER.

Witnesses:

GEORGE P. BARTON,

ELLA EDLER.