

No. 617,741.

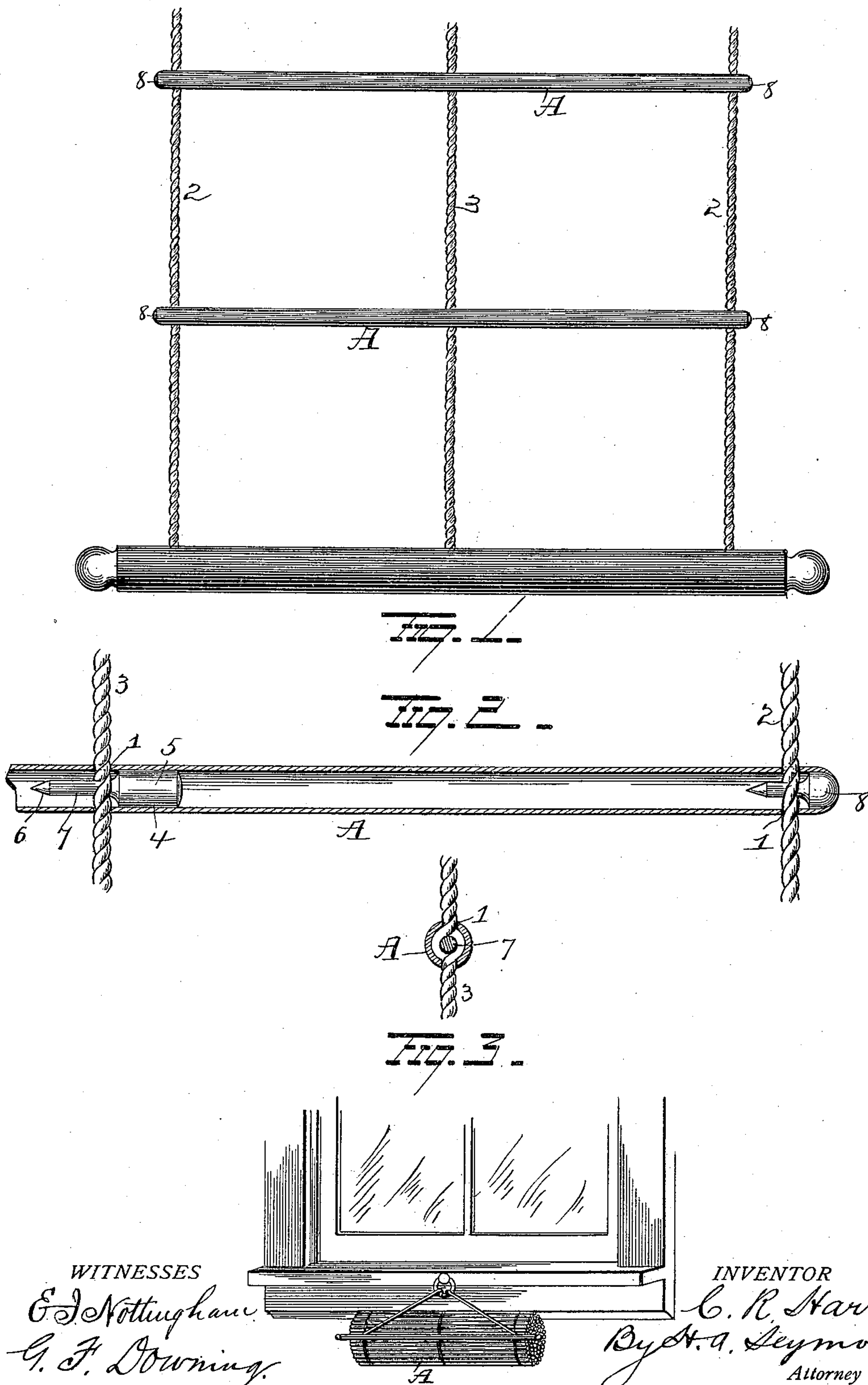
Patented Jan. 17, 1899.

C. R. HARRIS.

LADDER.

(Application filed Feb. 26, 1898.)

(No Model.)



WITNESSES

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LADDER.

SPECIFICATION forming part of Letters Patent No. 617,741, dated January 17, 1899.

Application filed February 26, 1898. Serial No. 671,840. (No model.)

To all whom it may concern:

Be it known that I, CHARLES R. HARRIS, of Williamsport, in the county of Lycoming and State of Pennsylvania, have invented certain
5 new and useful Improvements in Ladders; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the
10 same.

My invention relates to an improvement in ladders, and more particularly to such as are adapted to be wound on a drum and to be used as a fire-escape, one object of the invention
15 being to so construct a flexible ladder that the connecting devices by means of which the rungs are secured to the ropes or cables shall not project through or beyond the rung, whereby to facilitate the ready winding and un-
20 winding of the ladder.

A further object is to provide a securing device for the rungs of a flexible ladder which shall be simple and cheap in construction, which shall be strong and durable, which shall
25 be protected from the effects of exposure, and which shall be effectual in all respects in the performance of its functions.

With these objects in view the invention consists in certain novel features of construction and combinations and arrangement of
30 parts, as hereinafter set forth, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view of a portion of a ladder embodying my
35 invention. Figs. 2 and 3 are detail views, partly in section. Fig. 4 is a view showing the ladder wound.

A represents a rung of the ladder, made of gas-pipe or similar tubular construction.
40 Each tubular rung is provided near its ends and also at a point centrally between its ends with holes 1 for the passage of the steel cables 2 2 3 of the ladder. In securing the rung to the central cable 3 a key or wedge 4 is in-
45 serted into one end of the rung and forced to the center thereof, the body portion 5 of said key being of such diameter as to fit tightly within the rung, so as to avoid any possibility of its displacement after having been driven
50 thereinto. The forward end of the key is

pointed, as at 6, and the portion 7 is made smaller in diameter than the body portion 5. Thus as the key is being driven through the rung it will upon reaching the central cable 3 penetrate the same, the portion 7 passing
55 therethrough. The cable will be expanded where the portion 7 of the key passes through and made to completely fill the tubular rung at that point, so as to prevent the possibility of any movement of the rung on the cable,
60 the enlargement on the cable formed by passing the key through it forming a stop for the rung and assisting the key in securing the rung to the cable. The ends of the rung are secured in a similar manner to the cables 2 2
65 by means of keys or wedges 8. The keys or wedges 8 are similar in construction to the keys 4; but their body portions are preferably made shorter and adapted to close the ends of the rung. The outer ends of the keys 8 are
70 preferably rounded, and the ends of the rung may be slightly bent inwardly and made to embrace the rounded ends of the keys, so as to prevent any possibility of their escape.

By constructing a flexible ladder as above
75 described it will be seen that the fastening devices of the rungs are entirely within the rung, and hence the ladder can be compactly wound, there being no exterior coupling devices employed, which with such ladders as
80 heretofore constructed have prevented their being wound closely and compactly. Much difficulty has been encountered on account of the cables of flexible ladders becoming caught or entangled by couplings or protuberances
85 employed in securing the rungs to said cables. All danger of such entanglement of the ladder will be obviated by my improvements, there being no obstruction whatever beyond the rungs in any direction where said rungs
90 are secured to the cables.

My improved ladder may be closely coiled and inclosed within a suitable covering and secured to a building under the window-sills or in proximity thereto; or, if desired, it may
95 be stored at a convenient place within the room, from which it can be quickly removed and attached to the window-sill by means of hooks provided for that purpose.

Slight changes might be made in the details 100

of construction of my invention without departing from the spirit thereof or limiting its scope, and hence I do not wish to limit myself to the precise details herein set forth.

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

10 1. A flexible ladder comprising a cable, a rung and an expanding device inserted in the rung and passing through the cable so as to force strands of the cable against opposing inner faces of the rung, substantially as set forth.

15 2. A flexible ladder comprising cables, a rung having holes near its ends for the passages of said cables and keys inserted in the ends of said rung and having portions passing through the cables and expanding the same against the inner face of the rung, the ends

of said rung being bent inwardly so as to embrace the outer ends of said keys, substantially as set forth. 20

3. A flexible ladder comprising a cable, a tubular rung and a key having a body portion fitting tightly against the inner faces of the rung and having a pointed shank passing through the cable and expanding strands of the same against the inner opposing walls of the rung where said cable passes through the same, substantially as set forth. 25 30

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CHAS. R. HARRIS.

Witnesses:

S. G. NOTTINGHAM,
R. S. FERGUSON.