

J. W. PINE.  
Extension-Ladder.

No. 200,475.

Patented Feb. 19, 1878.

FIG:1.

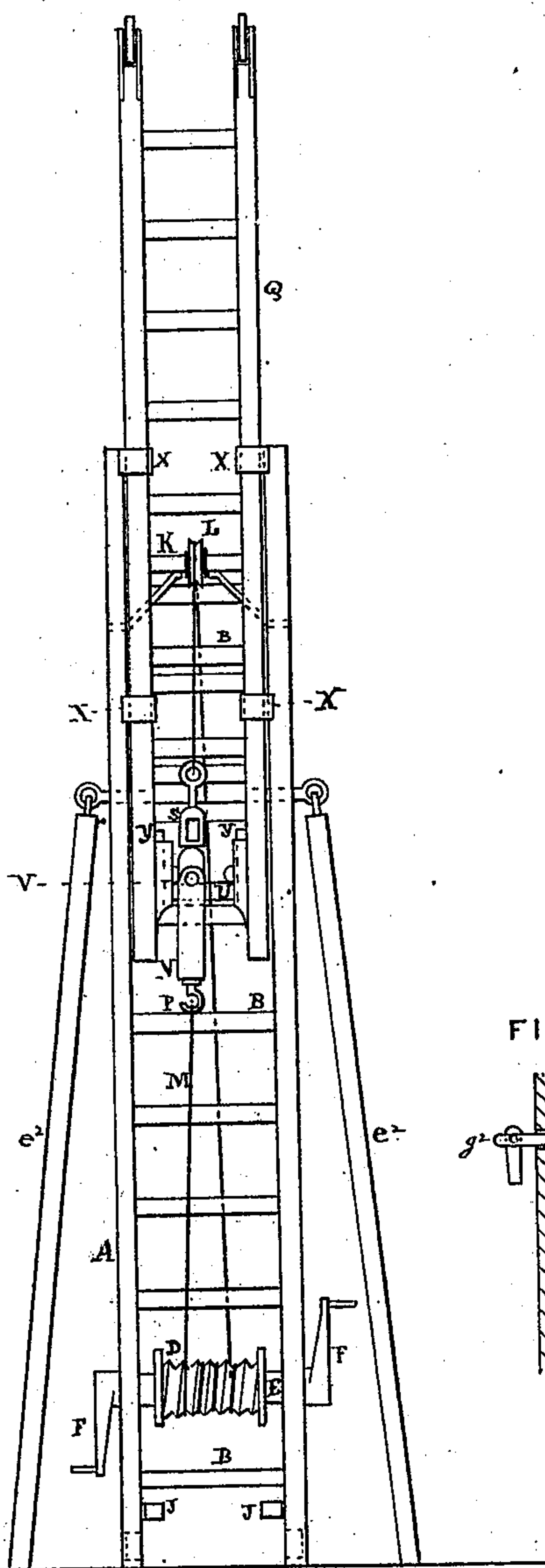


FIG:2.

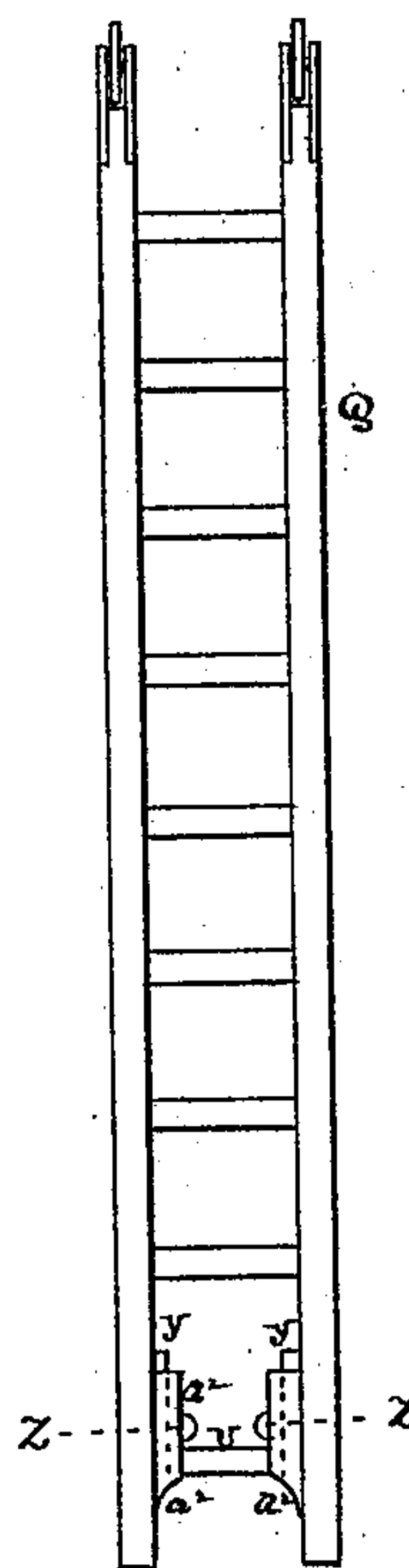


FIG:3.

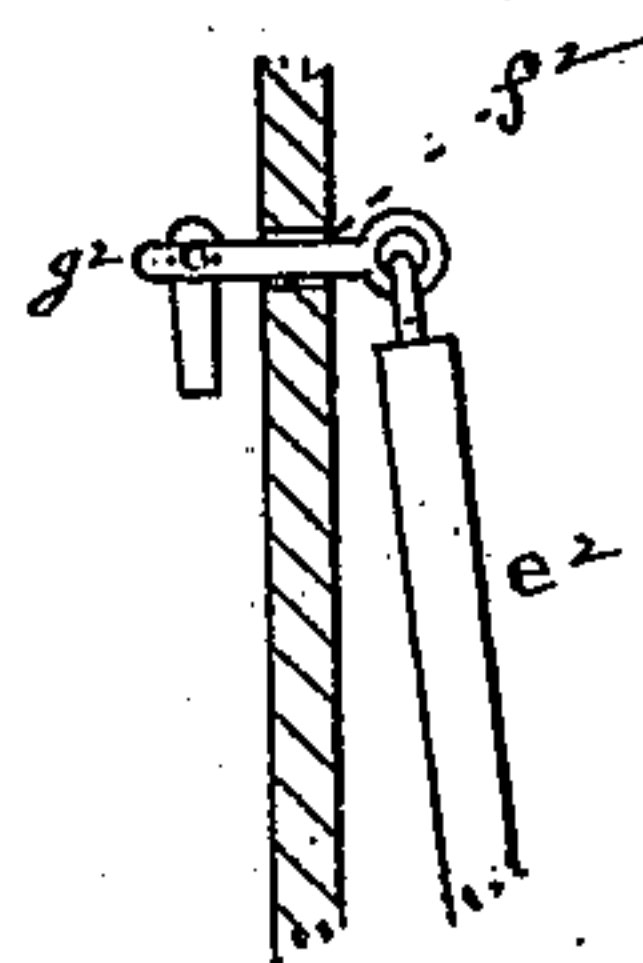
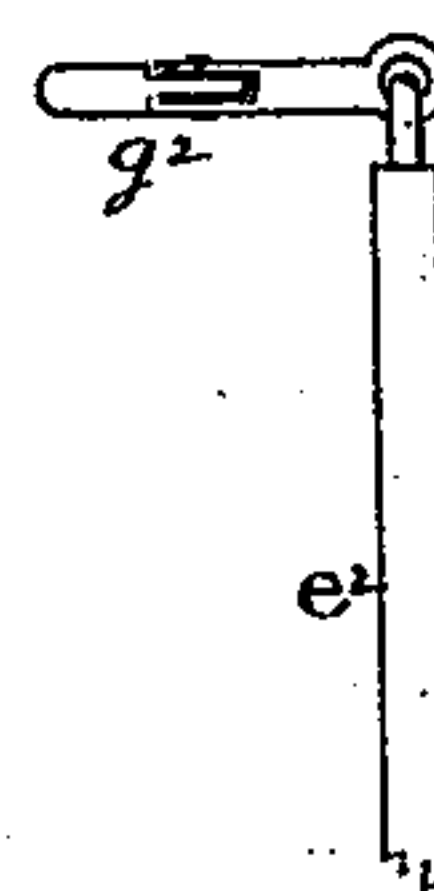


FIG:4.



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FIG. 9.

FIG. 5.

FIG. 6.

FIG. 7.

FIG. 8.

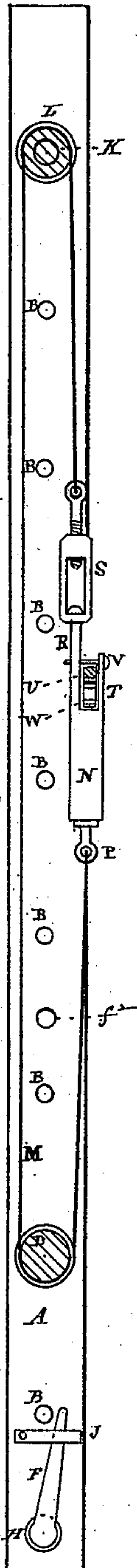
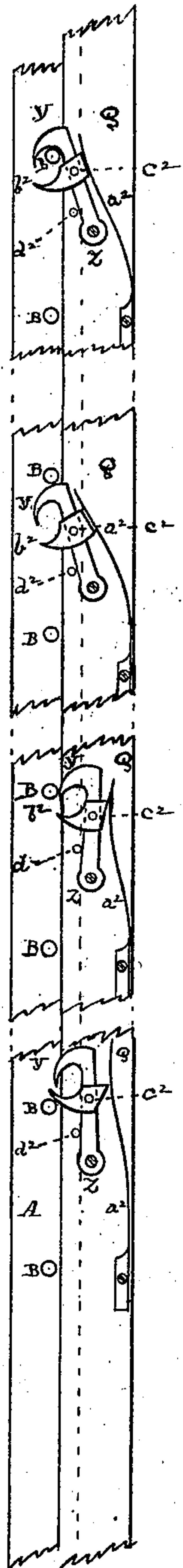


FIG. 10.

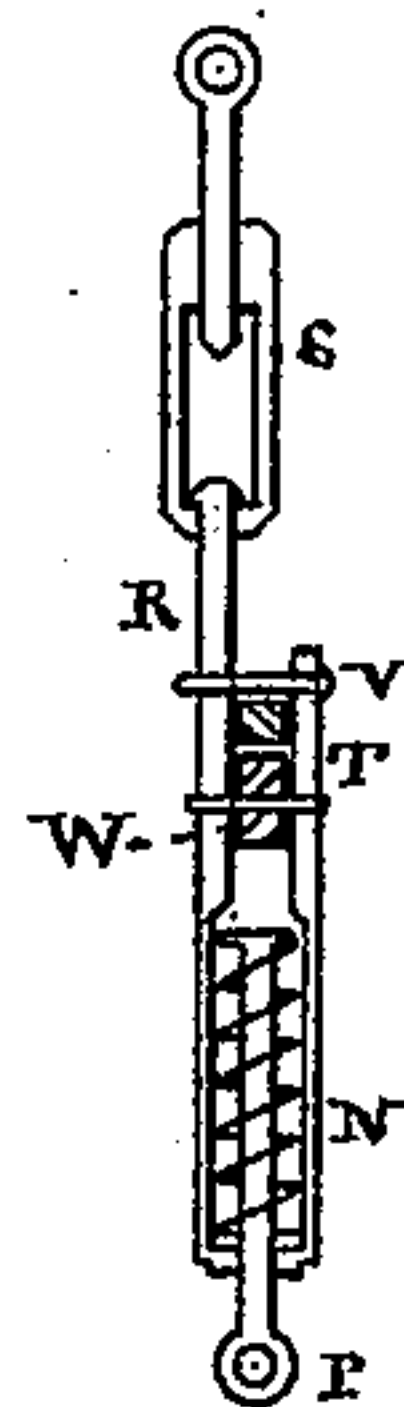
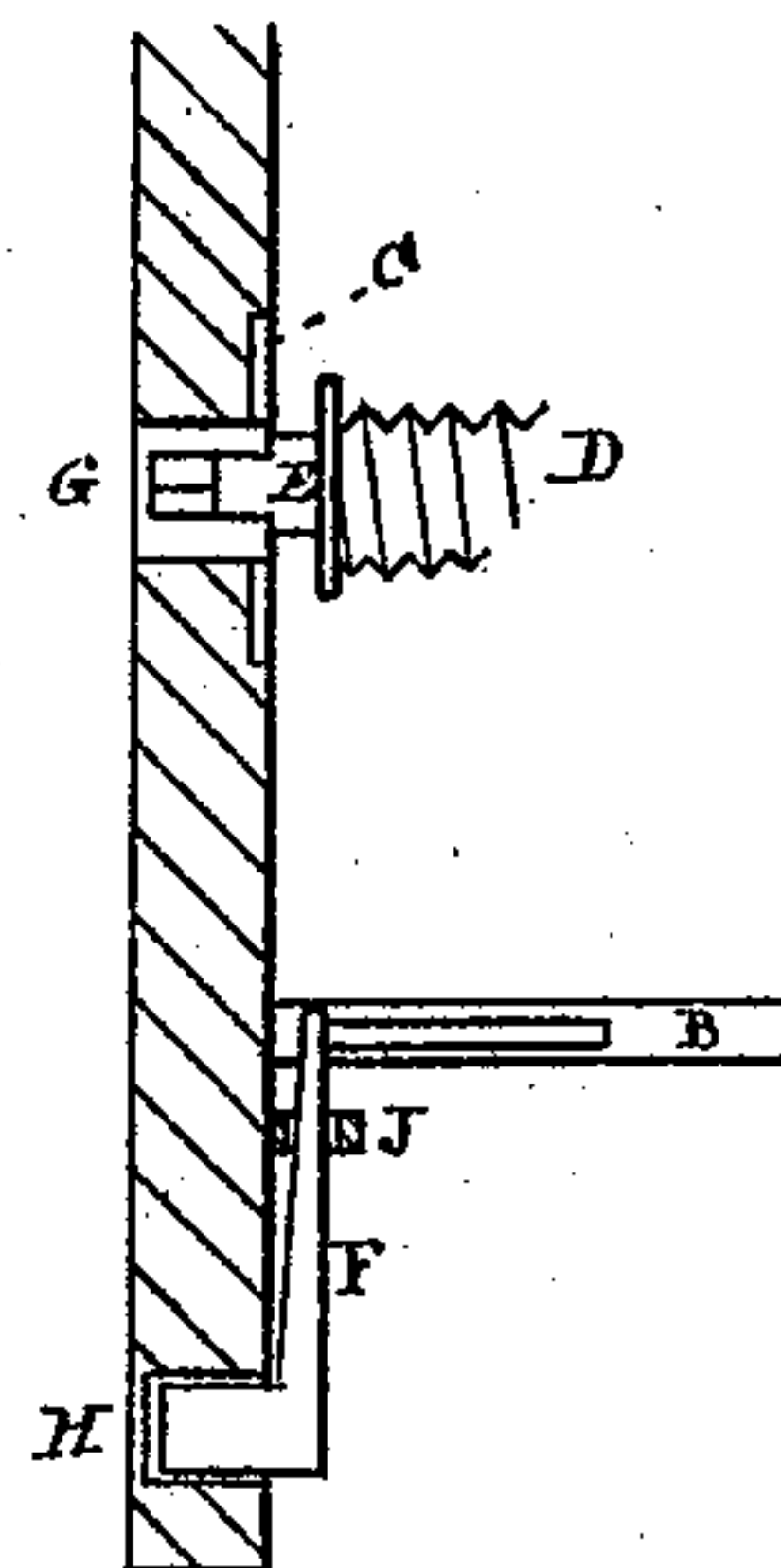


FIG. 11.



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## IMPROVEMENT IN EXTENSION-LADDERS.

Specification forming part of Letters Patent No. **200,475**, dated February 19, 1878; application filed  
June 22, 1877.

*To all whom it may concern:*

Be it known that I, JOHN W. PINE, of the city of Brooklyn, Kings county, and State of New York, have invented certain new and useful Improvements in Extension-Ladders, as will be fully set forth in the description and claims for the same, reference being had to the accompanying drawings, forming a part of this specification, the same letters of reference, wherever they occur, referring to similar parts.

Figure 1 represents a front elevation of the ladder complete; Fig. 2, a detached view of the adjustable extension-ladder; Figs. 3 and 4, detached views of the adjustable shores or braces. Figs. 5, 6, 7, and 8 represent four different positions of the safety latch or hook with reference to the rounds of the main ladder in the ascent and descent of the extension-ladder. Fig. 9 is a vertical sectional elevation of the main ladder, showing the endless rope and barreled-spring turn-buckle and extension-ladder device as attached thereto. Fig. 10 is a detached sectional view of the barreled-spring turn-buckle device. Fig. 11 is a detached sectional view of the lower end of one leg of the main ladder, showing the countersunk winding-stem of the grooved pulley, and mode of securing the cranks into recesses in the foot of the legs of the main ladder.

Letter A represents the legs of the main ladder, and B the rounds therein. In its lower end is arranged, in suitable bearings C, a spirally-grooved roller, D, having flanges at each side of the grooves. The ends of the axle E of the grooved roller are only of about the length of the thickness of the stuff from which the legs of the ladder are made, so as not to project beyond the outer face of the ladder, as shown in Fig. 11. The object of this is that they may be out of the way when sliding the ladders in and out on the truck-frame, as would be the case if they projected out to any extent.

To facilitate the application of the cranks F, a countersunk recess, G, surrounds the end of the axle. When the cranks are not in use they are secured to the inside of the legs of the main ladder by inserting the crank eye or head into a cavity, H, as shown in Figs. 9 and 11, with the staff of the crank held by a spring-

latch, J, to prevent its displacement from the side of the ladder-leg.

At the upper ends of the main ladder is a cross-head, K, stiffened by braces at each side. In the middle part of the cross-head is secured a loose-running pulley, L. Over this pulley, and around the spirally-grooved barrel or roller D, a rope or chain, M, is carried, and after making some four or more or less number of turns round the grooved roller, its two ends are secured to a barreled-spring turn-buckle and extension-ladder lifting device, as an intermediate link between the ends of the rope, to make an endless-rope elevator.

Letter N represents the barreled spring, to the lower end of which the lower end of the rope is attached by means of the spring compressor-rod P. The object of this compressor-spring is to take up any little slack that may occur in winding up the extension-ladder Q, and thus, by its automatic action, keep the endless rope at all times taut on the pulleys.

To the upper end of the case or barrel in which the compressor-spring is secured is a prolongation of one side of the case, as shown at R, Figs. 9 and 10. Attached to its upper end by a swivel-head is a turn-buckle, S, to which the upper end of the endless rope is attached. The object of this is to permit of taking up of any excess of slack in the rope which the spring N fails to take up automatically, and especially facilitate the tightening the endless rope by the man on the ladder, should he find, on ascending it, that the rope was not acting properly. At the upper end of the spring-barrel its side T, opposite to the prolongation R, as shown in Figs. 9 and 10, is also projected up to about half the length of the side R, thus leaving an opening between the sides R and T. The object of making this is to permit of the locking therein of a cross-bar, U, at the foot of the extension-ladder Q by means of the pin V, Figs. 1 and 9. To facilitate the sidewise motion of the barrel-spring in consequence of the changing position of the rope in the grooves of the roll, a small friction-roller, W, is arranged underneath the cross-bar, as shown in Figs. 9 and 10.

When the ladder is not in use, the exten-



sion-ladder Q is a separate and independent ladder, and each of the main and extension ladders may be used separately. When, however, the main ladder is required to be lengthened, the extension-ladder is then laid upon the rounds B of the main ladder, and slid under the guides X on the inner edges of the legs of the main ladder. The cross-bar U in the lower end of the extension-ladder is then inserted into the slot in the head of the spring-barrel, and secured therein by the pin V, as shown in Figs. 1 and 9. In this position the ladder may now be elevated; but to prevent any liability to accidents by the breaking of the endless elevator-rope, self-adjusting safety-latches or hooks Y are secured by center-pins Z to the lower inside faces of the extension-ladder, with a stiffening-spring,  $a^2$ , at its back, to keep the hooks at all times in their proper positions to engage upon the rounds B of the main ladder should the endless rope break. The ends of these hooks are curved on a true circle, or nearly so, so that, when the extension-ladder is being elevated, the head of the hook will strike the round B about at the point indicated in Fig. 6, and thus slip off the point, as represented in Fig. 7. As the latch-guard  $b^2$ , attached to the side of the hook-bar, is secured thereto by a loose center-pin,  $c^2$ , of course the guard gives back, and allows the ladder to ascend and the hook to engage upon the round of the main ladder, as shown in Fig. 5. To prevent the latch-lever from depressing below the proper point for its hook end to pass the round, as shown in Fig. 6, a stop,  $d^2$ , is secured into the side of the ladder, just under the latch-lever, and thus the latch-lever is kept at its proper place.

When it is necessary to draw back the extension-ladder, it is elevated just far enough to clear the latch-guard above the round of the ladder, when the stiffening-spring  $a^2$  will depress the latch-bar down upon the round and below the end of the guard  $b^2$ . The descent of the ladder now causes the guard  $b^2$  to take the position shown in Fig. 8, and as

the round of the main ladder is always behind the guard, of course the descent of the extension-ladder is continued without interruption till completely down.

To prevent any tendency to lateral tilting of the ladder, adjustable shores or braces  $e^2$  are inserted or attached to the sides of the main ladder by means of holes  $f^2$  therein, Figs. 3 and 9, into which is inserted a self-locking jointed eyebolt,  $g^2$ , secured by a link-joint to the upper end of the shores or braces. By this means the shores can be attached to and detached from the ladder with great facility, and at the same time with no possible chance of the drawing out of the jointed eyebolt except by manual exertions, as will be obvious from the view shown in Fig. 3.

Having now described my invention, I will set forth what I claim and desire to secure by Letters Patent of the United States:

1. In an extensible ladder, the elevating-rope M, in combination with the device for linking its two ends together to form an endless rope, composed of the barreled spring N and prolongations R and T, as and for the purposes set forth.

2. In combination with the linking device, composed of the barreled spring N, turn-buckle S, and prolongations R and T, the cross-bar U of the extension-ladder, as and for the purposes set forth.

3. The combination of the main and extensible ladders A and Q, safety-latch Y, spring  $a^2$ , guard  $b^2$ , and stop  $d^2$ , as and for the purposes set forth.

4. The combination of the main and extensible ladders A and Q with the shores  $e^2$  and self-locking jointed eyebolt  $g^2$ , secured to their upper ends, as constructed, and for the purposes set forth.

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Witnesses:

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