(No Model.)

# T. W. ALEXANDER.

## EXTENSION STEP LADDER.

No. 589,326. Patented Aug. 31, 1897.

Fig. 1

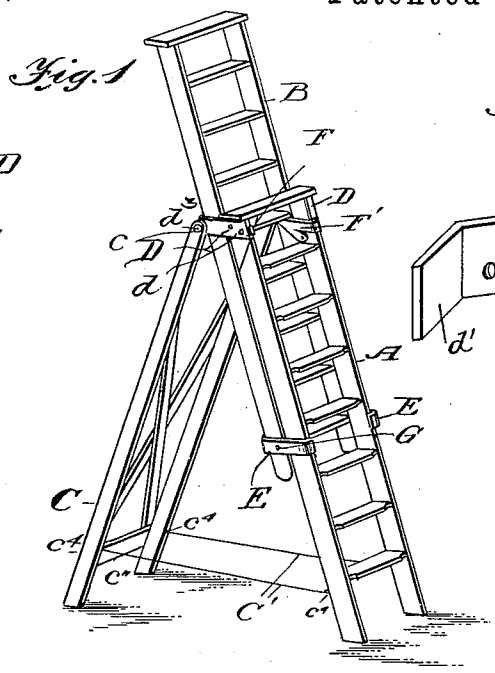



Fig. 2

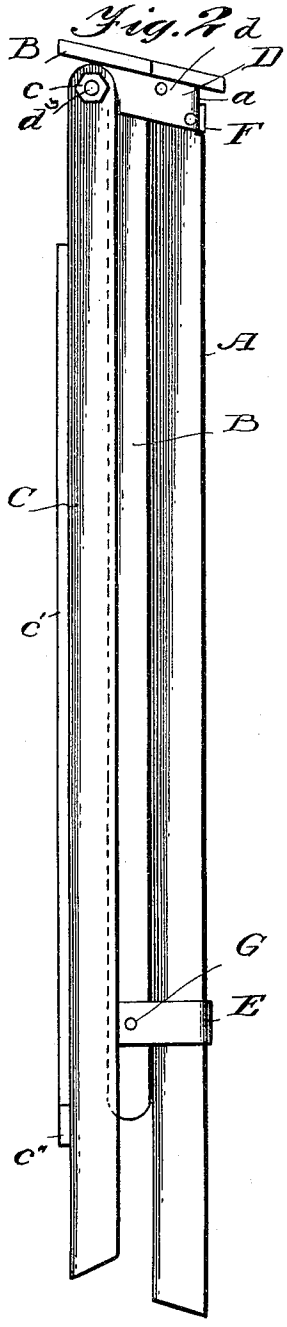



Fig. 6

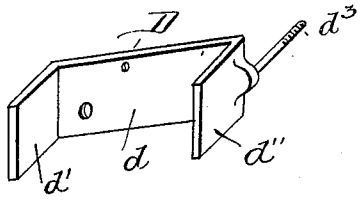



Fig. 3

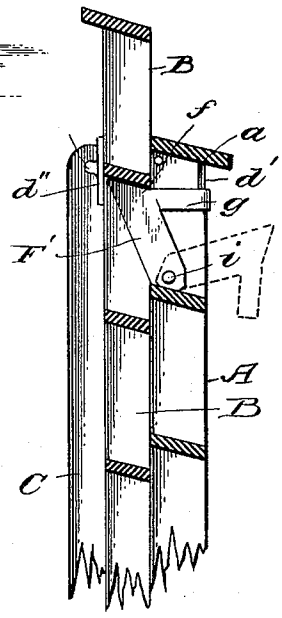



Fig. 4

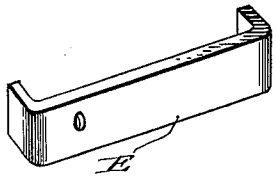
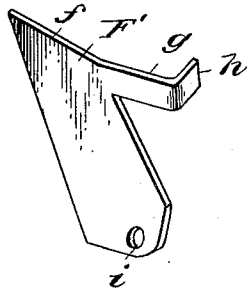



Fig. 5




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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

# UNITED STATES PATENT OFFICE.

THEOPHILUS W. ALEXANDER, OF BURLINGTON, IOWA.

## EXTENSION STEP-LADDER.

SPECIFICATION forming part of Letters Patent No. 589,326, dated August 31, 1897.

Application filed January 19, 1897. Serial No. 619,795. (No model.)

*To all whom it may concern:*

Be it known that I, THEOPHILUS W. ALEXANDER, a citizen of the United States, residing at Burlington, in the county of Des Moines and State of Iowa, have invented certain new and useful Improvements in Extension Step-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 same.

My invention relates to improvements in extension step-ladders in which I employ a non-extensible prop, which is hinged or pivotally attached in a novel manner to the step-ladder proper, and the extension-ladder is arranged to be projected or withdrawn alongside of the step-ladder proper without adjusting or changing the prop.

The objects of my invention are, first, to provide a simple, strong, and duarble construction which may be easily and readily adjusted for service around a dwelling, store, on a farm, or in any other place where such a structure may be desirable or necessary; secondly, to so construct and arrange the parts that the extension part when not in service will be entirely out of the way; thirdly, to provide a novel means for connecting the hinged prop to the main ladder and for guiding the extension-ladder in moving the same endwise on the main ladder; fourthly, to provide simple automatic holding-dogs arranged on the main ladder to engage directly with the steps of the extension-ladder in a manner to permit the dogs to engage automatically when the extension is withdrawn and to be thrown back out of position by a sharp pull on the extension-ladder when it is desired to retract the latter, and to improve the structure in minor details, so as to promote the efficiency of the same.

With these ends in view my invention consists in the novel combination of devices and in the construction and arrangement of parts, which will be hereinafter fully described and claimed.

To enable others to understand my invention, I have illustrated the preferred embodiment thereof in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a perspective view with the extension-ladder withdrawn partially from the step-ladder proper. Fig. 2 is a side elevation with the extension retracted. Fig. 3 is a longitudinal sectional view showing by full lines one of the holding-dogs in engagement with the extension-ladder and by dotted lines showing the dog thrown back out of position. Fig. 4 is a detail perspective view of one of the slidable keepers for the extension-ladder. Fig. 5 is a detail perspective view of one holding-dog. Fig. 6 is a detail view of one of the stationary keepers for guiding the ladder extension in its endwise movement and also serving as the support for the hinged prop.

Like letters of reference denote corresponding parts in all the figures of the drawings, referring to which—

A designates the step-ladder proper. B is the slidable member or the extension-ladder, and C is the hinged prop which holds the ladder in an upright position when opened for service.

The main ladder or the step-ladder proper, A, consists of the usual side rails and the transverse pieces forming the steps. The slidable or extension member B is constructed of similar side rails and cross step-pieces, but the extension member B is not as long as the main ladder A in order that the extension may be retracted within the limits of the main ladder, so as to be entirely out of the way and not interfere with the adjustment and service of the ladder A.

I prefer to so arrange the two members A B and to limit the sliding inward movement of member B that the steps thereof will coincide or lie in the same plane when the extension member B is retracted its full limit within the main ladder A.

The extension member B has its rails fitted edgewise against the rails of the ladder A, and the two members or ladders A B are confined or held together by keepers D E, which permit the member B to slide endwise on the main member A of the step-ladder. Two of the keepers D are employed near the upper end of member A, and two keepers E are arranged on the sides of the ladder near the lower steps thereof. The keepers E are flanged plates fitted to embrace the rails of

the two members A B, and they are fastened in any preferred way to the slidable or extension member B, so as to move therewith when the latter is adjusted, said keepers sliding freely on the main-ladder member A. The keepers D, however, are stationary and they are constructed in a novel way to serve the twofold purpose of furnishing a guide for the extension member B and a support for the prop C. Each stationary keeper is cast in a single piece of metal with a flat plate $d$, the flanges $d'$ $d''$ at the end edges of the plate, and the pintle $d^3$, which projects from the back flange $d'$. The main stationary member A has the front edge of its side rails recessed at $a$, and the keepers D are fitted laterally against the outside of the rails in a position to have the flanges $d'$ fit in the recesses $a$, while the rear flanges $d''$ embrace the rails of the extension member B, said keepers D being fastened to the member A by screws or other suitable fasteners.

It will be seen that the slidable and stationary keepers embrace the members of the ladder in a manner to confine the member B against both edgewise and sidewise displacement; but at the same time the member B is free, except when restrained by the holding-dogs presently described, to move endwise on the member A.

The pintles $d^3$ project outward from the stationary keepers at the back of the ladder, and these pintles pass through holes in the legs of the prop C to connect the latter pivotally to the member A through the medium of the pintles and the keepers D, which are fixed to said member A. The protruding ends of these pintles are threaded to receive the nuts $c$, or other retainers may be used for the purpose of holding the prop in engagement with the stationary keepers. The prop is strengthened by the crossed braces $c'$ and the transverse strip $c''$, and the outward movement of the prop away from the member A of the ladder is limited by the cords C', which are fastened to the eyes or loops $c^4$, attached to the prop and to the main member A of the ladder.

F F' designate the holding-dogs, which are pivotally attached within the side rails of the members A and are arranged in such relation to the slidable member B as to directly engage with the steps thereof automatically when the member B is withdrawn for use. Each dog is cast in a single piece of metal with a beveled nose $f$ and with an angular arm $g$, which terminates in a lip or flange $h$. The dog is pivoted at $i$ within the ladder-rail and lies normally in an inclined position to extend well across the rails of the member B and fit beneath the steps thereof to afford a firm support for said member B. The arm $g$ of each dog extends to the front of the rails of member A in order that the lip $h$ thereon may fit over the flanged end $d'$ of the keeper D, and thus the arm and lip serve as a stop to arrest the inward movement of the dog.

It will be noted that the dogs are arranged or hung to be off balance when the ladder is in an upright position and that they lie in the path of the steps of the slidable extension member. When the member B is raised, its steps strike the inclined dogs, which yield or give to permit the steps of the slidable member B to pass the dogs, which drop back into place beneath the steps immediately after said steps shall have passed the dogs, in order that the member B may be kept from sliding back by its own weight. The stop devices on the dogs limit the inward movement of the dogs and prevent them from dropping too far and allowing the member B to slip and descend. To lower the member B, it is raised suddenly in order to strike the dogs sharply and with sufficient force to throw the dogs forward past their center of gravity and incline them beyond the front of the member A, thus throwing the dogs out of the path of the steps of the member B and permitting the latter to descend without hindrance from the dogs. After the member B has been lowered the desired distance the dogs may be turned by hand back to their normal positions.

I prefer to brace the side rails of the extension member B by means of a tie rod or bolt G, which passes through the rails and the keepers E to rigidly join and strengthen the parts.

To prevent the ladder from slipping on the floor or pavement, pointed spurs or other suitable means (not shown) may be fastened to the side rails of the main member A of the ladder.

From the foregoing description taken in connection with the drawings it will be noticed that my ladder may be used with the same ease and facility as ordinary step-ladders. It possesses the advantageous property, however, of affording an extension-ladder which may be withdrawn for service without hindrance from or interfering with the foldable prop, and said extension is held securely locked in place by automatically-acting dogs arranged to engage directly with the steps of said extension-ladder section, thus simplifying the construction and promoting the efficiency of the structure.

It is thought that the operation and advantages of my invention will be readily understood and appreciated by those skilled in the art from the foregoing description taken in connection with the drawings.

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

1. The combination with a main-ladder member A, and a slidable extension member B fitted edgewise against said member A, of the stationary keepers D fastened to the side rails of the main member and flanged to embrace the slidable member, said keepers projecting at their rear ends beyond the slidable extension member and provided with the integral threaded pintles $d^3$ which project lat-

erally from the keepers, the non-extensible prop C fitted loosely on the pintles and thereby attached pivotally to the stationary keepers, nuts fitted on the threaded ends of said pintles, and holding-dogs pivoted to the side rails of the main member and engaging with the extension member, as and for the purposes described.

2. The combination with the main and extensible members of a ladder, and a hinged prop, of the automatic holding-dogs F arranged within the rails of the two ladder members and provided with the stop-arms *g* flanged to embrace the edges of the rails of the main-ladder member, for the purpose of arresting the movement of said dogs toward the extension-ladder member, said dogs being pivoted to the main-ladder member to hang by gravity in inclined positions across said side rails of both ladder members and to present their vertically-inclined edges and their straight top edges to the steps of the extension-ladder member, for the purposes described, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

THEOPHILUS W. ALEXANDER.

Witnesses:

JNO. J. SEERLEY,

CHAS. C. CLARK.