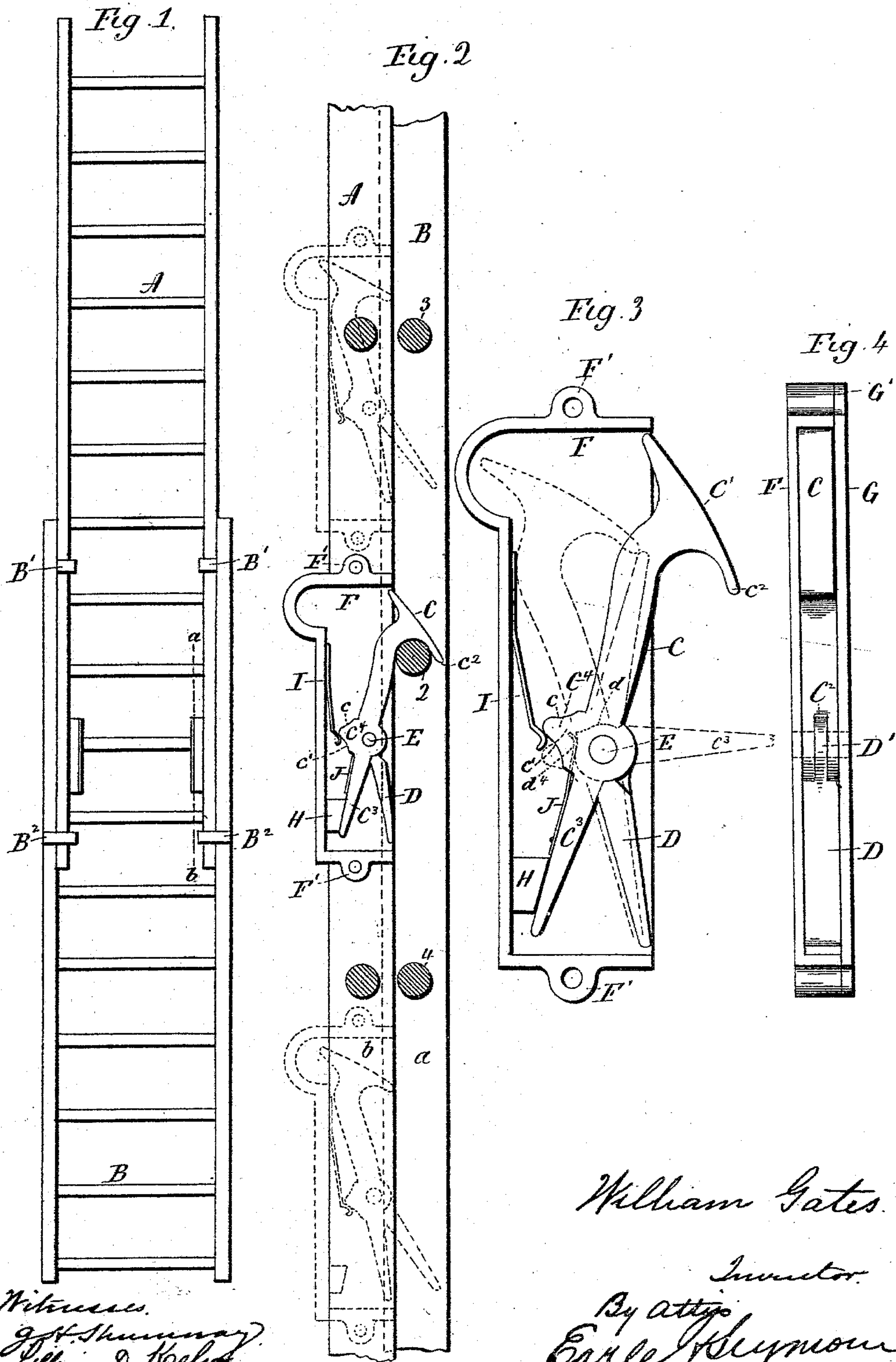


(No Model.)

W. GATES.  
EXTENSION ATTACHMENT FOR LADDERS.

No. 515,582.

Patented Feb. 27, 1894.



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# UNITED STATES PATENT OFFICE.

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## EXTENSION ATTACHMENT FOR LADDERS.

SPECIFICATION forming part of Letters Patent No. 515,582, dated February 27, 1894.

Application filed July 24, 1893. Serial No. 481,253. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM GATES, of New Haven, in the county of New Haven and State of Connecticut, have invented a new Improvement in Extension Attachments for Ladders; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters and figures of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a view in elevation of an extension ladder provided with extension attachments constructed in accordance with my invention; Fig. 2, an enlarged view partly in elevation and partly in section on the line *a—b* of Fig. 1, showing the projected or normal position of the hook of the attachment by full lines and the retired or retracted position of the hook by two sets of broken lines, which indicate two different elevations of the sliding upper ladder; Fig. 3, an enlarged view partly in section of one of the attachments with its cover removed, and Fig. 4, a similar view looking at the open edge of the attachment.

My invention relates to an improvement in extension attachments for ladders, or in other words, to those devices employed in connection with two ladders to permit the upper ladder to be moved up and down with respect to the lower ladder, and firmly fastened thereto in any desired position. These devices are attached to the upper ladder and provided with swinging hooks adapted to be engaged with the rungs of the lower ladder, and the object of my present invention is to produce an attachment of simple, compact, durable and effective construction, in which the projection of the hook shall be positively effected by means of a trip.

With these ends in view, my invention consists in an extension attachment having certain details of construction and combinations of parts as will be hereinafter described and pointed out in the claims.

It will be understood that two attachments are always employed with a pair of ladders, but inasmuch as the attachments will be exactly alike in construction, the illustration

and description of one attachment will suffice for an understanding of my invention. I have, however, shown in Fig. 1 of the drawings, two ladders, provided with a pair of my attachments, the upper ladder A being narrower than the lower ladder B, and arranged to slide up and down within the side pieces thereof. The lower ladder is furnished with two pairs  $B^1 B^1$ ,  $B^2 B^2$  of guides, which embrace the sides of the upper ladder, and guide the same as it is adjusted up and down.

My improved attachment consists essentially of a hook C and a trip D, hung on the same pivot E, within the body F of a case having a removable cover G, the said body and cover being provided at their ends with perforated lugs  $F'$ , and  $G'$ , which receive bolts having the double function of securing the cover to the body and both to the ladder. The particular construction of the body and cover, however, may be varied as desired. The hook C is constructed at its upper end, which constitutes the real hook and is adapted to be engaged with the rungs of the ladder, with an inclined operating face  $C'$ , the function of which will be set forth later on. At its lower end the hook is enlarged in its plane, and constructed with a longitudinal slot  $C^2$ , extending transversely through it, and receiving the flattened centrally perforated head  $D'$ , formed at the inner end of the trip D; the hook and trip being thus adapted to be hung on the same pivot E. As herein shown the hook is also constructed with a stop-arm  $C^3$ , extending in line with it below its enlarged portion, and arranged to engage with a stop H, consisting of a block, and located within the lower end of the case, as seen in Fig. 3. The function of the said stop-arm as thus constructed, is to limit the projection of the upper end of the hook from the case, as clearly shown in the said figure. If desired, however, I may dispense with the said arm and employ other means for limiting the projection of the hook. I shall, however, construct the hook at its lower end so as to adapt it to be positively engaged by the trip at a point below the pivot E for the positive projection of the hook. This engagement of the trip with the hook takes place when the trip is at the limit of its downward movement, the extreme inner



end of the trip then engaging with the extreme inner end of the outer face of the stop-arm  $C^3$ . The hook is further constructed at its lower end with an inwardly projecting lug  $C^4$ , having two corresponding oppositely inclined cam faces  $c$  and  $c'$ , which are alternately engaged by a stiff spring  $I$ , secured to the body  $F$  of the case. When the hook is turned on the pivot  $E$ , so as to engage the said spring  $I$  with the cam face  $c$  of the lug, the spring will operate to hold the hook in its retracted position, as shown by broken lines in Figs. 2 and 3, while on the other hand when the spring is engaged with the cam face  $c'$  of the lug, the hook will be held in its projected position, as shown by full lines in the same figures.

As herein shown I have provided a spring  $J$ , for the trip  $D$ , the said spring being secured to the inner face of stop-arm  $C^3$ , and extending upward into the longitudinal slot  $C^2$  formed in the enlarged lower portion of the hook, and arranged to co-operate with a long segmental recess  $d$ , formed in the flattened head  $D'$  of the trip, and also with a notch  $d'$  formed adjacent to one end of the said segmental recess. The said spring  $J$  may, however, be dispensed with, as it is not necessary to the operation of my improved device. When employed it serves to prevent the unduly free vibration of the pivotal trip  $D$ . Within the limits of the recess  $d$ , the trip swings practically unrestrained by the spring, between the point  $c^2$  of the hook and the intermediate position in which the trip is shown by the broken lines  $c^3$  in Fig. 3. Between such intermediate position of the trip, and its operating position in which it engages positively with the upper end of the stop-arm, the spring restrains the movement of the trip, and in its operating position enters the notch  $d'$  so as to hold the trip in that position against accidental dislodgment. It will be seen that the trip is not free to vibrate between its intermediate and operating position, whereby it is prevented from possibly swinging into position to engage endwise with the rungs of the lower ladder, while the upper ladder is being lowered, but as I said before, my device is fully operative without this trip spring, and I may dispense with it.

Having now described the construction of my improved extension attachment, I will proceed to set forth the mode of its operation, using for convenience of illustration, Fig. 2 of the drawings.

Let it be supposed, for instance, that the hook is projected and engaged with the rung 2 of the ladder, whereby the upper ladder is firmly secured, so far as downward movement is concerned, to the lower ladder. If now it is desired to lower the upper ladder for a distance represented by one rung, the upper ladder will first be lifted, against which movement there is no obstruction, through a distance somewhat exceeding the distance between the said rung 2 and the rung 3 next

above it. In lifting the upper ladder as described, the inclined operating face  $C'$  of the hook is engaged with the lower face of the said rung 3, whereby the force of the spring  $I$  is overcome, and the hook thrown back into its retracted or retired position, as shown by the upper set of broken lines in the said figure, the spring passing from the cam-surface  $c'$  to the cam surface  $c$  of the rearwardly projecting lug of the hook. The hook having been retracted as described, the upper ladder is lowered so as to permit the attachment to pass below the rung 2. While the attachment is being thus lowered, the pivotal trip, which is now projected, will engage with the rung 2, and be swung around by the same into the elevated position, in which it is shown by broken lines in Fig. 3, and in which its end engages with the extreme end  $c^2$  of the hook. In this position of retirement, so to speak, the trip clears the rung 2 in the downward movement of the ladder and attachment. Just as soon, however, as the trip passes below the rung 2, it will fall by gravity into its intermediate position, supposing the device to be provided with a trip spring, or into its lowest position supposing the device is not provided with such a spring. The lowering of the upper ladder is continued until the attachment has passed below the rung 4, which will engage with the trip, and again throw the same into its elevated or retired position, in which it will clear the said rung 4, and from which it will fall down by gravity again as soon as it passes below the said rung into the position in which the attachment is shown by the lower set of broken lines in Fig. 2. The upper ladder is now lifted, whereby the trip will be engaged with the lower face of the rung 4. If the trip is at this time in its intermediate position, it will be at once depressed into its operating position, in which it is positively engaged with the hook, which, when the upper ladder is lifted a little farther, will be positively projected from the case at a point above the rung 4. The upper ladder is now let down a little so as to permit the hook to engage with the rung 4 in the same manner as that in which it is shown by full lines to be engaged with the rung 2. If the trip is in its operative position when the lifting of the ladder is begun, it will at once positively project the hook without the slight movement required to move the trip from its intermediate to its operating position. The process of disconnecting the hook from the rung 2, and re-engaging it with another rung above the same, is the same as that just described, except the final movement of the ladder is upward instead of downward.

What I wish particularly to call attention to is that the projection of the hook is positive and not dependent upon the action of any springs.

My device is composed of few parts, is not liable to derangement, and will be found to be very effective in use.



I am aware that it is not new to employ, in such devices, hooks having inclined faces for positively retracting them, nor new to combine trips and springs with such hooks, and I do not claim any of those constructions broadly. I would have it understood, however, that I do not limit myself to the exact construction herein shown and described, for it is apparent that some changes of form and arrangement may be made without departing from my particular invention.

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

1. In an extension attachment for ladders, the combination with a case, of a hook pivotally hung within the case, and constructed at its hooked upper end with an inclined operating face, a pivotal trip arranged to engage with the hook below the pivot thereof to positively project its upper end from the case and a spring located within the case and engaging the hook, which it holds in its projected and retracted positions, substantially as described.

2. In an extension attachment for ladders, the combination with a case, of a hook pivotally hung within the case, and constructed at its hooked upper end with an inclined operating face, a pivotal trip having the same pivotal center as the hook, and constructed to positively engage with the same below the pivot thereof for positively projecting the hook into its operating position, and a spring located within the case and engaging the hook which it holds in its projected and retracted positions, substantially as described.

3. In an extension attachment for ladders, the combination with the case thereof, of a hook pivotally hung within the case and constructed at its hooked upper end with an inclined operating face, and at its lower end with an inwardly projecting lug having two

oppositely inclined cam-faces, a pivotal trip having the same pivotal center as the hook with which it positively engages below the pivotal points thereof for positively projecting the hook into its operating position, and a spring arranged to engage with the respective faces of the said lug, for holding the hook in its projected and retracted positions, substantially as described.

4. In an extension attachment for ladders, the combination with the case thereof, of a hook constructed at its hooked upper end with an inclined operating face, and at its lower end with a stop-arm, a longitudinal slot, and an inwardly projecting lug having two cam faces, a trip inserted into the said slot, and hung on the same pivot as the hook, and constructed to positively engage with the inner end of the outer face of the stop-arm for positively projecting the hook into its operating position, and a spring secured to the case and arranged to engage with the said lug for holding the hook in its projected and retracted positions, substantially as described.

5. In an extension attachment for ladders, the combination with the case thereof, of a hook pivotally hung therein, a spring secured to the case and engaging with the hook for holding the same in its projected and retracted positions, a trip pivoted on the same center as the hook and arranged to engage with the same for positively projecting it into its operating position, and a trip spring for controlling the vibration of the pivotal trip, substantially as described.

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

WILLIAM GATES.

Witnesses:

ADELBERT W. FLINT,  
GEO. D. SEYMOUR.