Feb. 21, 1939. J. H. RUSBY 2,147,991

EXTENSION LADDER

Filed June 12, 1937 2 Sheets-Sheet 1

Fig.1.

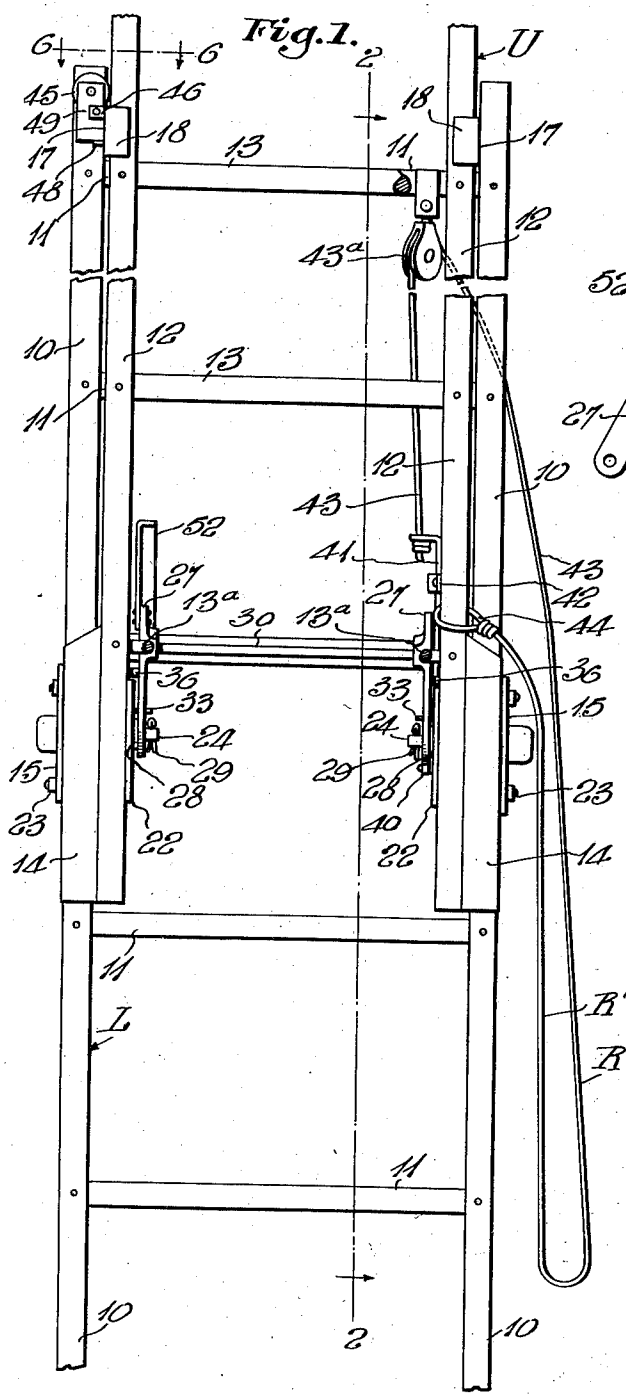


Fig.2.

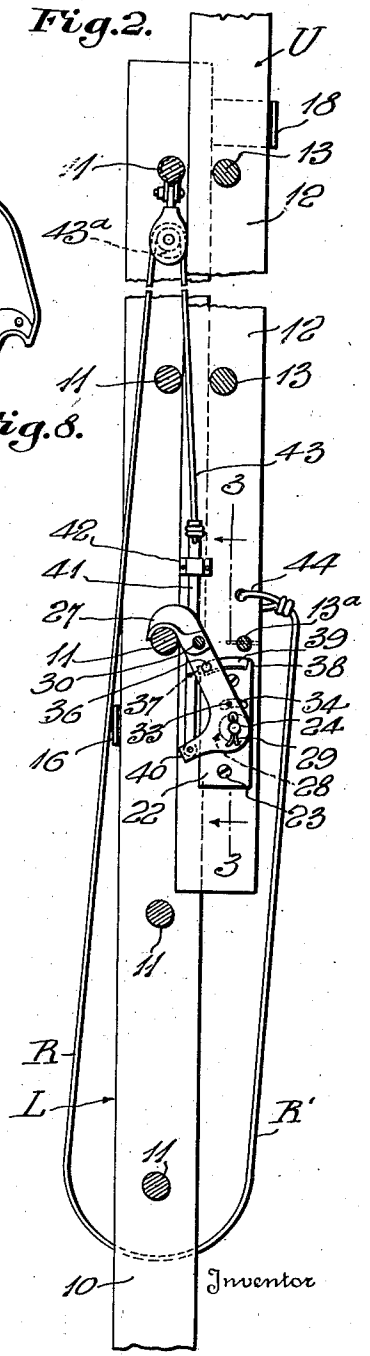
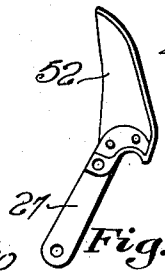


Fig.8.



Inventor

J. H. Rusby

By H. B. Wilson & Co

Attorneys

Feb. 21, 1939. J. H. RUSBY 2,147,991

EXTENSION LADDER

Filed June 12, 1937 2 Sheets-Sheet 2

Fig. 3.

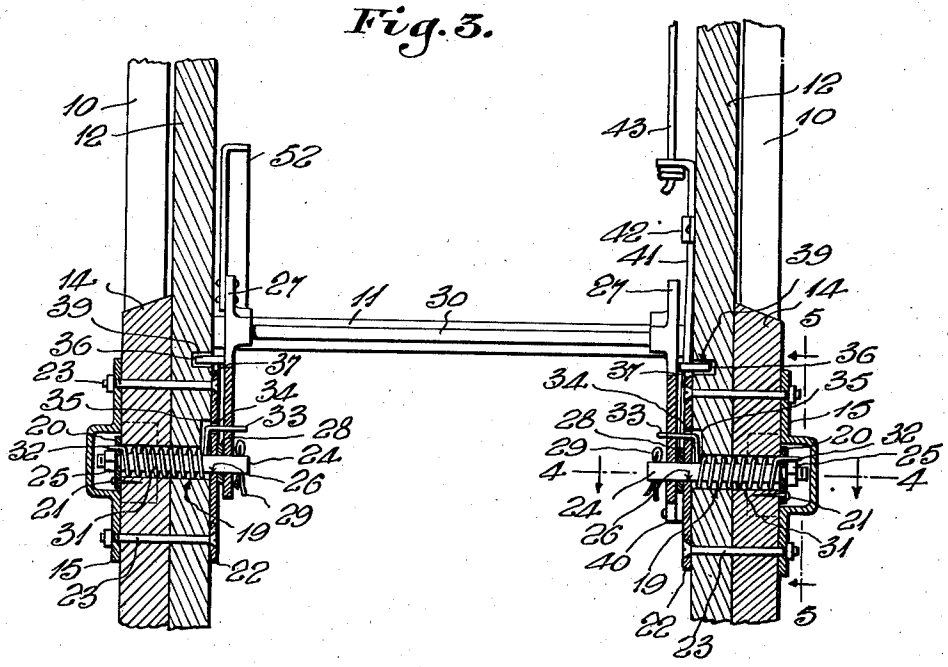


Fig. 6.

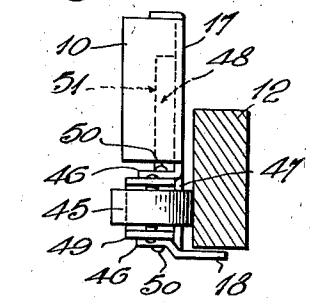


Fig. 5.

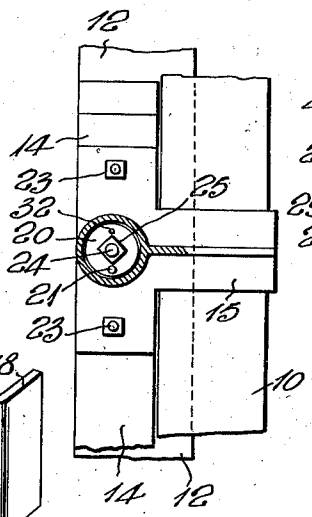
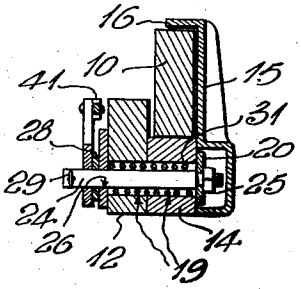


Fig. 4.



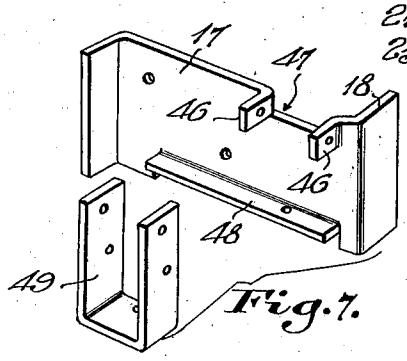


Fig. 7.

Inventor

J. H. Rusby

By H. Robertson & Co

Attorneys

Patented Feb. 21, 1939 2,147,991

UNITED STATES PATENT OFFICE

2,147,991

EXTENSION LADDER

Joseph H. Rusby, Nutley, N. J.

Application June 12, 1937, Serial No. 147,975

2 Claims. (Cl. 228—66)

The invention aims primarily to provide a new and improved hook means for holding the upper section of an extension ladder in any position to which it may be raised, said hook means being readily releasable when said upper section is to be lowered.

In carrying out the above end, two hooks are preferably mounted at the inner sides of the stiles of the upper ladder section to engage rungs of the lower section, and a further object is to provide a rod which rigidly connects both hooks for movement in unison, said rod being so located as to be out of the way and to be guarded against being stepped upon and bent.

A cable is employed for releasing the hook means and raising and lowering the upper section, and a further object is to provide a novel arrangement in which this cable may be used also to pull said upper section downwardly if it should be frictionally held against descent by gravity.

The above mentioned cable, when pulled in ladder-extending direction, has a tendency to laterally tilt the upper ladder section when it nears maximum raised position, thereby having a tendency to cause binding of the guides which slidably connect the two sections, but a further object of the invention is to make novel provision for preventing such binding.

Yet another object is to provide a rather simple and inexpensive construction, yet one which will be highly desirable, easy to operate, safe, and durable.

With the foregoing in view, the invention resides in the novel subject matter hereinafter described and claimed, description being accomplished by reference to the accompanying drawings.

Fig. 1 is a front elevation partly broken away and partially in section.

Fig. 2 is a vertical sectional view on line 2—2 of Fig. 1.

Fig. 3 is a vertical sectional view on line 3—3 of Fig. 2.

Fig. 4 is a detail horizontal section on line 4—4 of Fig. 3.

Fig. 5 is a detail vertical section on line 5—5 of Fig. 3.

Fig. 6 is a detail horizontal section on line 6—6 of Fig. 1.

Fig. 7 is a perspective view of the guiding plate and bracket shown in Fig. 6.

Fig. 8 is a side elevation of one of the rung-engaging hooks.

A preferred construction has been illustrated and will be rather specifically described, with the understanding however, that variations may be made within the scope of the invention as claimed.

The upper and lower ladder sections are denoted at U and L respectively, and for purposes of reference, the stiles and rungs of said lower section L are denoted at 10 and 11 respectively, and the stiles and rungs of said upper section are identified at 12 and 13 respectively, one of these rungs being particularly denoted at 13a and being preferably in the form of a metal rod located to perform a function hereinafter explained. The stiles 12 of the upper section U are preferably provided at their lower ends with blocks 14 secured against their outer sides, and guide plates 15 are bolted or otherwise secured against the outer sides of these blocks, said guide plates being provided with lateral ends 16 to slidably engage the rear edges of the stiles 10. Other guide plates 17 are bolted or otherwise secured to the stiles 10, near the upper ends of the latter, and are provided with laterally bent front ends 18 to slidably engage the front edges of the stiles 12.

Two aligned openings 19 are formed through the lower ends of the stiles 12 and through the blocks 14 attached to said stiles. A relatively small plate 20 extends across the outer end of each of these openings and is fastened to the block 14 by a nail, screw or the like 21, and a vertically elongated plate 22 extends across the inner end of the opening 19 and is secured to the stile 12 by bolts or the like 23. A pivot stud 24 extends centrally through each opening 19 and is securely fastened by any preferred means 25 to the plate 20, the inner portion of this stud being passed through an opening 26 in the plate 22 and projecting inwardly beyond this plate. Two hooks 27 to engage the rungs 11, are pivotally mounted upon the projecting inner ends of the two pivot studs 24 and washers 28 are preferably interposed between the lower ends of these hooks and the plates 22. Cotter pins 29 preferably pass through the inner ends of the studs 24. The upper ends of the hooks are rigidly connected with each other for movement as a single unit, by means of a rod 30. This rod is located directly behind the rung 13a of the upper section U and is so positioned that it always lies directly in front of one of the rungs 11, it being thus insured that said rod 30 shall not be in the way and that it shall not be stepped upon and bent, even if the upper section U be detached from the lower section L and used alone, either as a ladder or as part of scaffolding. The rung 13a, as above stated, is in the form of a metal rod for strength, in view of the fact that there is not sufficient space to permit the use of a full size rung at this location.

A coiled torsional spring 31 surrounds each of the pivot studs 24 and is suitably connected at its outer end 32 with the plate 20, preferably by laterally bending the end of said spring and passing it though an opening in said plate. The inner end of each spring 31 is provided with a lateral arm 33 which passes through an arcuate slot 34 in the plate 22 and is connected with the hook

27, preferably by passing it through an opening in said hook. The stile 12 may be suitably recessed as denoted at 35 to receive this arm.

The two springs 31 urge the hooks 27 in rung-engaging direction and it is, of course, understood that when manufacturing the ladder, the plates 20 are not secured to the blocks 14 until they have been rotated sufficiently to tension said springs 31 to the required extent, the nails or the like 21 being then driven.

Near its upper end, each hook 27 is provided with a lateral stop pin 36 extending across the upper end of the plate 22 and cooperable with a stop lug 37 on said plate to limit the swinging movement of the hooks under the action of the springs 31. In the present disclosure, movement of the hooks in the other direction would be limited by the rung 13a, but I prefer to provide the upper end of each plate 22 also with another stop lug 38 which would coact with the pin 36 in case it should be decided to dispense with said rung 13a. In the present disclosure, the pins 36 extend into recesses 39 in the stiles 12.

Near its lower end, one of the hooks 27 is provided with a rearwardly projecting arm 40 to which the lower end of a link 41 is pivoted, said link being slidable in an appropriate guide 42. One end of a cable 43 (metal or rope) is connected with the upper end of the link 41 and the other end of said cable is connected at 44 with the lower end of the stile 12 adjacent which said link is mounted. This cable is looped over a sheave 43a suspended from one of the rungs 11 (preferably the uppermost) of the lower ladder section L and said cable is of such a length that the lower end of the loop will be within reach of a person standing upon the ground. By pulling upon the reach R of the cable 43, the upper ladder section U is elevated and the hooks 27 are swung to released position against the action of the springs 31. Just as soon as the reach R is released, however, these springs 31 again throw the hooks to rung-engaging position so that they will be in readiness to engage the next adjacent rung as soon as the section U lowers sufficiently. The cable reach R is also useable for releasing the hooks, holding them released and lowering the section U. If this section U be frictionally held against free descent by gravity, it may be positively pulled downwardly by pulling upon the cable reach R'. Attaching the cable to the upper ladder section, also obviates any loose end which might become entangled in the operator's legs, in the ladder ends, or in paint brushes, tools or the like.

As the cable 43 is connected with the lower portion of only one of the stiles 12, through the medium of the link 41 and the hook 27, when said cable is used for elevating the upper section U, it has a tendency to laterally tilt said upper section when the latter has been extended near the maximum distance, and this tendency of said section U to laterally tilt, also has a tendency to cause the guides which slidably connect the two sections, to bind and interfere with easy raising of said section U. To overcome the lateral tilting tendency of the section U, therefore, and to consequently prevent the guides from binding, I mount a roller 45 on the guide 17 toward which said section U has a tendency to tilt, said roller engaging the outer side of one of the stiles 12. In mounting this roller, I preferably make use of the construction shown more particularly in Figs. 6 and 7, which construction will now be described.

Two lugs 46 are stamped laterally outward from the plate 17 under consideration, leaving a notch 47 in the upper edge of said plate near its front end. A flange 48 is also stamped laterally outward from the plate 17, at the lower edge of the latter. A U-shaped bracket 49 rests upon the flange 48 and extends between the lugs 46, being secured to said flange and lugs by rivets 50. The roller 45 is mounted between the arms of the bracket 49 and the lower portion of this roller may well pass through the notch 47. If the flange 48 be of a length as great as that shown, the inner side of the stile 10 will be suitably grooved as shown in dotted lines at 51 in Fig. 6, to receive the rear portion of said flange, and by seating the flange in such a groove, any tendency of the plate 17 to cant upwardly or downwardly, will be prevented.

As it is very often desirable to push the upper section U to a desired elevated position, one of the hooks 27 is preferably provided with a beak 52 to engage the rungs 11 and move both hooks backwardly to rung-clearing position as each rung is encountered upon the ascent of said section U.

It will be seen from the foregoing that novel and advantageous provision has been made for carrying out the objects of the invention, and while the details disclosed may well be followed, attention is again invited to the possibility of making variations within the scope of the invention as claimed. For instance, while two hooks are shown, one could be made to suffice, or more than two could be used if desired. Then too, although I have shown the bracket 49 riveted to the plate 17, it could of course be otherwise secured, for example by welding it to said plate or by casting it integrally therewith.

I claim:—

1. In an extension ladder, an upper section having stiles and rungs, at least one of said stiles being formed with an opening from its inner to its outer side, outer and inner plates secured to the outer and inner sides of said stile and extending across the ends of said opening, said inner plate having a pivot stud-receiving opening alined with the stile opening and also having a slot spaced from said pivot stud-receiving opening, a pivot stud passing through said stile opening and through said pivot stud-receiving opening, said pivot stud being connected to said outer plate and projecting inwardly beyond said inner plate, a coiled torsion spring surrounding said pivot stud within said stile opening and connected at its outer end with said outer plate, the inner end of said spring being provided with an arm passing through said slot of said inner plate, and a hook mounted on the projecting inner end of said pivot stud and connected with said arm, said hook being engageable with rungs of a lower ladder section and being urged to rung-engaging position by means of said spring.

2. In an extension ladder, an upper section having stiles and rungs, a plate secured to the inner side of one of said stiles, a rung-engaging hook pivotally mounted at the inner side of said plate, a stop stud projecting laterally from said hook across the upper end of said plate, and a stop lug integral with said upper end of said plate and disposed in the path of said stop stud to limit the movement of the hook in rung-engaging direction.

JOSEPH H. RUSBY.