June 8, 1954 G. R. NILSSON 2,680,555

EXTENSION LADDER HOOK

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Fig. 1

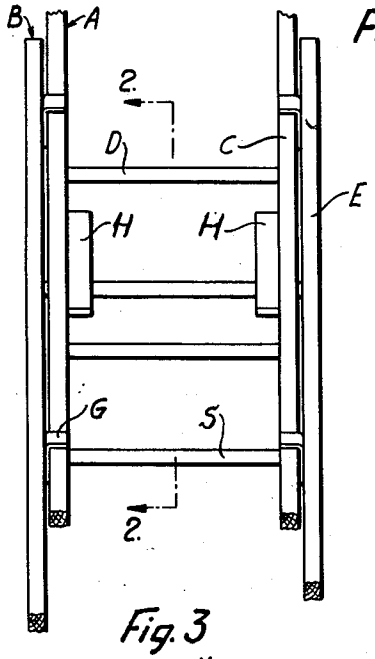


Fig. 2

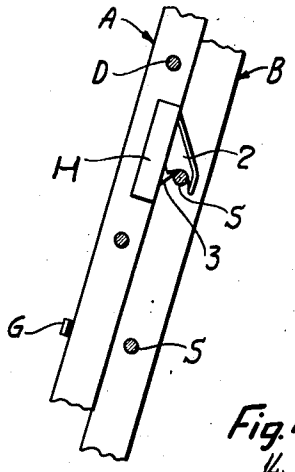


Fig. 3

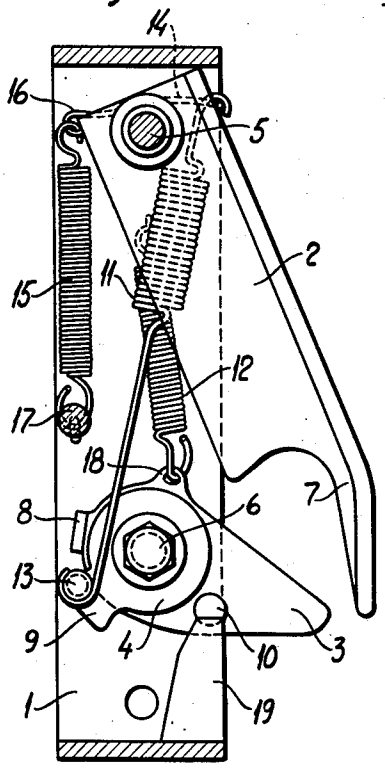
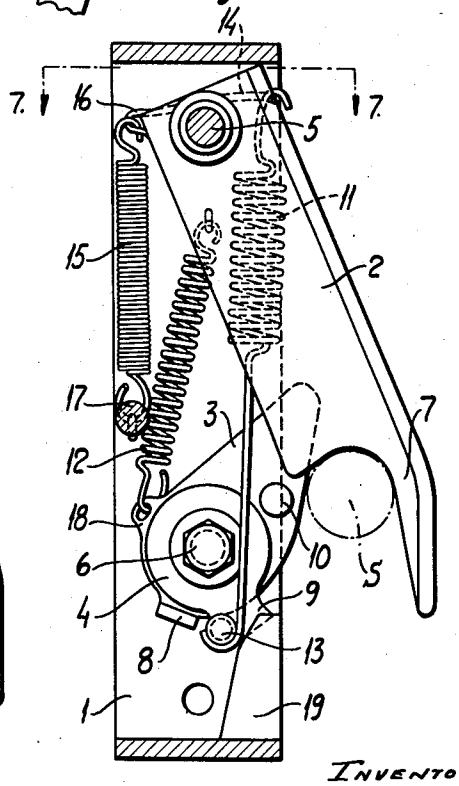


Fig. 4



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Fig. 5

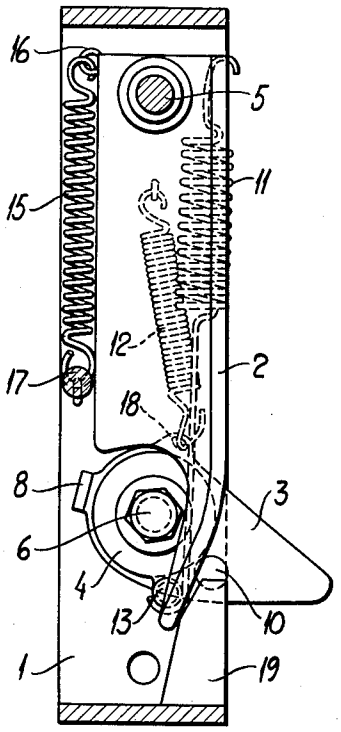


Fig. 6

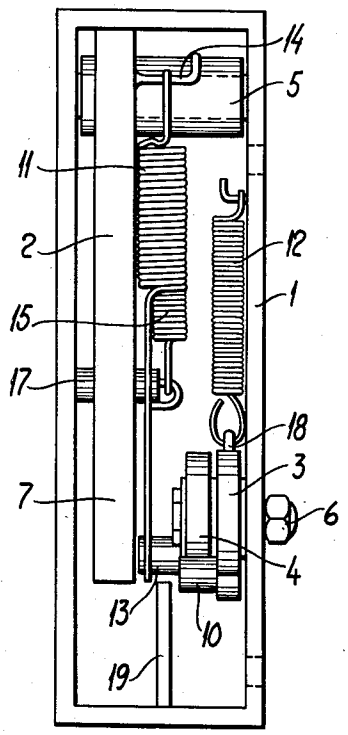
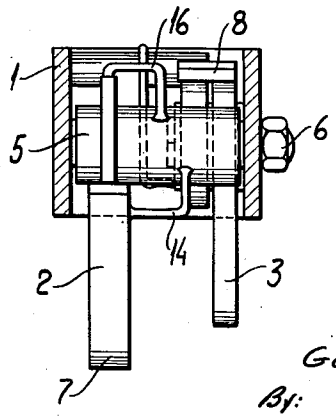


Fig. 7



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EXTENSION LADDER HOOK

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3 Claims. (Cl. 228—66)

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The present invention relates to hooking arrangements for extensible ladders, which arrangement contains a hooking arm arranged to cooperate with the rungs of the next lower ladder unit.

According to the present invention there is provided a hooking arrangement in which the hooking arm can be actuated upon by two springs, one of which being arranged to hold the hooking arm in an operative position and the other spring, the restoring spring, which is more powerfully dimensioned than the one first mentioned, being arranged to be stretched and slackened respectively by means of an adjusting mechanism working in dependence of the direction of movement of the ladder unit carrying the hooking arrangement in relation to the next lower ladder unit, the restoring spring being arranged in stretched position to keep the hooking arm in an inoperative position.

These and other more detailed and specific objects will be disclosed in the course of the following specification, reference being had to the accompanying drawings, in which—

Fig. 1 is an elevational view of parts of two sections of an extension ladder showing ladder hooks of the invention applied thereto;

Fig. 2 is a sectional view along the line 2—2 in Fig. 1;

Fig. 3 is a side view of the mechanism with the hooking arm in operative position;

Fig. 4 shows the same mechanism when the hooking arm engages a ladder rung;

Fig. 5 shows the same mechanism in still another position;

Fig. 6 is a front view of the hooking arrangement; and

Fig. 7 is a section along the line 7—7 of Fig. 4.

Referring now more particularly and by reference characters to the drawings, A and B designate generally two sections of a common extension ladder, the inner section A of which comprises stiles C and rungs D and outer section B of which comprises similar stiles E and rungs S. The two sections are held in slidable overlapping relation by conventional guides G and are arranged to be adjusted relatively lengthwise in usual fashion to vary the overall length of the ladder. Such adjustments are made in steps corresponding roughly to the distance between the rungs. For then securing the ladder sections in adjusted positions hook arrangements designated generally at H are employed.

The hook arrangement comprises a frame 1, for instance rectangular, the purpose of which is

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to be fitted on the upper ladder unit. In said frame a hooking arm 2, arranged to cooperate with the rungs S of the ladder unit B, as well as a feeling arm 3 and a trigger 4 are provided. The hooking arm is pivoted on a shaft 5 at the upper end of the frame and so arranged, that it can be altogether enclosed in the frame 1, i. e. assume a vertical position according to Fig. 5. The feeling arm 3 and the trigger are freely mounted on a bolt 6 attached to one of the side pieces of the frame 1. The length of the arms 2 and 3 is adjusted in such a way that the feeling arm and a hook 7 at the outer end of the hooking arm 2 can engage a ladder rung S of the ladder unit B at the same time, as is shown in Fig. 4. The trigger 4 is arranged to be moved by the feeling arm 3 through the intermediation of a catch 8. When the feeling arm is turned in a counter-clockwise direction, the catch mentioned engages an ear 9 on the trigger 4. On the side of the feeling arm 3 opposite to the catch 8 in relation to the bolt 6 the arm is provided with a pin 10, which cooperates with the ear 9 at the angular turning of the feeling arm in a clockwise direction. In this way the trigger can be adjusted from the position shown in Fig. 3 with the ear 9 situated at the left edge of the frame 1 to the position shown in Fig. 4, where the ear mentioned is situated at the right edge of the frame, and back again to the starting position in Fig. 3. The trigger is turned approximately 90°. The trigger can be actuated by two springs 11 and 12. The spring 11 is coupled to a peg 13 on the ear 9 and at its other end to an arm 14, firmly fixed to the hooking arm 2. This spring works as a restoring spring for the restoring of the hooking arm 2 from an operative position to an inoperative position and is more powerfully dimensioned than a spring 15, which works to move the arm 2 outwards to the operative position shown in Fig. 3. The spring 15, at one of its ends, is coupled to an arm 16 fixed on the hooking arm 2 and at its other end connected with a peg 17 inserted in the frame 1. The spring 12 mentioned above is at its upper end connected with the frame and at its lower end hooked onto an ear 18 on the feeling arm 3 situated in such a way that the spring 12 is working to move the feeling arm from the position shown in Fig. 4 downwards. In relation to the pivot bolt 6 the upper end of the spring 11 is situated in such a way that the trigger can be brought to pass the dead point position. The mechanism is arranged in such a way that the restoring spring 11 is stretched and slackened respectively by means of the trigger 4

which in its turn is dependent of the feeling arm 3 for its position. Thus, the trigger and the feeling arm together form a setting mechanism, the functioning of which is dependent upon the direction of movement of the ladder unit A in relation to the ladder unit B.

When heightening the ladder unit A the hooking arm 2 in its operative position hits the rungs S with its straight outer backside and is pushed inwards into the frame 1 against the action of the spring 15 when passing each rung. In the same way, the feeling arm 3 engages the rungs with its upper edge and is conducted downwards and inwards into the frame 1 by each rung. Consequently, there is nothing to prevent the ladder unit from being moved upwards on the ladder unit B. Each time a rung is passed the hooking arm 2 snaps outwards on account of the stretching of the spring 15, and the feeling arm 3 is restored to its outward position by the spring 12.

When lowering the ladder unit the feeling arm 3 first engages a rung S and is pushed upwards counter-clockwise (Fig. 4). Then the hook 7 slides into mesh with the rung, the hooking arm being pressed into a locking engagement with same, while the feeling arm 3 being turned further counter-clockwise gives the trigger 4 such a turning angle, that the peg 13 is brought past the dead point position of the spring 11, the trigger taking the position shown in Fig. 4. However, the restoring spring 11 is stretched with no influence on the hooking arm 2, since the position of same is fixed by the rung. In this manner, however, the mesh between the hooking arm and the rung is secured. If the ladder unit A is moved upwards from the position shown in Fig. 4, the hooking arm snaps inwards into the frame 1 while the feeling arm 3 is restored to its initial position according to Fig. 3 by its spring 12. The trigger 4, however, remains in the position shown in Fig. 4 due to the engagement with a stopping ledge 19 so that the hooking arm is retained in an inoperative position. In this condition the ladder unit can be lowered without that the hooking arm engages the rungs S. The feeling arm 3 is of course moved each time a rung passes, but this does not bring about any change in the position of the trigger, since the catch 8 just ticks over. Upon a renewed upward movement of the ladder unit the upper edge of the feeling arm 3, however, hits against the first rung S and is turned clockwise by same (Fig. 5). In doing this the pin 10 on said arm engages the ear 9 on the trigger and turns it past the dead point position for the spring 11 which spring restores the trigger to the position shown in Fig. 3. The spring 11 is then altogether slackened, whereby the spring 15 can bring the hooking arm 2 to the operative position.

The mechanism described above offers the necessary safety margin for devices of this type, since the hooking arm 2 cannot be brought to assume the inoperative position unless said arm earlier has been in engagement with a rung. Not until this has happened during which the feeling arm has been forced upwards to the position shown in Fig. 4 is the restoring spring 11 stretched by the turning of the trigger 4 and retained in its stretched position. Thus, there is no risk that the hook 7 can be brought to an inoperative position by the downwards movement of the ladder unit in such an in-between position of the runner, in which the point of the hook can be imagined to accidentally catch into the side of the

rung S, which is situated closest to the frame 1. Should the runner accidentally start gliding from such a hooking position, the hook unfailingly catches the next rung and goes into a normal locking engagement with same. Finally it should be pointed out that the hook is opened up as soon as the runner is moved upwards past the first rung and remains in this opened position so that it always retains a position of preparedness when the ladder unit is again lowered.

It is apparent that the device herein described may be modified in design and in details of construction with a view of adapting it to particular requirements, without however departing from the spirit of the invention.

What I claim is:

1. An extension ladder hook mounted on a movable ladder section, comprising a hooking arm, two springs fastened to said arm, one of these springs being adapted to hold the hooking arm in operative position for engaging the rungs of the underlying ladder section, the other spring being adapted to restore the hooking arm into an inoperative position enabling the lowering of the movable ladder section, a spring actuated feeling arm angularly adjustable by the rungs of the underlying ladder section, a trigger adjustable by said feeling arm and connected with said restoring spring and arranged to stretch said spring when turned.

2. An extension ladder hook mounted on a movable ladder section, comprising a hooking arm, two springs fastened to said arm, one of these springs being adapted to hold the hooking arm in operative position for engaging the rungs of the underlying ladder section, the other spring being adapted to restore the hooking arm into an inoperative position enabling the lowering of the movable ladder section, a spring actuated feeling arm angularly adjustable by the rungs of the underlying ladder section, a trigger adjustable by said feeling arm and connected with said restoring spring and arranged to stretch said spring when turned, said feeling arm having two catch members for adjusting said trigger, one for each adjusting direction, the catch member acting during the downwards movement of the ladder unit being arranged to turn the trigger to a position in which said member has passed a dead point position in relation to the fastening point of the restoring spring, the other catch member being arranged to release said trigger during the upwards movement of the ladder unit, said two catch members being mutually so arranged that the feeling arm, when the trigger has passed its dead point position, is freely adjustable by the rungs of the next lower ladder unit during the downwards movement of the upper ladder unit.

3. An extension ladder hook according to claim 2, in which the feeling arm is actuated by a spring which is arranged to hold said arm in a resting position situated in such a way in relation to the hooking arm in its operative position, that, upon lowering of the ladder unit, a rung of the next lower ladder unit is inserted into said hooking arm at the same time as the feeling arm is angularly adjusted by the same rung bringing along the trigger past its dead point position.

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