Nov. 21, 1961 G. P. FOLLEY 3,009,534

DEVICE FOR WORKING IN ELEVATED POSITIONS

Filed April 24, 1959 2 Sheets-Sheet 1

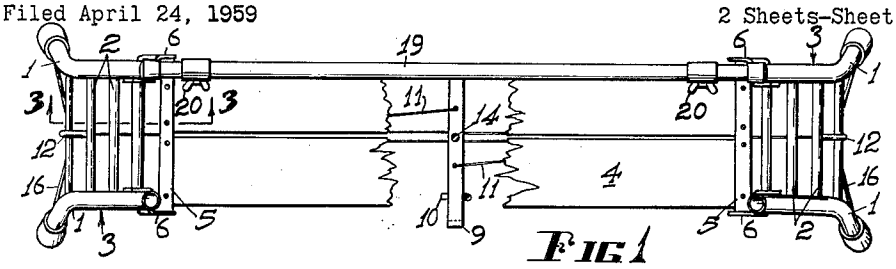

FIG 1

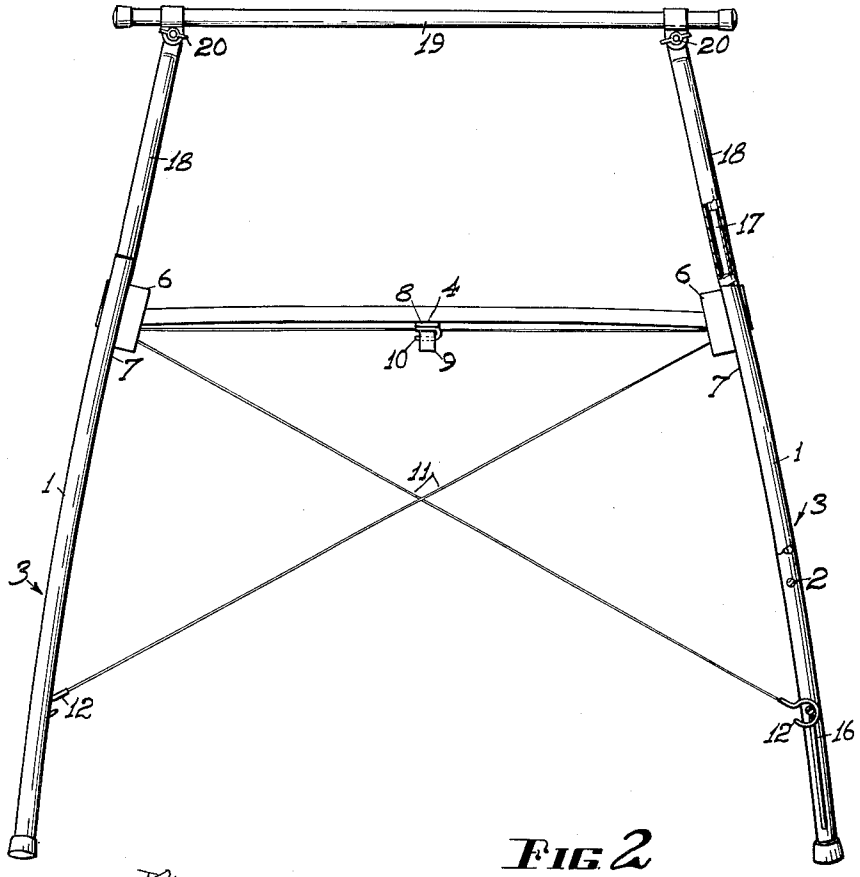

FIG 2

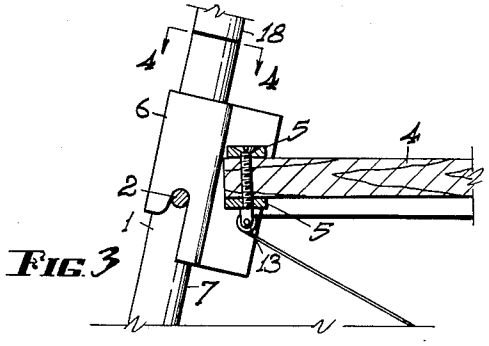

FIG 3

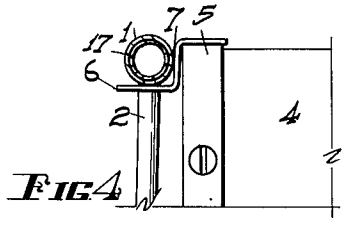

FIG 4

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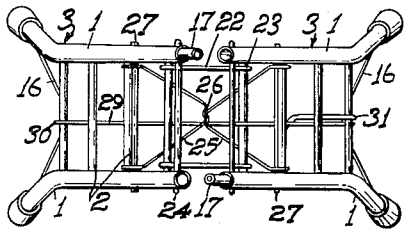

FIG. 5

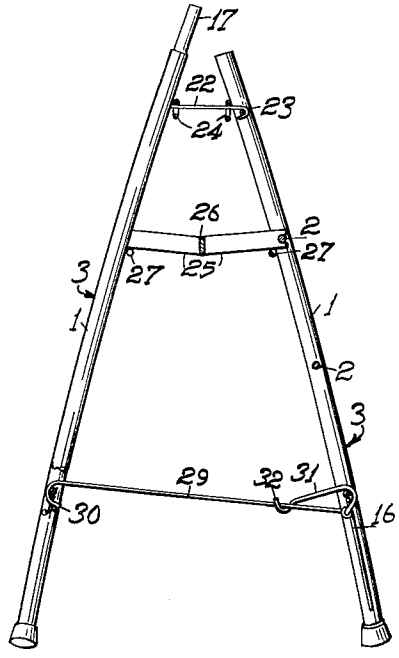

FIG. 6

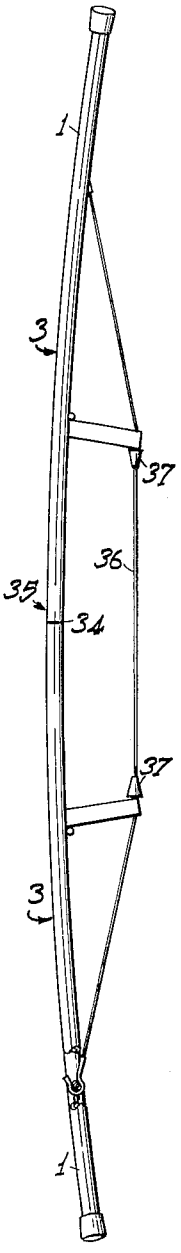

FIG. 7

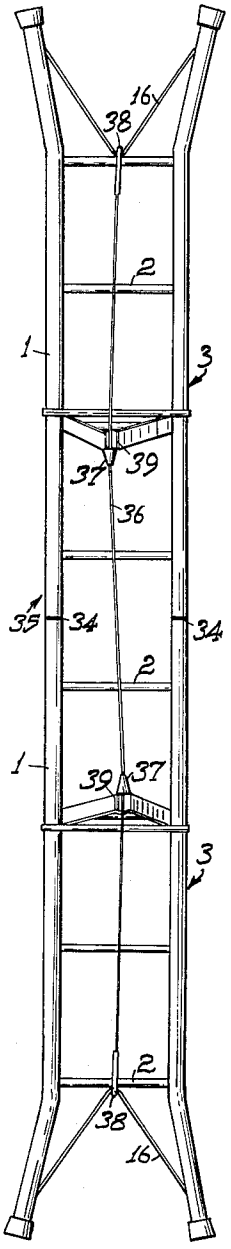

FIG. 8

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DEVICE FOR WORKING IN ELEVATED POSITIONS

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3 Claims. (Cl. 182—119)

This invention relates to a device for working in elevated positions and in particular it relates to a device with ladder like sections.

It is known to use elevated platforms for certain operations, such as painting or building construction, it is known to use step-ladders for other operations such as painting, electrical wiring, or building and it is also known to use ordinary ladders for such similar purposes.

The two main problems associated with such devices used for working in elevated positions are firstly that to achieve a desirable degree of rigidity, it has been found necessary to have a somewhat heavy device if it is of usual size, and secondly that the size of a ladder or scaffold or the like is usually somewhat large for transporting and storing.

It is of course known to reduce the weight of ladders and the like by making use of lightweight material, but this is usually somewhat expensive to purchase and expensive to fabricate since it is not usually as easy to weld as steel. Another method which has been proposed has been to stretch a wire or similar member down the length of the stile of a ladder on its rear surface, the wire being used to apply an initial stress to the ladder in a reverse direction to the stress applied by the application of a load. In this case, unless the depth of stile is made considerable, it will be seen that the stress in the wire will be very great indeed if the wire is to take all the tensile stress, and in the event of a wooden ladder being used, considerable difficulty has been experienced in securing the ends of the wire to the stiles of the ladder to take this high degree of stress. For this reason the effectiveness of the wire reinforced ladders is somewhat reduced, and the wire is regarded purely as a stiffening medium whereby the strain of the stiles is slightly reduced.

It is the main object of this invention to provide certain improvements to devices for working in elevated positions whereby they may be made both rigid and light without the need of using expensive lightweight materials.

A further object of the invention is to provide a device for working in elevated positions which does not occupy the same amount of space as the conventional ladder.

It will further be seen from the description of the invention that the invention may be made use of to provide a combination which may be erected either as a step-ladder, a ladder, or an elevated platform.

Briefly the invention comprises two ladder sections, means retaining one end of one of the ladder sections in fixed relationship with one end of the other said ladder section, and tension members engaging both said ladder sections to strain the stiles of both said ladder sections.

For the invention to be clearly understood, an embodiment will be described with reference to the accompanying drawings in which:

FIG. 1 is a top view, partly broken, of an elevated platform constructed according to this invention,

FIG. 2 is a front elevation of same, being partly in section,

FIG. 3 is a fragmentary section to an enlarged scale on line 3—3 of FIG. 1,

FIG. 4 is a similar fragmentary section on lines 4—4 of FIG. 3,

FIG. 5 is the top view of a step-ladder using some of the elements shown in FIGS. 1 to 4,

FIG. 6 is a side elevation, partly in section, of FIG. 5,

FIG. 7 is a side elevation of a ladder constructed using some of the elements shown in FIGS. 1 to 6, and

FIG. 8 is a rear elevation of FIG. 7.

In all figures of the drawing, the stiles 1 have rungs 2 therebetween to make up the ladder sections 3.

Referring now particularly to FIGS. 1, 2, 3 and 4, a platform 4 is made from timber secured at its ends between the steel straps 5 which are disposed transversely in relation to the platform 4, the ends of the steel straps 5 being welded to locking plates 6, the locking plates 6 being provided with a notched out portion 7 to engage over the top rungs 2 of the ladder sections 3. As shown in FIGS. 3 and 4, the locking plates 6 engage the rear surface 7 of the stiles 1 both above and below the top rung 2, this introducing the feature of "fail safe." A central strap 8 has pivotally mounted to it a lever 9 which is arranged to engage under the catch 10, but the lever 9 may be sprung clear of the catch 10 to thereby rotate. Tension means are applied to the bottom rung 2 of each of the ladder sections 3, the tension means being in the form of prestressing cables 11 which terminate at their lower ends in the hooks 12, the tension cables 11 passing over straining members 13 and terminating on the lever 9 at points removed from the pivot point 14 of the lever 9, and on either side of the pivot point 14.

The cables 11 are disposed diagonally beneath the platform 4 so that any tension applied to them by operation of the lever 9 has the effect of causing the platform 4 to be placed in compression. Since the locking plates 6 non-rotatably interconnect the ladder sections 3 with the platform 4, it will be seen that any strain applied to the lower ends of the ladder sections 3 by tensioning the prestressing cables 11 will also tend to strain the platform 4 upwardly at its central point. Thus the strain induced in the platform 4 and in the stiles 1 due to the application of prestressing is in the opposite direction from the strain which would be imposed upon these members due to the application of a load on the platform 4. In order to prevent excessive deflection of the bottom rung 2 of the ladder sections 3, a tension strap 16 is connected between the bottom rungs 2 and the stiles 1. The stiles 1 are of tubular material and have extension members 17 which may be a fixture as shown, or may be loose members, projecting from the stiles on one side of the platform 4, and these support handrail supports 18 which in turn are locked to a handrail 19 by means of the clamp 20.

The handrail supports 18 are normally urged outwardly away from each other along the handrail 19 before the clamp 20 is locked, this providing rigidity for the handrail 19. When it is desired to disassemble the device, it is merely necessary to remove the handrail, disengage the lever 9 from the catch 10 and so release the strain from the stiles 1 and platform 4, and release the hooks 12 from the rungs 2. The locking plates 6 may then be lifted away from the rungs 2, and the ladder sections 3 may be placed alongside the platform 4, this providing for easy packaging.

Referring now to FIGS. 5 and 6, the drawings illustrate use of similar ladder sections 3, the upper ends being retained in fixed relationship to each other by means of the adaption member 22 with hooks 23 at each end engaging over the rungs 2 of the ladder sections 3, and extensions 24 on either side to engage against the rear surface 7 of the stiles 1. The compression members 25 interengage each other at 26, but are arranged non-coaxially as shown more particularly in FIG. 6, so that compression applied to the compression members 25 will

prevent them from rotating with their free ends upwardly. The compression members 25 engage corresponding rungs 2 on the ladder sections 3, and are further fitted with members 27 to prevent rotation of the compression members 25 with their free ends moving in a downward direction. A removable prestressing rod 29 has a hook 30 to engage over a rung 2, and a pivotally engaged lever 31 to engage over a corresponding rung 2, and catch over the prestressing rod 29 by means of the off-set hook 32 on the lever 31.

In so operating the lever 31, tension is applied to the stiles 1 of the ladder sections 3 to draw them inwardly together, this being resisted by the compression members 25 and the adaption member 22. This is found to increase the rigidity of the device when so erected.

Referring now to FIGS. 7 and 8, similar ladder sections 3 are shown interconnected at the point 34. This is achieved by sliding the tubular stiles 1 over the extension members 17, and provides a means for obtaining a ladder assembly 35 where the sections 3 are in end to end relationship, being fixed by the extension members 17. FIGS. 7 and 8 show use of the compression members 25 which are also illustrated in FIGS. 5 and 6, these compression members engaging rungs 2 of the ladder sections 3, and being retained against rotation outwardly towards the ends by means of the members 27 which engage the rear surfaces 7 of the ladder sections 3. A prestressing cable 36 is provided with retaining clamps or blocks 37 which prevent rotation of the compression members 25 inwardly away from the ends of the ladder assembly 35.

Hooks 38 are secured to the ends of the prestressing cable 36 to engage the rungs 2 at the ends of the ladder sections 3. Grooves 39 are located in the upstanding portion of the compression members 25 to retain the prestressing cable 36 against side ways displacement from the compression members 25.

From the above description it will be seen that this invention provides a means for constructing a ladder which is light and rigid, a device which may be used in lieu of a step-ladder which is also both light and rigid, and also a device which may be used as a scaffold, again varying the characteristic of being able to be built both light and rigid. It will of course be seen that variations could be made to the embodiment, such as for example hinging the ladder sections together at the point where they are retained in fixed relationship to each other, making use of compression straps in lieu of the compression members 25 described above, where the straps may engage the stiles of the ladder and be retained thereto by means of pegs, screws or the like, or bending the stiles of the ladder near the ends which are retained in fixed relationship to each other so that they may directly support a platform.

It will be seen however that these are only minor variations from the above embodiment and still lie within the general scope of the invention.

What I claim is:

1. A device for working in elevated positions comprising two ladder sections with stiles and rungs, a platform supported as a compression member between said ladder sections, means to retain the upper ends of said ladder sections in fixed relationship to the ends of said platform, prestressing cables releasably engaging the lower ends of said ladder sections and also engaging a lever pivotally mounted on the underside of said platform, said cables slidably engaging straining members at the ends of said platform and being diagonally disposed beneath said platform, said cables straining the lower ends of said stiles inwardly towards each other and straining said platform upwardly at its centre when said lever is moved to engage a catch, and said cables releasing the strain on stiles and platform when said lever is moved to disengage said catch.

2. A device for working in elevated positions comprising two ladder sections with stiles and rungs, a platform supported between said ladder sections, the upper ends of said ladder sections being retained in fixed relationship to the ends of said platform by locking plates on the ends of said platform, each said locking plate engaging the top rung of a ladder section and engaging the rear surface of a stile above and below said top rung, two prestressing cables each releasably engaging at one end the bottom rung of each of said ladder sections and both engaging at the other end a lever pivotally mounted on the underside of said platform, said cables slidably engaging straining members at the ends of said platform and being diagonally disposed beneath said platform, said cables straining the lower ends of said stiles inwardly towards each other and straining said platform upwardly at its centre when said lever is moved to engage a catch, said cable releasing the strain on stiles and platform when said lever is moved to disengage said catch, extension members extending upwardly from the stiles on one side of said platform and engaging hand rail supports carrying a hand rail above and to one side of said platform.

3. A device for working in elevated positions comprising two ladder sections with stiles and rungs, a platform supported between said ladder sections, the upper ends of said ladder sections being retained in fixed relationship to the ends of said platform by locking plates on the ends of said platform, each said locking plate engaging the top rung of a ladder section and engaging the rear surface of a stile above and below said top rung, two pre-stressing cables each releasably engaging at one end the bottom rung of each of said ladder sections and both engaging at the other end a lever pivotally mounted over on the underside of said platform, said cables slidably engaging straining members at the ends of said platform and being diagonally disposed beneath said platform, said cables straining the lower ends of said stiles inwardly towards each other and straining said platform upwardly at its centre when said lever is moved to engage a catch, said cable releasing the strain on stiles and platform when said lever is moved to disengage said catch, extension members extending upwardly from the stiles on one side of said platform hand rail supports on the extension members, clamps on the upper ends of said hand rail supports, and a hand rail engaged by the clamps, said hand rail supports being strained away from each other thereby placing the hand rail in tension.

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