

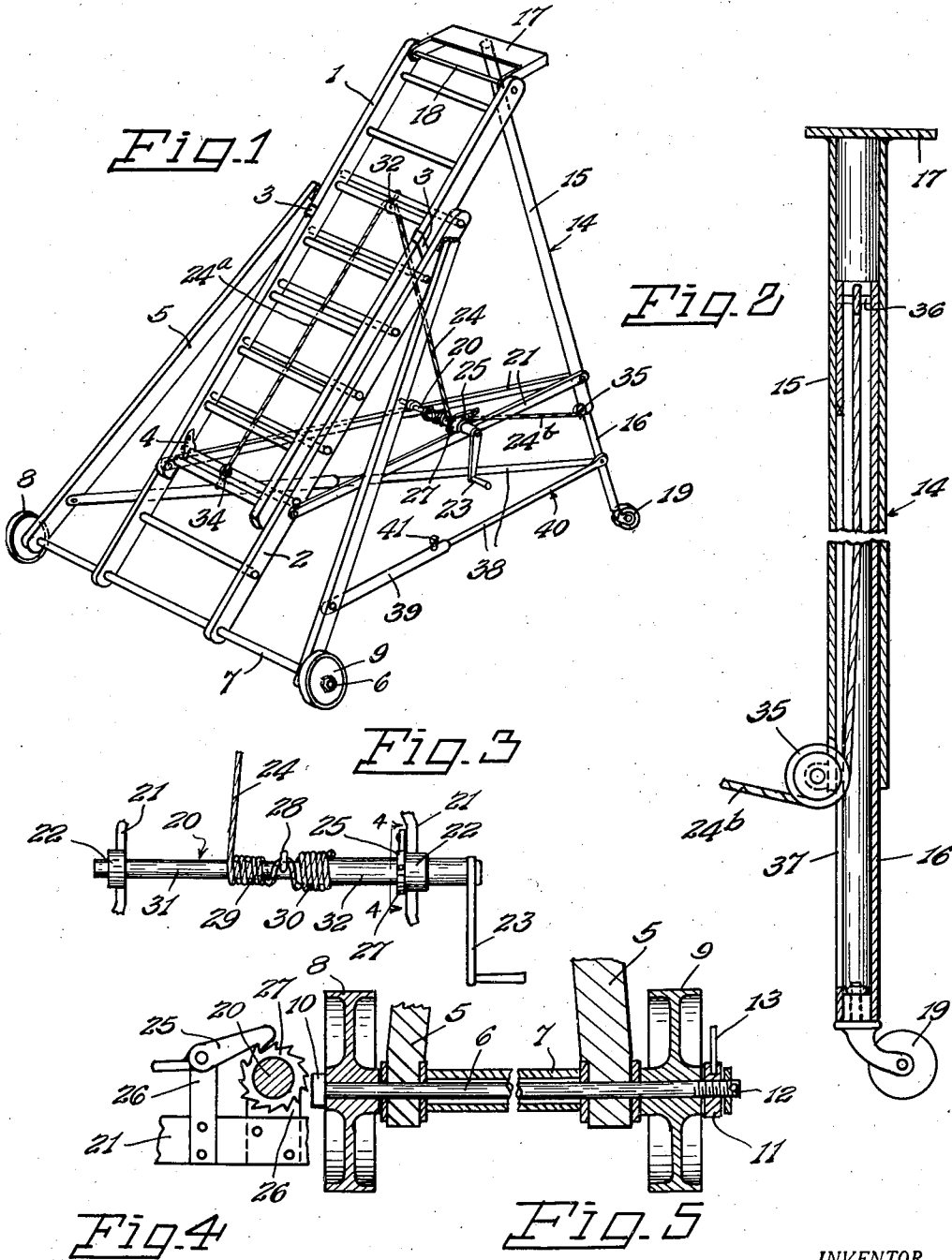
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LADDER

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LADDER

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This invention relates to a step ladder and it is one object of the invention to provide a ladder which is extensible for vertical adjustment according to whether a tall ladder or a short ladder is needed, the ladder being also so constructed that it will be propped in an upright inclined position for use and readily movable from one position to another.

Another object of the invention is to provide improved means for shifting a ladder section vertically along a lower ladder section and at the same time shifting one section of a prop vertically so that the prop will accommodate itself to the height of the ladder.

Another object of the invention is to provide an improved winding drum or windlass for the cable by means of which the upper ladder section and the upper section of the prop are vertically adjusted, the drum or windlass being so formed that when it is turned the cable will be taken up or let out in such a manner that the upper sections of the ladder and prop will be adjusted at an even rate of speed.

Another object of the invention is to provide supports for the ladder with rollers so mounted that they may be allowed to turn freely when shifting the ladder from one place to another and the rollers then secured against turning so that unintentional movement of the ladder out of its proper position will be prevented.

Another object of the invention is to provide a ladder which is of strong construction and very easy to operate as well as capable of being reduced to a compact mass when not in use.

The invention is illustrated in the accompanying drawing, wherein:

Fig. 1 is a perspective view of the improved ladder.

Fig. 2 is a sectional view taken longitudinally through the rear prop of the ladder of Fig. 1.

Fig. 3 is an enlarged view of the windlass about which the cable is wound.

Fig. 4 is a view taken along the line 4—4 of Fig. 3, and showing the dog and ratchet for controlling rotation of the windlass.

Fig. 5 is an enlarged sectional view of the machine for rotatably mounting the front rollers of the ladder and controlling rotation of the rollers.

This improved ladder is an extension ladder and has an upper section 1 and a lower section 2, the upper section fitting between side rails of the lower section and slidably held in engagement with the lower section by hooked clips 3. Hooks 4 are carried by the side rails of the upper ladder

section for engaging rungs of the lower ladder section and securely holding the upper ladder section in vertically adjusted position. This is a conventional means for holding the upper ladder section in an adjusted position.

Side braces 5 are provided for the ladder and have their upper ends secured against outer faces of the side rails of the lower ladder section. These braces diverge downwardly from the side rails of the lower ladder section and, at their lower ends, are formed with openings to receive end portions of a rod or shaft 6 which passes through a pipe or tube 7 having its ends abutting inner faces of the props. The tube also passes through lower end portions of the side rails of the lower ladder section. Rollers 8 and 9 are rotatably carried by end portions of the rod or shaft 6 which project from the props, the roller 8 being held in place by the head 10 of the rod and the roller 9 being held in place by a nut 11 screwed upon the threaded end portion 12 of the rod. A handle 13 is provided for the nut in order that it may be easily turned and tightened to draw the shaft or rod longitudinally and apply pressure to frictionally hold the rollers stationary and thus prevent unintended rolling movement of the ladder out of a desired position. When the nut is loosened, the rollers can turn freely and the ladder may then be easily shifted from one position to another.

There has also been provided a rear prop 14 consisting of telescoping upper and lower tubular sections 15 and 16. The upper or outer section 15 has its upper end fixed to a shelf or platform 17 pivoted upon a rod 18 at the upper end of the upper ladder section 1 and the lower or inner section of the prop is provided at its lower end with a caster 19 for resting upon the ground or floor and cooperating with the front rollers to permit easy shifting of the ladder from place to place.

The upper sections of the ladder and the rear prop are to be simultaneously shifted vertically during adjustment of the ladder for height, and in order to do so there has been provided a windlass 20 which extends between braces 21 and is rotatably mounted in bearing brackets 22. A turning handle 23 is provided at one end of the windlass and, in order that the windlass may be held against retrograde rotation after being turned in a direction to wind the cable 24 thereon, there has been provided a pawl or dog 25 pivoted upon a bracket 26 and engaged with a ratchet wheel 27 carried by the windlass, as shown in Fig. 4. The cable has its intermediate

portion engaged with a hook 28 midway the length of the windlass and wound about the windlass in opposite directions, as shown at 29 and 30 in Fig. 3. The portion 31 of the windlass about which the portion 29 of the cable is wound is of less diameter than the portion 32 of the windlass about which the portion 30 of the cable is wound. Therefore, when the windlass is turned to wind the cable thereof, the two portions of the cable will be wound at different rates of speed. This is essential in order to cause the upper ladder section and the upper section of the rear prop to be shifted vertically in proper timed relation to each other. The forward portion 24 of the cable is extended upwardly for engagement with the pulley 33 at the upper end of the lower ladder section and then downwardly with its end secured to the lower rung of the upper ladder section, as shown as 34. The rear portion 24b of the cable extends rearwardly from the windlass and after being engaged with the pulley 35, is extended upwardly through the lower tubular section 16 of the rear prop and secured to a pin 36 passing through the upper end of this lower prop section. The pulley 25 is rotatably mounted at the lower end of the upper prop section. The pulley 25 is rotatably mounted at the lower end of the upper prop section 15 with a portion projecting through the slot 37 formed longitudinally in the lower proper section and from an inspection of Fig. 2 it will be readily seen that when the windlass is turned to wind the cable thereon, engagement of the cable with the pulley 35 will cause the upper prop section to be shifted upwardly to a raised position of adjustment while the portion of the cable extending forwardly from the windlass is exerting pull on the upper ladder section to raise the same. The fact that the rear portion of the cable is wound about the larger portion 32 of the windlass causes it to be wound at a greater rate of speed than the forward portion of the cable which is wound about the smaller portion 31 of the windlass and has direct pull upon the lower ladder section. Therefore, the upper section of the rear prop which has its pulley 35 resting on the rear portion of the cable intermediate the length thereof, will be shifted vertically at the same speed as the upper ladder section.

Horizontal braces 38 are provided to maintain the rear prop in proper angular relation to the ladder and extend horizontally between lower end portions of the prop and the braces 5. Each of the braces 38 consists of a tubular front section 39 pivoted to the companion brace 5 and a rear rod or section 40 pivoted to the lower prop section and having its forward portion slidably received in the tubular front section where it is secured in a set position by a set screw 41.

When this ladder is in use, it is set up as shown in Fig. 1 of the drawing and rolled along the floor or other surface to the place where it is to be used. The nut 11 is then tightened to exert binding pressure on the rollers 8 and 9 and the ladder will thus be prevented from moving out of place. The crank 23 is grasped and the windlass turned to wind the front and rear portions of the cable thereon, and during such winding, the upper ladder section and the upper section of the rear prop will be shifted upwardly to the desired height where they will be held as the pawl 25 will prevent retrograde rotation of the windlass. By moving the pawl out of engagement with the ratchet 27, the windlass will be permitted to turn in a direction to unwind the cable and the

upper sections of the ladder and the rear prop can slide downwardly and return to their original position. By releasing the braces 21 and 38, the rear prop may be swung forwardly against the ladder sections and the ladder may then be stored in a small space until again needed or easily carried to another place of use where it could not be conveniently rolled.

Having thus described the invention, what is claimed is:

1. In a ladder construction, upper and lower ladder sections, the upper ladder section being slidable longitudinally of the lower ladder section, a rear prop having an upper section pivoted at its upper end to the upper ladder section and a lower section telescoping into its upper section, a brace extending between the lower ladder section and the upper section of the rear prop, a windlass carried by said brace, and a cable having its intermediate portion wound about said windlass and its end portions extending from the windlass and connected to the upper sections of the ladder and the rear prop for shifting the same vertically when the windlass is turned.

2. In a ladder construction, upper and lower ladder sections, the upper ladder section being slidable longitudinally of the lower ladder section, a rear prop having an upper section pivoted at its upper end to the upper ladder section and a lower section telescoping into its upper section, bracing means extending between the lower ladder section and the upper section of the rear prop, a windlass carried by said bracing means, and a cable wound upon said windlass and connected with sections of the ladder and the prop for shifting upper sections thereof vertically when the windlass is turned.

3. In a ladder construction, upper and lower ladder sections, the upper ladder section being slidable longitudinally of the lower ladder section, a rear prop having an upper section pivoted at its upper end to the upper ladder section and a lower section telescoping into its upper section, bracing means extending between the lower ladder section and the upper section of the rear prop, a windlass carried by said bracing means, a guide at the lower end of the upper prop section, the lower prop section being formed with a longitudinally extending slot, a guide carried by the upper portion of the lower ladder section, and a cable having its intermediate portion connected with said windlass, portions of the cable being wound about the windlass in opposite directions and extending forwardly and rearwardly therefrom, the forwardly extending portion of said cable being engaged with the guide of the lower ladder section and downwardly therefrom and secured to the lower end portion of the upper ladder section, and the rearwardly extending portion of said cable being engaged with the guide at the lower end of the upper prop section and extended upwardly through the lower prop section and secured at the upper end of the lower prop section.

4. The structure of claim 3 wherein the windlass is formed with a portion of relatively small diameter having the forwardly extending portion of the cable wound thereon, the windlass also being provided with a portion of relatively large diameter having the rearwardly extending portion of the cable wound thereon.

5. In a ladder construction, upper and lower ladder sections, the upper ladder section being slidable vertically relative to the lower ladder section, a rear prop pivoted to the upper end of said upper ladder section and having upper and

5 lower telescoping sections, bracing bars extend-
 ing between the prop and the ladder sections with
 their front ends connected to the lower ladder
 section and their rear ends secured to the upper
 10 prop section, vertical bracing bars at opposite
 sides of the lower ladder section secured at their
 upper ends to the lower ladder section and di-
 verging downwardly therefrom, braces under the
 first bracing bars secured at their front and rear
 15 ends to the vertical bracing bars and the lower
 prop section, a windlass extending between the
 first bracing bars and rotatably mounted there-
 on, and a cable wound about said windlass and
 connected with the upper ladder section and the
 20 upper prop section for shifting said sections ver-
 tically when the windlass is turned.

6. In a ladder construction, upper and lower
 ladder sections, the upper ladder section being
 slidable vertically relative to the lower ladder sec-
 tion, a rear prop pivoted to the upper end of said
 upper ladder section and having upper and lower
 telescoping sections, bracing bars extending be-
 tween the prop and the ladder sections with their
 front ends connected to the lower ladder section

and their rear ends secured to the upper prop
 section, vertical bracing bars at opposite sides
 of the lower ladder section secured at their upper
 ends to the lower ladder section and diverging
 downwardly therefrom, braces under the first
 5 bracing bars secured at their front and rear ends
 to the vertical bracing bars and the lower prop
 section, a windlass extending between the first
 bracing bars and rotatably mounted thereon, a
 cable wound upon said windlass for shifting the
 10 upper ladder section and the upper prop sec-
 tion vertically when the windlass is turned, a
 caster at the lower end of the rear prop, a tube
 extending horizontally through lower ends of the
 vertical braces and side bars of the lower ladder
 15 section, a rod extending through said tube with its
 end portions projecting outwardly from lower
 ends of the vertical braces, rollers carried by the
 projecting end portions of said rod, a head at one
 end of said rod, and a nut threaded upon the
 20 other end portion of said rod and when tightened
 exerting pressure to bind the rollers against ro-
 tation.

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