

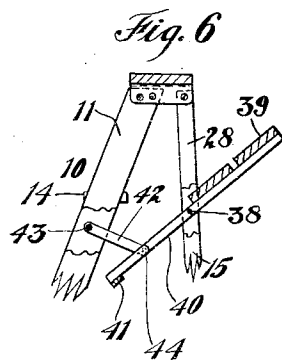
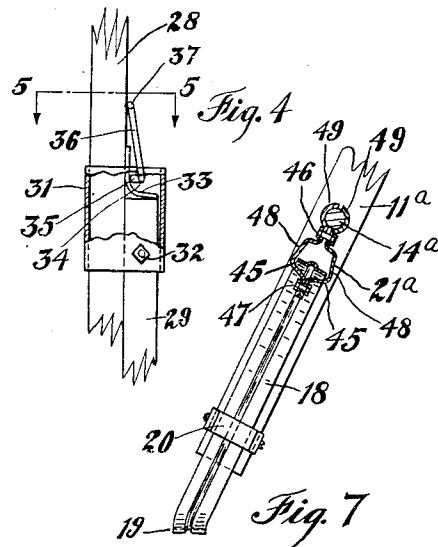
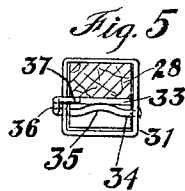
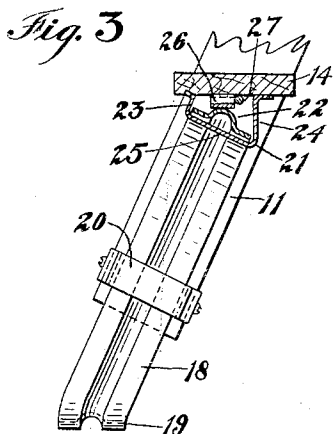
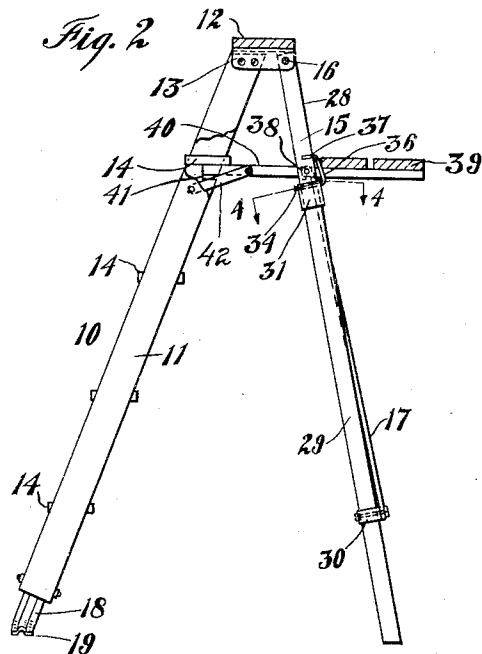
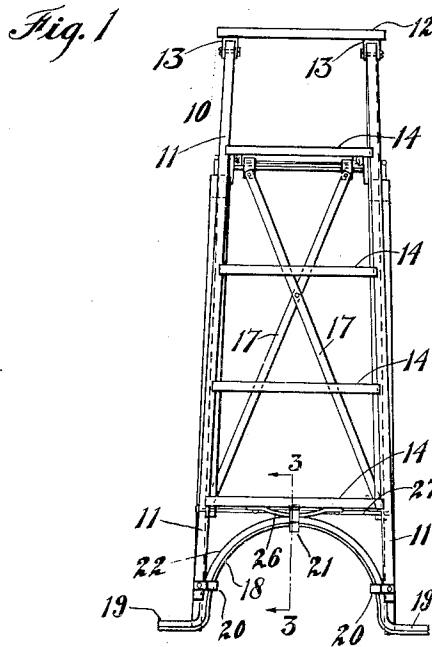
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LADDER

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LADDER

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5 Claims. (Cl. 228-64)

This invention relates to ladders, and it has for its object to provide improvements in devices for leveling the ladder or an uneven supporting surface.

Of the accompanying drawing, Fig. 1 is a front elevation of a stepladder provided with my improvements.

Fig. 2 is a side elevation thereof, partly broken away and in section.

Fig. 3 is a vertical section on the line 3-3 of Fig. 1.

Fig. 4 is a detail side elevation, partly broken away, showing the adjustment clamp for one of the extensible rear legs.

Fig. 5 is a section on the line 5-5 of Fig. 4.

Fig. 6 is a side elevation, partly broken away and in section, of the upper part of the stepladder, showing it in partly folded condition.

Fig. 7 is a partial vertical section showing a modification.

Referring at first to Figs. 1 to 6, I have illustrated a stepladder of the inverted V-type comprising a front ladder member 10 consisting of side rails 11, a top step or platform 12 affixed to said rails by brackets 13 on its under side, and a series of lower steps 14, together with a rear prop or leg structure comprising legs 15 individually hinged at 16 to the platform brackets 13 and connected by crossed, diagonal braces 17.

At the lower end of the ladder member 10 I provide an automatic self-leveling and gripping foot structure of which the foot member consists of a stout metal strip 18 semi-circularly curved in the form of a bow and having its ends bent horizontally outward, and also turned flatwise, to provide supporting feet 19. This foot strip slides circumferentially through a pair of U-shaped brackets 20 affixed to the respective side rails 11 near their lower ends and projecting inwardly therefrom, and through a middle guide and clamping bracket 21 affixed to the lower side of the lowermost step 14, to vary its angular relation to the ladder, in the plane of the latter, and thereby reciprocally to alter the height of the feet 19. The foot strip 18 is formed with an outwardly-bent middle rib or corrugation 22 for the purpose of stiffening it.

The middle bracket 21 is formed as a metallic loop having a pair of upwardly-convergent legs 23, 24 together constituting one member of an automatic clutch for frictional wedging engagement with the edges of the foot strip 18, constituting the other clutch member, when said bracket is forced downwardly against said edges, and a connecting lower bar 25 at right-angles to said legs. For assisting the action of gravity in releasing the member 18 from the grip of the wedging legs 23, 24 when relieved of the weight of the ladder, I provide a bowed plate spring 26 having one end or both ends slidably fixed to the

under side of the lower step 14 just in front of a metal tie-rod 27 which connects the side rails 11, said spring bearing against the reinforcing rib 22. The presence of a spring is not essential in all cases, since the foot member generally tends to release itself when the engaging pressure is removed.

It is further necessary to adjust the rear feet in order to level the ladder with a full four-point contact on an uneven surface, and to alter the lengths of the rear legs to accommodate extreme differences of level, as on stairs etc. While the arrangements to that end could vary widely, and those at the front can also vary in the new combination of front and rear leveling supports which I have here disclosed for a stepladder of the V or straddle type, the preferred arrangements at the rear are as follows.

On the outer side of each of the side rails 28 of the prop member 15 is mounted an adjustable leg section 29 which slides through a guide bracket 30 fixed upon the lower end of said side rail, said section being provided at its upper end with a rectangular guide sleeve 31 fixed thereto by means of a bolt 32. An L-shaped metallic clamping plate 33 loosely mounted in the upper end of sleeve 31 has one wing bearing against the end of the leg section 29 and the other wing bearing against the side rail 28. For setting or releasing said clamping plate there is provided a rock-shaft 34 journaled in bearing apertures in the front and rear walls of the sleeve, said shaft forming the pivot of a lever which has a short arm or cam member 35 formed by cranking or bending the shaft for coaction with said clamping plate 33, and a long arm 36 provided with an inwardly-bent handle portion 37 at its upper end for turning the rock-shaft and acting as a stop against the side rail 28 when the arm 36 is turned to its upward position as shown in the drawing, in which position it sets the clamping plate 33 in frictional locking engagement with the rail 28 to hold the leg section 29 at a fixed adjustment. When the clamp is thus locked, the downward pressure of the ladder through the rail 28 is exerted in the direction of the clamp-setting action of the lever and hence tends to increase the tightness of locking. To release the clamp, the lever is turned downwardly through approximately a half circle.

Upon a cross-rod 38, connecting the side rails 28 of the prop member near their upper ends, is pivoted a shelf 39 for supporting pails or other objects when the stepladder is in use. The side bars 40 of said platform are carried forwardly to rest against the lower side of the topmost of the series of lower steps 14 when said ladder is unfolded, and are connected by a front cross-bar 41 which may be used as a handle to manipulate the shelf. A pair of links 42, pivoted at their for-

ward ends upon a tie-rod 43 connecting the side rails of the ladder member 10, and pivoted at their rear ends at 44 to the bars 40 between the rod 38 and the cross-bar 41, serve to form, with said bars 40, a toggle by which, through manipulation of the shelf 39 from either end, the prop member 15 may be either brought forward into its folded relation against the rear side of the ladder member 10 or unfolded and held in fixed relation thereto when the ladder is set up for operation, the toggle members in the latter case passing over center to a position slightly out of line as indicated in Fig. 2.

In the operation of my invention, when the ladder member 10 is elevated to take its weight off the foot member 18, the latter will be automatically released from gripping engagement with the wedge legs 23 and 24 of the middle guide-bracket 21, and said member 18 may then be freely slid through the guides 20, 21 to vary the height of the feet 19 reciprocally with reference to said ladder member. Upward pressure on either of said feet will automatically bring the other one down to the supporting surface and thus adjust the foot member to said surface while the steps are held substantially horizontal. Hence this device accommodates itself automatically to any slopes or irregularities within its range. When downward pressure on the bracket 21 is restored, its wedges automatically lock against the edges of the member 18, by bodily sliding movement of the ladder and its brackets 20 and 21, relative to the member 18, in or longitudinally of the common plane of the ladder and member 18, and clamp the latter against further movement.

The prop member 15 having been unfolded to the position shown in Fig. 2 by manipulation of the shelf 39 and its toggle, the other two feet of the ladder at the lower ends of the leg sections 29 may then be brought to a bearing on the ground by causing the ladder to lean at the proper angle and adjusting the height of either or both of said leg sections if necessary, this adjustment being quickly performed by loosening the clamps in the sleeve 31, sliding the section 29 and resetting said clamp. While the adjustments at the front and the rear of the ladder are independently performed, the adjustable foot devices, having general characteristics as described, cooperate in the leveling of the ladder in a shorter time and with less effort than has heretofore been required under similar conditions. Thus, in painting a building, cleaning windows, etc., it is sometimes desired to straddle a hedge or bushes with the V-type of stepladder herein illustrated. The operator can automatically level his front portion with the self-adjusting foot member 18 and having done so, he can bring the prop member 15 into contact with the ground and adjust the height of either of the leg sections 39 if necessary. Often the sliding of one of said leg sections until it reaches the ground after the other one has been placed on the ground, and clamping thereof, will be the only manual adjustment required.

My invention, embodied in a stepladder substantially as described, provides for easy adjustment to a 4-point bearing under almost any ground conditions which may be encountered, as well as on stairways and other indoor or outdoor situations, and when leveled it is firmly held in the proper adjustment. After being used, the ladder can be quickly restored to its folded condition, in the desired length.

My improved self-adjusting and self-clamping

foot member may also be employed with other forms of ladders including the single or ordinary rung type, and in the modification illustrated in Fig. 7 I have represented such an application. In this case 11^a indicates one of the side rails and 14^a the lower rung step of a single ladder. 18 is a circumferentially-slidable, semi-circular foot member of the same construction as shown in Figs. 1, 2 and 3, having feet 19 at the ends thereof and mounted in side guides 20 on the ladder rails. A modified middle guide 21^a for the member 18 in this instance is formed by a pair of duplicate bracket plates 45 connected by bolts 46, 47 above and below the member 18. Said plates have intermediate upwardly-convergent, wedging portions 48 for gripping engagement with the edges of the strip 18 when bracket 21^a is depressed by the weight of the ladder, and their upper ends are formed with clamping jaws 49 curved to conform to the ladder rung 14^a for gripping the latter.

Various other modifications could be made within the scope of my invention, and I do not desire to limit said invention except as required by the claims hereof and the prior art.

I claim:

1. The combination, with a ladder, of a clutch device, a bow-shaped member longitudinally slidable with reference to said device to vary the relative elevation of its ends and also bodily slidable in the plane thereof, said clutch device gripping said foot member by downward sliding movement of the ladder on said foot member, and resilient means for releasing the grip of said clutch device when the ladder is lifted.
2. A ladder foot attachment comprising side guide brackets attachable to the lower ends of the ladder side rails, a middle bracket having means for attaching it to the ladder, a bow-shaped member having end feet and slidably adjustable with reference to said brackets to vary the relative elevation of said feet, said brackets being bodily slidable downwardly on said member, in the plane of the member, for clutch engagement, one of said brackets including a clutch device engaging the member by such bodily sliding movement, and clutch-releasing spring means associated with the middle bracket and bearing downwardly on the bow-shaped member.
3. The combination, with a ladder composed of side rails and cross steps, of a pair of guides at the lower ends of said side rails, a clutch member fixedly attached to the lower step, and a substantially semi-circular foot member slidable circumferentially through said guides and adapted to be gripped by the clutch member when subject to the weight of the ladder.
4. The combination, with a ladder, of a pair of guides thereon, an intermediate bracket on said ladder, having upwardly convergent wedging portions, and a substantially semi-circular foot member slidable through said guides and bracket and provided with feet at its ends, said member having its edges gripped by said wedging portions when subject to the weight of the ladder.
5. A ladder including a side rail, a leg section longitudinally slidable thereon and having a clamping sleeve embracing said side rail, a friction clamp carried in said sleeve and engaging the rail, said clamp comprising an L-shaped gripping plate loosely mounted in the sleeve and having wings bearing respectively against a lateral face of the side rail and an end face of the leg section and a lever pivoted on the sleeve for operating said plate.

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