May 22, 1945. W. C. YARMOLOWICH 2,376,529

EXTENSION LADDER

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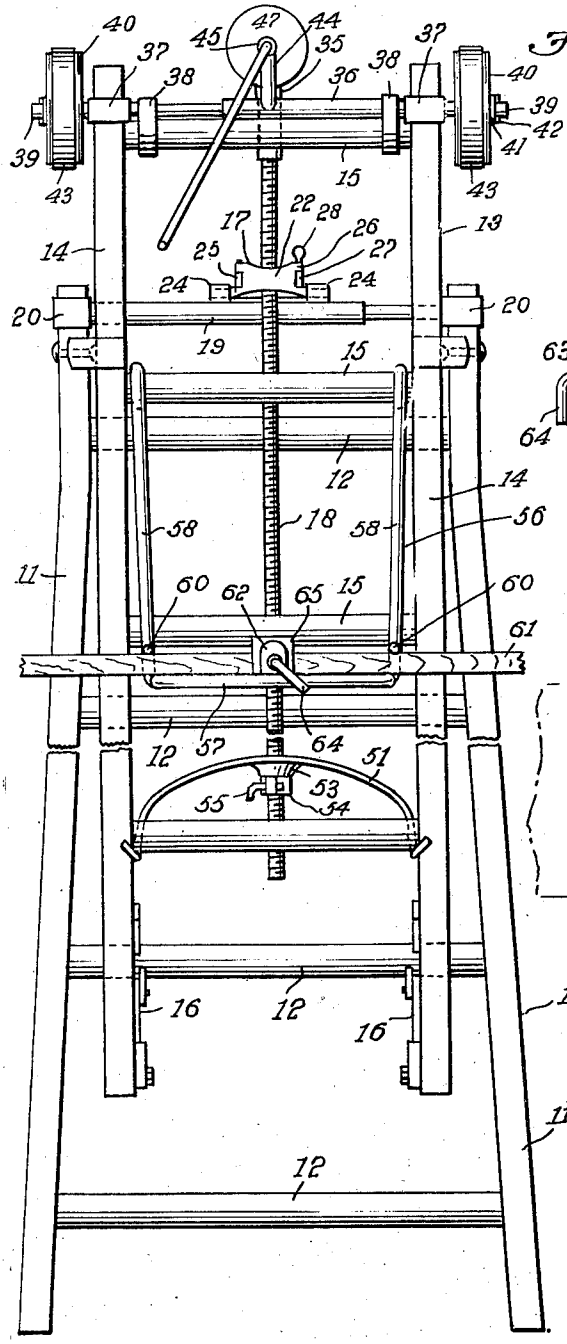


Fig. 1

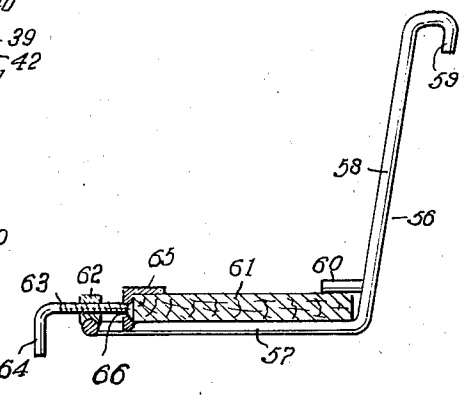


Fig. 2

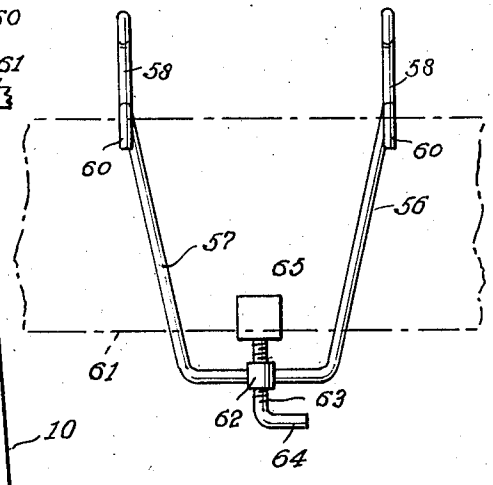


Fig. 3

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EXTENSION LADDER

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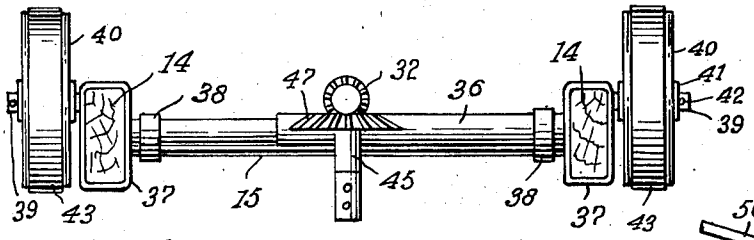


Fig. 5

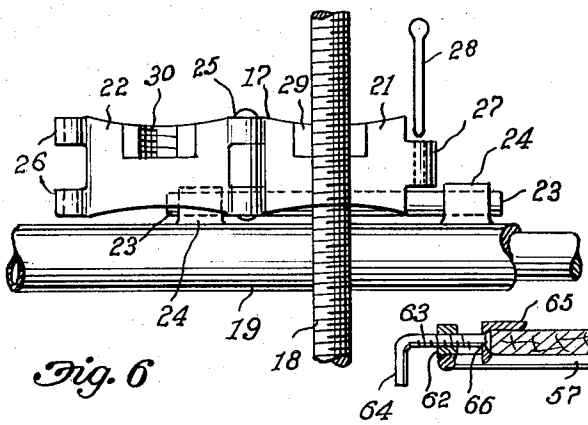


Fig. 6

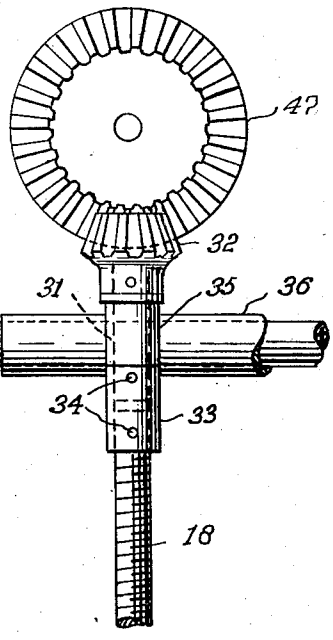


Fig. 7

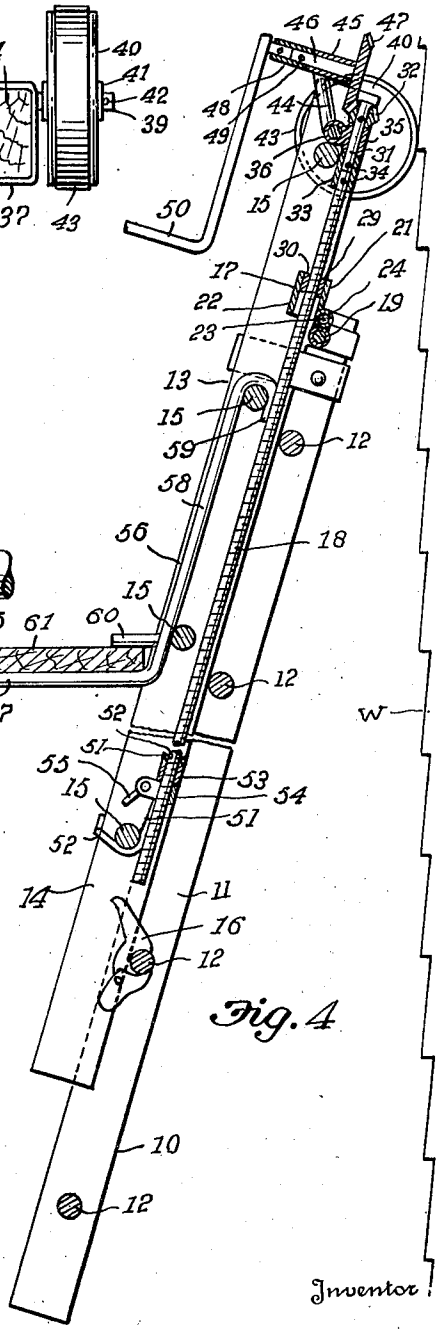


Fig. 4

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UNITED STATES PATENT OFFICE

2,376,529

EXTENSION LADDER

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Application August 7, 1943, Serial No. 497,761

6 Claims. (Cl. 228—19)

The invention relates to extension ladders and more particularly to ladders of this character having means thereon whereby the operator may easily and quickly adjust the ladders while working thereon.

An object of the invention is the provision of an extension ladder having a screw jack mechanism thereon for adjusting the length of the ladder.

Another object is to provide such a ladder in which the screw jack is operated from the upper end of the ladder so that the workman may make the adjustment without changing his position upon the ladder.

Still another object is the provision of an extension ladder having a longitudinal screw journalled upon the upper or extensible ladder and a nut carried by the lower or stationary ladder for engagement with said screw.

A further object is to provide bevel gears and a hand operated crank at the top of the extensible ladder for operating said screw to raise or lower the extensible ladder.

A still further object is to provide a split nut upon the lower or stationary ladder for engaging the screw, said nut being hinged so as to permit easy disengagement of the screw in order that rapid extension of the ladder may be accomplished in conventional manner.

Another object of the invention is the provision of bearing wheels at the upper end of the extensible ladder for bearing against the wall or other supporting structure so as to permit easy movement of the extensible ladder without danger of catching upon the siding or other projections on said wall.

Still another object of the invention is the provision of a scaffold hanger for the ladders when leaning against a wall or other structure for supporting a scaffold plank or the like upon which workmen may stand or sit at a distance above the ground.

A further object is to provide a scaffold hanger which is simple and inexpensive to manufacture, light in weight, sturdy in construction and easily assembled upon the ladder.

A still further object is the provision of a scaffold hanger which is quickly and easily adapted to support scaffold planks of various widths.

Another object is to provide such a hanger with means for rigidly clamping the scaffold plank thereon.

The above together with other objects, features and advantages which will be apparent from the drawings and following description, or which may be later referred to, may be attained by constructing the improved extension ladder and scaffold hanger in the manner illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of an extension ladder embodying the invention, showing the improved scaffold hanger applied thereto;

Fig. 2, a vertical, longitudinal sectional view through the scaffold hanger detached from the ladder, showing a scaffold plank clamped in the hanger;

Fig. 3, a top plan view of the scaffold hanger;

Fig. 4, a vertical, longitudinal sectional view through the extension ladder and scaffold hanger, showing the parts in the position shown in Figure 1;

Fig. 5, a slightly enlarged, top plan view of the upper or extensible ladder;

Fig. 6, an enlarged, detail view of the separable nut and a portion of the jack screw, showing the nut in the open or inoperative position; and

Fig. 7, an enlarged, fragmentary elevation of the upper portion of the jack screw and the bevel gears for operating the screw.

Similar numerals refer to similar parts throughout the drawings.

The invention is shown as applied to a conventional extension ladder including the lower or stationary ladder indicated generally at 10 and comprising the upright side rails 11 and rungs 12 and the upper or extensible ladder indicated generally at 13 and comprising the upright side rails 14 and rungs 15.

The usual catches 16 may be provided for permitting the ladders to be extended or collapsed in conventional manner when the mechanism of the present invention is disengaged, and these catches form no part of the present invention, being merely a part of the conventional extension ladder to which the invention is applied.

A split nut, indicated generally at 17, is mounted upon the upper end of the lower or stationary ladder for engagement with a jack screw 18 swivelled upon the upper or extensible ladder for transferring the load between the ladders and extending or collapsing the upper ladder relative to the lower ladder.

This split nut is carried upon a telescoping tubular bracket 19 attached to the upper ends of the side rails 11 of the lower ladder by means of the loops 20, the telescopic design of this bracket permitting attachment of the same to ladders of various widths.

The split nut is formed of two halves indicated generally at 21 and 22, the member 21 having at

its lower edge the horizontal pintles 23 journalled in the bearing lugs 24 formed upon the telescopic bracket 19, and the member 22 is hingedly connected at one edge to the adjacent edge of the member 21 by the vertical hinge joint 25, the swinging edge of said member 22 being provided with the perforated ears 26 arranged to cooperate with the similar ear 27 upon the opposite edge of the member 21 to receive a locking pin 28 to hold the parts in closed position with the split nut sections 29 and 30, upon the members 21 and 22 respectively, engaging the jack screw 18 as best shown in Fig. 4 of the drawings.

When it is desired to disengage the split nut from the jack screw the locking pin 28 may be removed and the section 22 swung open upon its hinge joint 25 as shown in Fig. 6, thus disengaging the split nut section 30 from the jack screw, and the section 21 may be tilted backward, away from the nut, upon the hinge joint 23, entirely disengaging the split nut section 29 from the jack screw, permitting the ladders to be quickly extended or collapsed in conventional manner.

The upper end of the jack screw 18 may be connected to the shaft 31 of the bevel pinion 32 by means of the coupling sleeve 33 and pins 34.

This shaft 31 is journalled in the bearing portion 35 carried by the tubular telescoping bracket 36 provided at its ends with loops 37 located around the upper ends of the upright side rails 14 of the upper or extensible ladder.

Clips 38 are provided for clamping the telescoping bracket 36 to the upper rung of the extensible ladder 13. This permits adjustment of the bracket to accommodate ladders of various widths and provides means for rigidly mounting the bearing for the jack shaft and pinion.

Short shafts or axles 39 are rigidly mounted upon the loops 37 and the bearing wheels 40 are journalled upon said shafts being retained thereon as by the washers 41 and pins 42. These bearing wheels are preferably provided with tires 43 of rubber or the like for contact with the supporting wall or structure against which the ladder is located.

A bracket arm 44 mounted upon the telescoping bracket 36, supports the bearing portion 45 located at right angles to the bearing portion 35. The shaft 46 of the bevel gear 47 is journalled in the bearing portion 45, said bevel gear meshing with the bevel pinion 32.

The shaft 46 of the bevel gear may be connected to a coupling 48 as by a pin 49 and the handle crank 50 is connected to said coupling for operating the bevel gear and pinion to rotate the jack screw 18.

An arcuate bracket 51 is provided with hooked ends 52 arranged to be hooked around one of the lower rungs 15 of the upper or extensible ladder 13 and is provided at its central portion with a clearance opening 52 and hollow boss 53 through which the lower portion of the jack screw is located, a split nut 54 being tightened upon the screw below said boss as by the lever 55.

In operating the above described mechanism to adjust the ladder, the split nut 29—30 is disengaged from the screw 18, as shown in Fig. 6, in the manner above described, permitting rapid extension or collapsing of the ladder to the desired height in conventional manner. This may be done with the ladder lying on the ground or with it positioned against a wall or other supporting structure as desired.

The split nut is then engaged with the jack screw by closing the sections 21 and 22 and locking them together with the locking pin 28. The ladder may then be either extended or collapsed to any desired position by rotation of the crank handle 50 in the proper direction rotating the screw 18 through the split nut 29-30, this being accomplished by the workman who may remain in position at or near the top of the ladder.

As the screw mechanism is operated as above described to raise or lower the upper or extensible ladder relative to the lower or stationary ladder the bearing wheels 40 will ride up or down upon the supporting wall as indicated at W in Fig. 4, the wheels riding over the edges of siding boards or other obstruction on the wall without interfering with the adjustment of the ladder.

In order to provide a scaffold upon two of the ladders when placed in spaced position against a wall or the like a scaffold hanger shown in Figs. 1 to 4 may be supported upon an upper rung of each of said pair of ladders.

This scaffold hanger is in the form of a one-piece hanger formed of a rod or the like and indicated generally at 56. This hanger comprises the substantially U-shaped horizontal portion 57 with the upturned legs 58 terminating at their upper ends in the down turned hooks 59 arranged to be engaged over an upper rung 15 of the extensible ladder 14, the lower portions of the legs 58 resting against the next lower rung of the upper ladder.

A pair of studs or pins 60 may be provided upon the lower portions of the legs 58, spaced above the horizontal U-shape portion 57 of the hanger a sufficient distance to permit a scaffold plank 61 resting upon said horizontal portion 57 to fit beneath said studs.

A stationary nut 62 is fixed at the center of the horizontal portion 57 of the hanger and a screw 63 is threaded through said nut and provided at its outer end with an angular portion 64 for manually operating the screw.

The angular clamp 65 is swivelled to the inner end of the screw as indicated at 66 and adapted to engage the outer edge of the scaffold plank 61 to clamp the same tightly upon the hanger. This provides for quick and easy adjustment of the hanger to accommodate scaffold planks of various widths and to hold the same tightly clamped upon the hanger.

I claim:

1. An extension ladder comprising a lower ladder and an upper ladder telescopically mounted thereon, a telescopic cross brace detachably connected at its ends to the upper ladder, a bearing on said cross brace, a longitudinal screw journalled in said bearing, a second telescopic cross brace detachably connected at its ends to the lower ladder, a split nut upon the second cross brace for engaging the screw, and means for rotating the screw.

2. An extension ladder comprising a lower ladder and an upper ladder telescopically mounted thereon, a telescopic cross brace detachably connected at its ends to the upper ladder, a bearing on said cross brace, a longitudinal screw journalled in said bearing, a second telescopic cross brace detachably connected at its ends to the lower ladder, a split nut upon the second cross brace for engaging the screw, and means for rotating the screw, and bearing wheels upon the ends of the upper telescopic cross brace.

3. In combination with an extension ladder comprising a lower section and an upper section slidable one on the other, elevating means detachably connected to said ladder sections for

moving the upper section longitudinally relative to the lower section, said elevating means comprising a cross brace detachably connected to the upper end of the upper section, a bearing on said cross brace, a longitudinal screw journalled at its upper end in said bearing, a second cross brace detachably connected to the lower section, a split nut upon the second cross brace for engaging the screw, a bracket detachably connected to the lower portion of the upper section, a bearing on said bracket for the lower portion of the screw, a collar fixed upon the screw immediately below said last named bearing, and means for rotating the screw.

4. In combination with an extension ladder comprising a lower section and an upper section slidable one on the other, elevating means detachably connected to said ladder sections for moving the upper section longitudinally relative to the lower section, said elevating means comprising a telescopic cross brace detachably connected to the upper end of the upper section, a bearing on said cross brace, a longitudinal screw journalled at its upper end in said bearing, a second telescopic cross brace detachably connected to the lower section, a split nut upon the second cross brace for engaging the screw, a bracket detachably connected to a lower rung of the upper section, a bearing on said bracket for the lower portion of the screw, a collar fixed upon the screw immediately below said last named bearing, and means for rotating the screw.

5. In combination with an extension ladder comprising a lower section and an upper section slidable one on the other, elevating means detachably connected to said ladder sections for moving the upper section longitudinally relative to the lower section, said elevating means comprising a telescopic cross brace having loops detachably connected to the upper end of the side rails of the upper section, a bearing on said cross brace, a longitudinal screw journalled at its upper end in said bearing, a second telescopic cross brace having loops detachably connected to the upper ends of the rails of the lower section, a split nut upon the second cross brace for engaging the screw, a bracket detachably connected to a lower rung of the upper section, a bearing on said bracket for the lower portion of the screw, a collar fixed upon the screw immediately below said last named bearing, and means for rotating the screw.

6. In combination with an extension ladder comprising a lower section and an upper section slidable one on the other, elevating means detachably connected to said ladder sections for moving the upper section longitudinally relative to the lower section, said elevating means comprising a cross brace detachably connected to the upper end of the upper section, a bearing on said cross brace, a longitudinal screw journalled at its upper end in said bearing, a second cross brace detachably connected to the lower section, a split nut upon the second cross brace for engaging the screw, said split nut comprising a section hinged to the second cross brace on a horizontal axis, a second section hinged to one end of the first named section, and means for detachably connecting the opposite ends of said sections together, a bracket detachably connected to the lower portion of the upper section, a bearing on said bracket for the lower portion of the screw, a collar fixed upon the screw immediately below said last named bearing, and means for rotating the screw.

WILLIAM C. YARMOLOWICH.