Sept. 28, 1965 F. C. FRY 3,208,555

HOISTING ATTACHMENT FOR A LADDER

Filed May 19, 1964 3 Sheets-Sheet 1

Fig. 1.

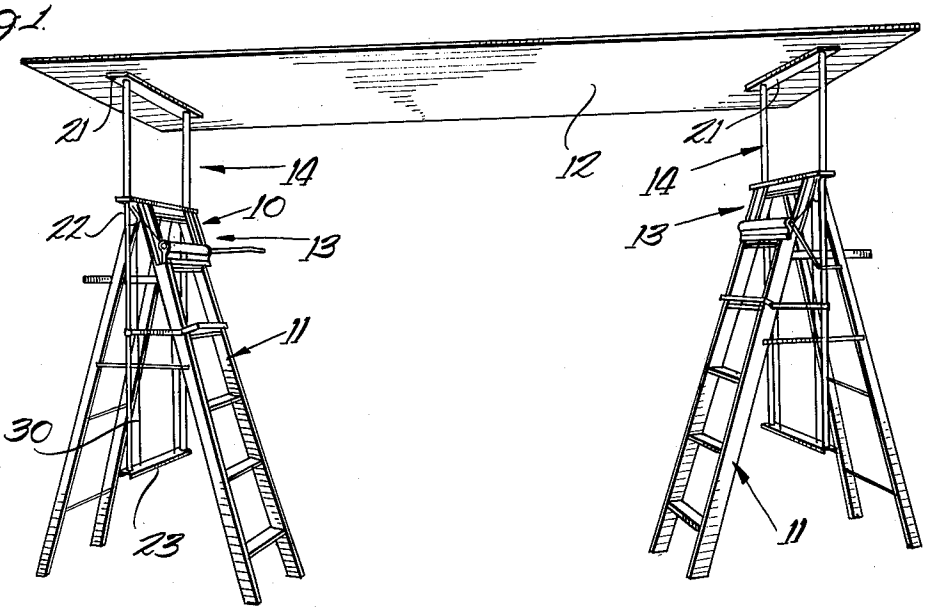


Fig. 2.

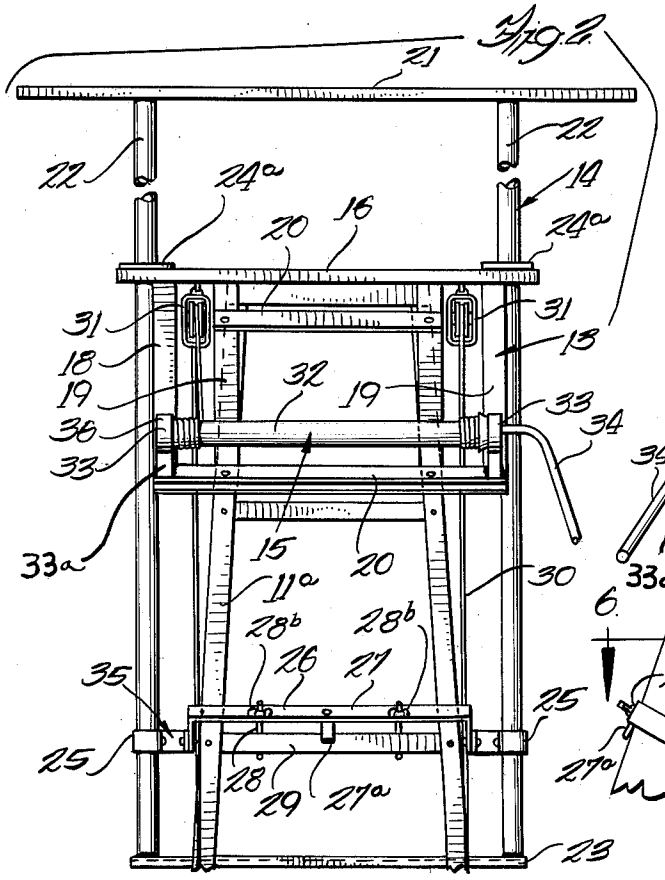
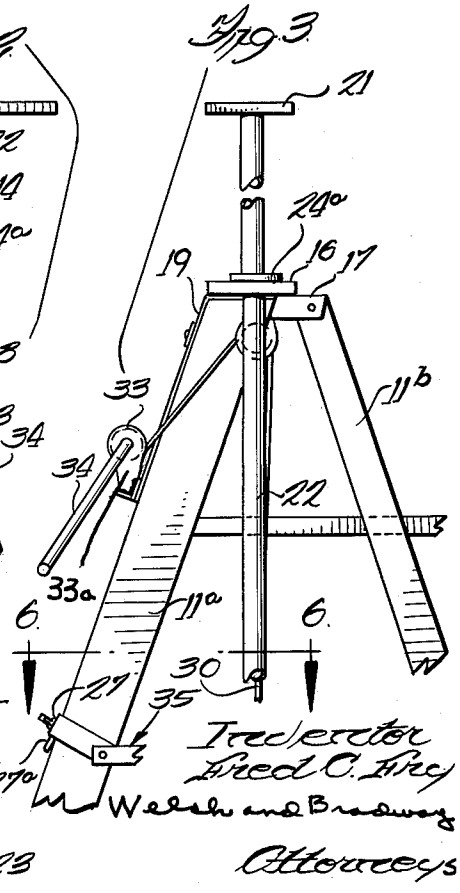


Fig. 3.



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Sept. 28, 1965 F. C. FRY 3,208,555

HOISTING ATTACHMENT FOR A LADDER

Filed May 19, 1964 3 Sheets-Sheet 2

Fig. 4

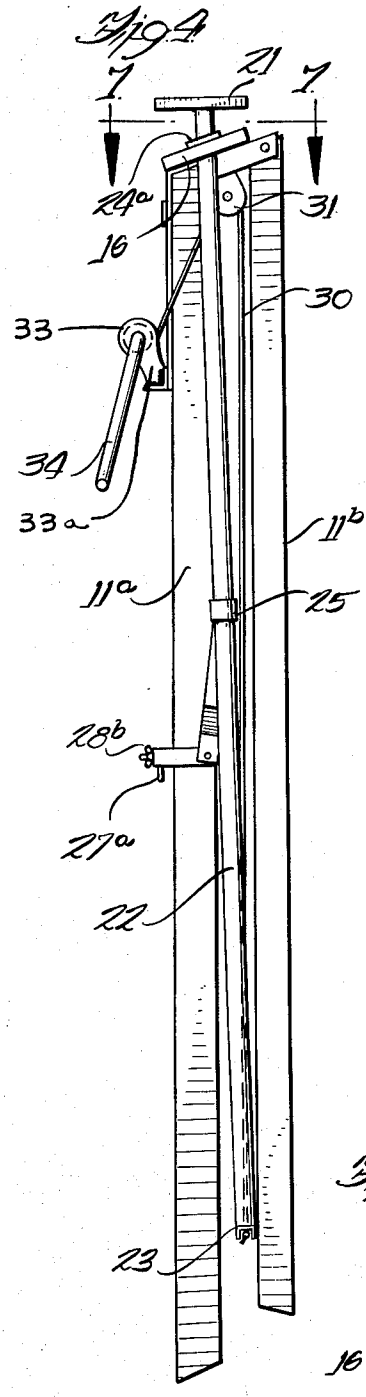


Fig. 5

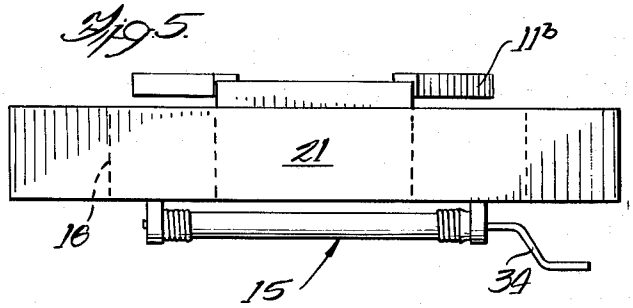


Fig. 7

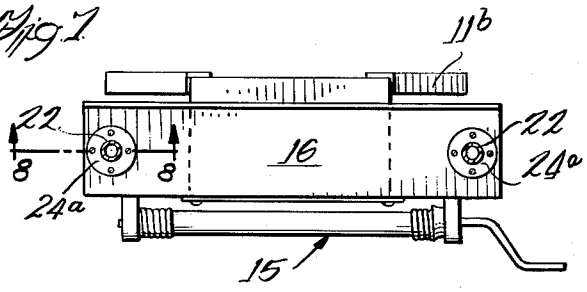


Fig. 6

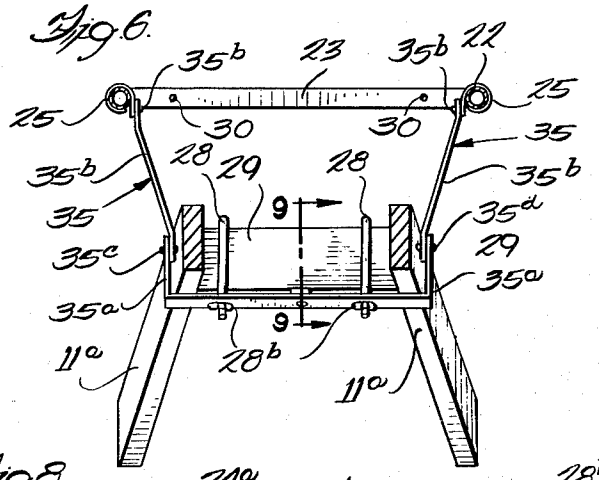


Fig. 8

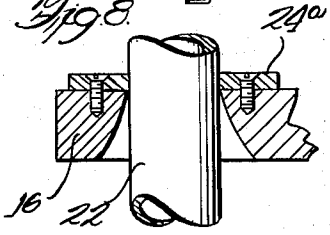
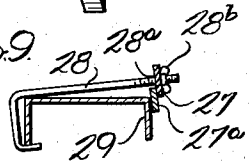


Fig. 9



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Sept. 28, 1965 F. C. FRY 3,208,555

HOISTING ATTACHMENT FOR A LADDER

Filed May 19, 1964 3 Sheets-Sheet 3

Fig. 10.

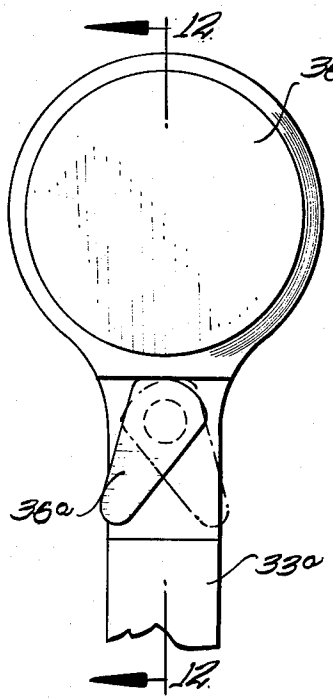
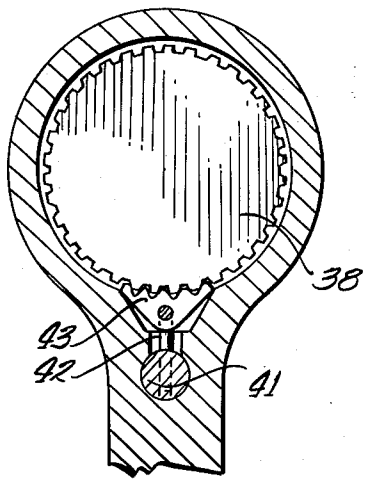
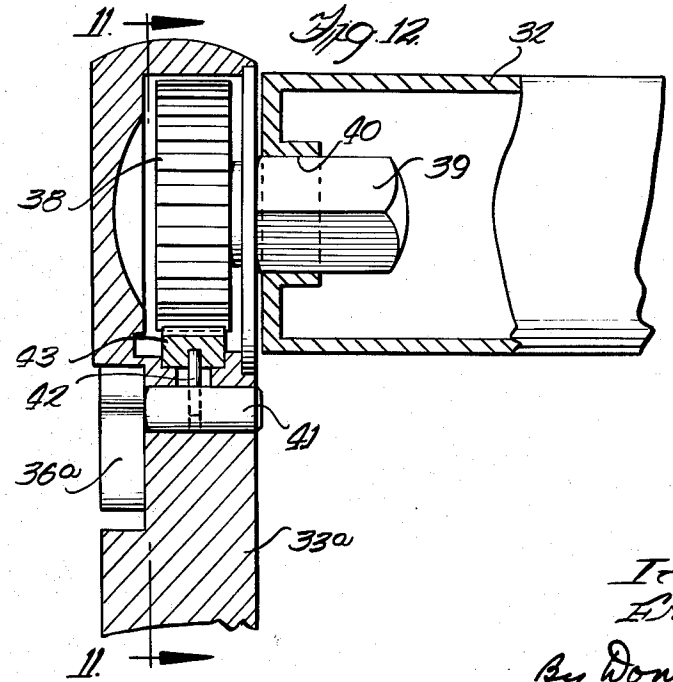


Fig. 11





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3,208,555

HOISTING ATTACHMENT FOR A LADDER

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7 Claims. (Cl. 182—116)

This invention relates to an apparatus for lifting and supporting objects such as building panels, scaffolding, etc. and the primary object is to provide such an apparatus which is constructed in a novel manner so that it can be easily attached to and removed from a conventional stepladder.

Another object of this invention is to provide a hoisting apparatus for mounting on a stepladder which transfers the weight of the supported object to the stepladder in such a manner as to obtain maximum stability.

Another object is to provide a hoisting attachment for a stepladder which can be folded while attached to the ladder for compactness and ease of storage.

Another object of this invention is to provide a hoisting apparatus which is readily portable.

Other objects and advantages of the invention will become apparent from the following description taken in connection with the accompanying drawings in which:

FIGURE 1 is a perspective view of hoisting apparatus embodying the novel features of the present invention, two units being shown as mounted on stepladders and supporting a building panel;

FIGURE 2 is a fragmentary front elevational view of the apparatus mounted on a stepladder;

FIGURE 3 is a fragmentary side elevational view of the apparatus mounted on a stepladder;

FIGURE 4 is a side elevational view of the stepladder and hoisting apparatus in the folded condition;

FIGURE 5 is a plan view of the hoisting apparatus and stepladder as shown in FIG. 4;

FIGURE 6 is a sectional view taken along line **6—6** of FIG. 3; and

FIGURE 7 is a sectional view taken along line **7—7** of FIG. 4.

FIG. 8 is a fragmentary sectional view taken along the line **8—8** of FIG. 7;

FIG. 9 is a sectional view taken along the line **9—9** of FIG. 6;

FIG. 10 is a fragmentary end elevational view of the cable drum support looking to the right from the left in FIG. 2;

FIG. 11 is a fragmentary sectional view taken along along the line **11—11** of FIG. 12; and

FIG. 12 is a fragmentary sectional view taken along the line **12—12** of FIG. 10.

The hoisting apparatus 10 shown in the drawings to illustrate the present invention is intended to be used when mounted on a stepladder **11**. A single hoisting apparatus and a stepladder can be used or, as shown in FIGURE 1, a pair of stepladders each equipped with this apparatus can be used to lift and support an object such as a flat rectangular building panel **12** in a horizontal position. In general, the apparatus comprises a supporting framework **13** which rests on a stepladder, an elevating structure **14** which is guided by the supporting framework and an elevating mechanism **15** mounted on the supporting framework and connected to the elevating structure to raise, lower and hold it in various elevated positions.

In accordance with the present invention, the hoisting apparatus **10** is constructed in a novel manner so as to permit its rapid attachment to and removal from a ladder **11** while providing an apparatus which cannot easily be dislodged from the ladder. To accomplish this purpose, the supporting framework **13** is formed of a flat rectangular top plate **16** which is positioned on the top step **17** of the ladder and extends outwardly beyond the ends of the top step. To hold the top plate on the top step of the ladder and to provide a support for the elevating mechanism **15**, the framework includes a brace portion **18** which is attached to and depends from the top plate at the same angle as the front legs **11***a* of the ladder intersect the top step of the ladder when the ladder is unfolded. Thus, the brace portion of the framework will lean against and engage the front legs of the ladder when the top plate is positioned on the top step of the ladder. The bracing portion of the framework consists of four flat metal bars **19** of inverted L-shape with shorter legs which are fastened as by screws (not shown) to the bottom surface of the top plate and with longer legs extending downwardly and outwardly to lie along the outer sides of the front legs of the stepladder. A pair of lateral bars **20** extend across and are fastened to the downwardly extending bars to form a rigid structure. One bar **20** is fastened to lower ends of all four longer legs, but shorter upper bar **20** only spans inner legs. An angle iron is used as the lower bar for a purpose to be disclosed later. These lateral bars will extend across and rest against the front legs of the stepladder when the framework is in position.

To provide maximum stability when the hoisting apparatus is mounted on a stepladder, the elevating structure **14** is arranged so that it moves in a vertical plane which passes through the top step **17** of the ladder and substantially bisects the angle formed by the front legs **11***a* and rear legs **11***b* of the ladder. Also, due to the construction of the hoisting apparatus, the weight of the supported object **12** is transferred to the top plate **16** of the supporting framework **13** and then to the top step of the ladder and distributed over this step in a substantially uniform manner. In order to perform in this way, the elevating structure is constructed of a flat rectangular platform **21** which supports the object being elevated and which in turn is supported and moved by a pair of spaced poles **22**. The elevating structure is completed by a bar **23** which connects the bottoms of the poles to form a rectangular frame. The poles extend through and are guided within openings **24** in the top plate of the supporting structure, these openings being located outwardly beyond the ends of the top step **17** of the ladder. The poles are thereby positioned so as to straddle the ladder in a plane extending through the top step of the ladder and substantially bisecting the angle formed by the front and rear legs of the ladder.

To guide the poles **22** and restrict their movement to a vertical plane extending through the top step **17** of the stepladder, guiding surfaces are provided at and below the top plate **16** of the framework **13**. In this instance, the guides at the top plate are provided by washers **24***a* which are fastened to the upper surface of the top plate concentrically with the openings **24** in this plate. The washers have interior openings of the same diameter as the exterior of the poles **22** in order to provide guiding surfaces for the poles.

The lower guiding surfaces for the poles **22** are provided by the interior surfaces of tubular sleeves **25** which receive the poles and are positioned beneath the openings in the top plate. The sleeves are supported by the ends of a U-shaped member **26** which extends around the front legs **11***a* of the ladder and rests on the ladder below the framework **13**. The bight portion **27** of this U-shaped member extends across and engages the front legs of the ladder. To hold the U-shaped support in position on the ladder, J-shaped hooks **28**, which extend through openings **28***a* in the bight portion, are hooked around the rear edge of a step **29** and held against the bight portion by wing nuts **28***b*. To prevent bowing of the bight portion

when the wing nuts are drawn up tightly, a tab **27***a* is positioned in the center of the bight and extends downwardly therefrom to engage the front edge of the step.

The mechanism **15** for raising and lowering the elevating structure **14** comprises cables **30** which are attached in a suitable manner to the bottom cross bar **23** connecting the poles **22**, extend through pulleys **31** attached to the bottom of the top plate **16** of the supporting framework **13** and are wound around a drum **32** of a winch. The winch drum is journaled in bearings **33** supported on the bracing portion **18** of the supporting framework and is turned by a handle **34** attached to one end of the drum. In the embodiment shown in the drawings, the bearings are supported by uprights **33***a* affixed, as by welding, to the lower lateral bar **20** which, as previously described, is formed from an angle iron. The rotation of the drum is controlled by a ratchet and pawl mechanism **36** at one end of the drum. This mechanism fits in one of the bearings **33** and is selectively adjustable by a movement of an indicator **36***a* to permit rotation of the drum in either direction for winding and unwinding the cables as well as to hold the elevating structure in various elevated positions.

In the present instance, the pawl and ratchet mechanism **36** is of the type commonly used on socket wrenches. Such mechanism is shown in FIGS. 10 to 12 and includes a toothed ratchet wheel **38** rotatably mounted in a casing which constitutes one of the bearings **33**. A square cross section male projection **39** projecting rigidly from the wheel fits into a socket **40** of similar shape in the drum **32** (FIG. 12). The indicator **36***a* projects rigidly from a shaft **41** journaled in the upright **33***a* and connected by a pin **42** to a pawl **43** for shifting the pawl to different positions for rotation of the wheel and drum in opposite directions in a well-known manner in response to shifting of the indicator **36***a* to its different limit positions shown in full and in phantom in FIG. 10.

The pulleys **31** supporting the cables **30** are attached to the top plate **16** outwardly beyond the ends of the top step **17** of the ladder so that the weight of the elevating structure and the supported object is transferred to the top plate of the supporting framework and the top step of the ladder. This arrangement provides stability since the weight carried by the ladder is concentrated in a plane between the front and rear legs.

The previously mentioned guides for the elevating framework **14** are constructed and supported in a novel manner to permit the poles **22** of the elevating framework to be moved into parallelism with the bracing portion **18** of the supporting framework so that the ladder and hoisting apparatus can be folded compactly, as shown in FIGURE 4, for ease of storage. In order to permit the hoisting apparatus to be folded, it is necessary that the poles be tiltable relative to the top plate **16** and toward the bracing portion. This is accomplished by forming the openings **24** in the top plate with increasing cross section from the surface of the top plate adjacent the washer **24***a*, which in this instance is the top surface, to the opposite surface and by supporting the sleeves **25** so that they can be moved from an operating position where they are located directly below the openings **24** to a folded position where they are located adjacent to the front legs **11***a*. The shape of the openings and the use of washers as guiding surfaces at the top of the poles permits the poles to be tilted relative to the top plate when the sleeves are moved to the folded position yet restricts the movement of the poles to the vertical when the sleeves are placed in the operating position.

To enable the sleeves **25** to be movable between the aforementioned positions, the arms **35** of the U-shaped guide support **26** are divided into sections **35***a* and **35***b* which are pivotally connected to each other and to the sleeves. Sections **35***a* are formed as short stubs which are rigidly connected to and extend outwardly from the ends of bight portion **27** of the U-shaped support. These stubs are connected by pivot pins **35***c* to the ends of arm sections **35***b* which are at their opposite ends connected to the sleeves by pivot pins **35***d*. The pivotal connections **35***c* at the stub end of the arm sections **35***b* permit these sections to be folded into parallelism with the front legs of the stepladder and thus allow the sleeves to be moved adjacent to the front legs. The pivotal connections **35***d* between the arm sections and the sleeves allow the sleeves to remain aligned with the poles as the sleeves are moved between their operating and folded positions.

The hoisting apparatus **10** can be most readily mounted on a stepladder **11** when the stepladder is folded as shown in FIG. 4 and is lying flat with the front legs **11***a* and steps **29** facing upward. The elevating structure **14** of the hoisting mechanism is moved to its lowered position so that the platform **21** contacts the top plate **16** of the supporting framework **13** and the U-shaped member **26** supporting the lower guides **25** is folded to allow the poles **22** to be parallel with the brace portion **18** of the supporting framework. With the hoisting apparatus thus compacted, it is ready to be placed on the stepladder. Since the stepladder generally is longer than the poles of the hoisting apparatus, the bar **23** connecting the bottoms of the poles must be slipped over the bottoms of the legs of the ladder and between the front and rear sets of legs of the ladder. When the bar is so positioned, the top plate of the supporting framework is moved into position to contact the top step of the ladder with the bracing portion of the framework resting against the front legs of the ladder as shown in FIG. 4. The supporting framework can be permanently attached to the ladder by means of suitable fasteners (not shown) to secure the top plate to the top step of the ladder. However, the use of fasteners is not necessary since the supporting framework will be held in position on the ladder by its own weight when the ladder is in its upright operating position. The J-shaped hooks **28** which extend through openings **28***a* in the bight portion **27** of the U-shaped support and are held therein by wing nuts **28***b*, are hooked around the rear edge of a step **29** and are drawn up by the wing nuts until the tab **27***a* is tightly engaged with the front edge of said step. The correct step to be used is preselected and is determined by the length of the arms **35** of the U-shaped support and the angle formed by the front legs of the ladder with the vertical so that the sleeves will be positioned beneath the openings in the top plate when the ladder is unfolded.

The ladder and hoisting apparatus are now ready to be put in use by unfolding the ladder and placing it in its upright position with the legs on a supporting surface. When the ladder is upright, the poles **22** are moved away from the front legs **11***a* and into their vertical position between the front and rear legs of the ladder. Movement of the legs will automatically unfold the arms **35** of the U-shaped support **26** and position the sleeves **25** beneath the openings **28** in the top plate so that the poles can be guided by the sleeves and the washers **24***a* for movement in a vertical plane extending through the top step of the ladder. The elevating structure can now be raised by setting the ratchet indicator **36***a* in the lifting position and by turning the handle **34** in the proper direction.

I claim:

1. A hoisting apparatus for installation on a stepladder, said apparatus having, in combination, a supporting framework having an elongated flat top plate resting on the top step of said stepladder and extending beyond the ends thereof and a bracing portion attached to said top plate and extending angularly and downwardly from one side of the top plate to lie against said stepladder when the top plate is positioned on the top step thereof, openings located in said plate outwardly beyond the ends of said top step, poles slidably mounted in said openings for guided vertical movement therein, a platform mounted on the tops of said poles, elevating means mounted on

said framework and connected to said poles to raise the poles and platform relative to said framework, releasable means to hold the poles and platform when elevated, and additional guiding means engaging said poles below said openings.

2. A hoisting apparatus of the type called for in claim 1 in which the elevating means comprises cables attached to the poles and supported by pulleys attached to said flat plate, a drum journaled on said bracing portion of the framework for receiving and winding said cables, and handle means attached to said drum to turn the drum, said releasable means having a ratchet and pawl to prevent unwinding of the cables from the drum.

3. A hoisting apparatus of the type called for in claim 1 in which washers having giuding surfaces for the poles are attached to one surface of said top plate and said openings are formed with increasing cross section from the surface of the top plate adjacent said washers to the opposite surface to allow the poles to be tilted relative to the top plate.

4. A hoisting apparatus of the type called for in claim 1 in which said additioinal guiding means comprises a pair of tubular sleeves connected to the ends of the arms of a U-shaped member having a bight portion adapted to clamp around and be supported by the legs of the stepladder, said arms being pivotally attached to said bight portion and to said sleeves to permit the sleeves to be moved from under said openings and adjacent to said legs of the ladder.

5. A hoisting apparatus for installation on a stepladder, said apparatus comprising a supporting framework resting on the top step of the stepladder, an elevating structure having vertical members positioned outwardly of the ends of said top step and guided by said framework for vertical movement in a plane extending through the top step of the stepladder, elevating means connected to said framework and elevating structure for controlling the vertical movement of the elevating structure relative to the framework and for transferring the weight of said elevating structure to the top step of said ladder, and selectively releasable means to hold the elevating structure in position relative to said framework.

6. A hoisting apparatus for installation on a stepladder, said apparatus having a framework supported by the top step and a pair of legs of said stepladder, an elevating structure having a top platform mounted on a pair of poles spaced apart a distance greater than the length of said top step, guides attached to said framework and positioned outwardly of the ends of the top step to receive said poles and control their movement in a vertical plane extending through said top step, said poles being inserted in said guides with said top platform positioned above said framework, a rotatable drum journaled on said framework, a handle attached to the drum for causing rotation thereof, cables attached to the elevating structure and engageable with the drum to wind about the drum and lift said structure upon rotation in one direction and to unwind and lower the structure upon rotation in the opposite direction, and releasable means to prevent rotation of the drum in said opposite direction.

7. A hoisting apparatus for installation on a stepladder, said apparatus comprising a supporting framework resting on the stepladder, a rectangular elevating framework guided by said supporting framework for vertical movement in a plane extending through the top step of the stepladder, said elevating framework having vertical members spaced outwardly from said top step and horizontal members connected to said vertical members and positioned above and below the top step, elevating means mounted on said supporting framework and connected to said rectangular framework for controlling the vertical movement of said rectangular framework relative to the supporting framework and for transferring the weight of said elevating framework to the top step of said ladder, and selectively releasable means for holding the rectangular framework in elevated positions relative to said supporting framework.

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