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HOISTING ATTACHMENT FOR LADDERS

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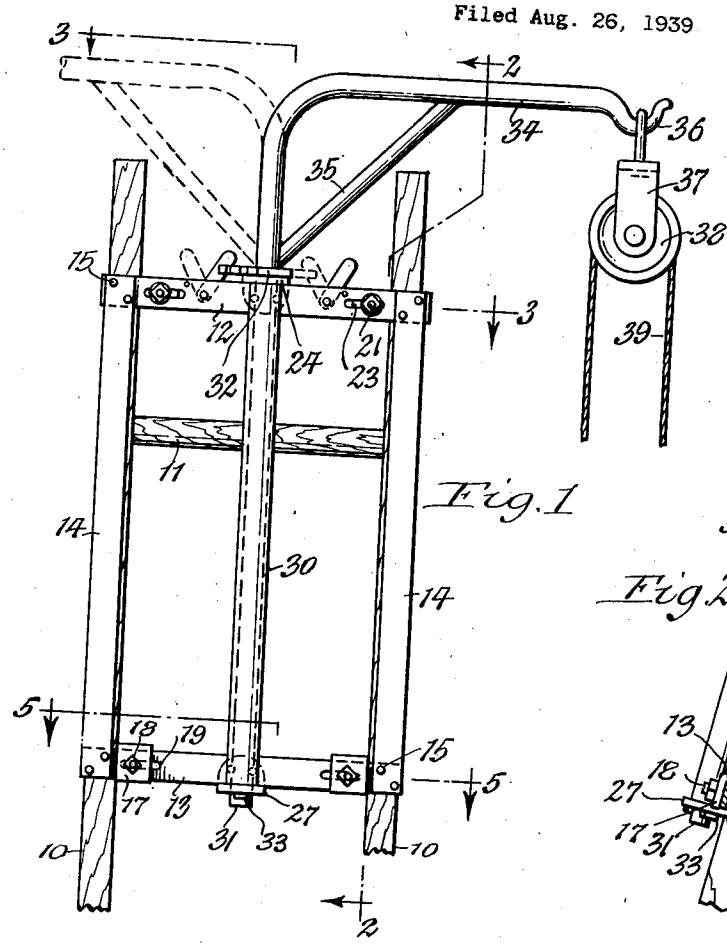


Fig. 1

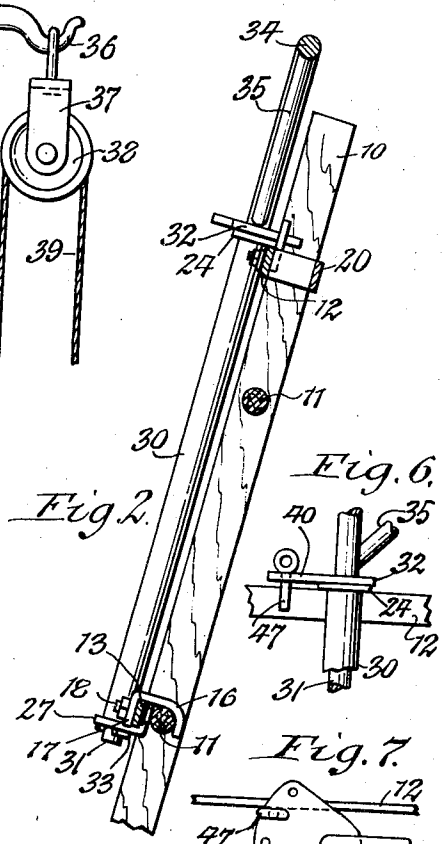


Fig. 2

Fig. 6

Fig. 7

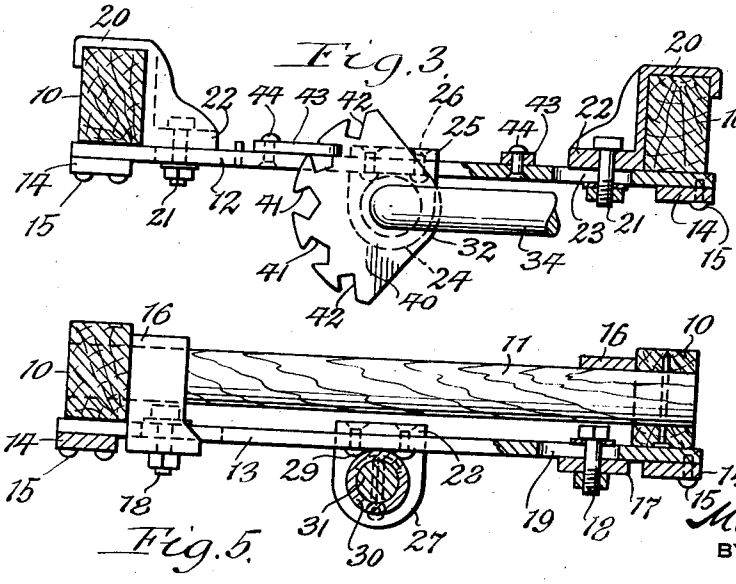


Fig. 3

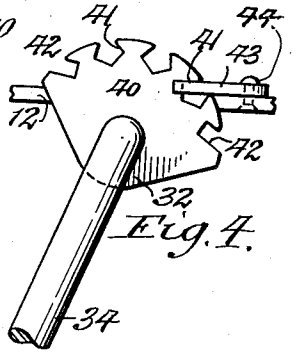


Fig. 4

Fig. 5

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HOISTING ATTACHMENT FOR LADDERS

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3 Claims. (Cl. 248—210)

This invention relates to a hoisting attachment for ladders whereby an ordinary ladder may be converted into an apparatus for hoisting materials such, for example, as roofing materials which are used in constructing or repairing the roofs of houses, although the same may also be used advantageously for other purposes.

It is the object of this invention to provide a hoisting attachment of this character which is very simple in construction and low in cost and which can be readily applied to ladders of various widths and which can be readily adjusted with reference to the position of the load to be lifted so that this can be done most efficiently and with the greatest safety.

In the accompanying drawing:

Fig. 1 is a fragmentary front elevation of a ladder equipped with a hoisting attachment embodying this invention.

Fig. 2 is a vertical section taken on line 2—2, Fig. 1.

Fig. 3 is a horizontal section, on an enlarged scale, taken on line 3—3, Fig. 1.

Fig. 4 is a fragmentary view of the adjusting mechanism shown in Fig. 3 but in a different position.

Fig. 5 is a horizontal section, on an enlarged scale, taken on the correspondingly numbered line in Fig. 1.

Fig. 6 is a fragmentary front view of a hoisting attachment showing a modification of the means for holding the lifting mechanism in its adjusted position.

Fig. 7 is a top plan view of the construction shown in Fig. 6.

In the following description similar characters of reference indicate like parts in the several figures of the drawing:

This hoisting attachment may be used in connection with ladders which vary in detail construction and are made of various materials, but the ladder shown in the drawing as one suitable for use in connection with this attachment comprises two upright side rails of wood which are spaced apart and connected at suitable intervals throughout the height of the same by means of horizontal rungs or rounds 11 which are also made of wood.

In its general organization, the hoisting attachment embodying this invention, comprises an upright carriage which is adapted to be slid vertically on the ladder into the position best suited for handling the load which is to be lifted, and a derrick pivotally mounted on the carriage so as to be capable of swinging horizontally thereon and adapted to carry the tackle whereby the load is to be lifted.

In its preferred construction, this carriage comprises a frame which includes upper and lower metal cross bars 12, 13 which extend in spaced relation across the front side of the ladder and upright metal side bars 14, 14 which connect corresponding ends of the cross bars and are preferably arranged in line with the side rails. The connection between the horizontal and upright bars of the frame may be effected either by rivets 15, as shown in the drawing, or by other suitable means, such as electric welding.

Means are provided for locking this frame on different rungs of the ladder for the purpose of holding the hoisting apparatus at different points in the height of the same to suit the location where the work is being done on a building. As shown in Figs. 1, 2 and 5, these locking means include two supporting hooks 16 which are mounted on the lower cross bar of the carriage and project rearwardly and downwardly therefrom over one of the rungs of the ladder, as shown in Fig. 2.

In order to hold the lower part of the frame against horizontal movement on the ladder these supporting hooks 16 are engaged with the inner sides of the ladder rails 10 and to permit such hooks to be engaged with the rails of different ladders having their rails spaced different distances apart, means are provided for adjusting these hooks horizontally on the frame. The preferred means for effecting such adjustment of these hooks, as shown in Figs. 1 to 5, consist of a bracket arm 17 projecting downwardly from the front end of each hook and engaging with the front side of the lower frame cross bar 13, and a clamping bolt 18 passing through each of these arms and through a horizontal slot 19 in the adjacent part of said lower cross bar. Upon loosening the bolts 18 the hooks 16 may be slid horizontally the requisite extent for engaging them with the inner sides of the ladder rails after which these hooks may be held in place by tightening these bolts and thereby holding the lower part of the hoisting frame and the ladder against horizontal displacement relative to each other.

The upper part of the hoisting frame is connected with the rails of the ladder by means which operate to guide this frame vertically on the ladder and also hold the same against horizontal displacement relative to each other. The preferred means for accomplishing this purpose consist of two guide hooks 20 which engage with

the rear and lateral sides of the ladder rails and are adjustably connected with the opposite ends of the upper frame cross bar 12 by means of clamping bolts 21 passing through a bracket arm 22 of each guide hook and through a horizontal slot 23 in the adjacent end portion of the upper frame cross bar 12, as best shown in Fig. 3. By these means these hooks not only serve as guides which hold the frame against forward, backward and sidewise movement on the ladder, but also permit of shifting these guide hooks relative to the frame in order to adapt the latter to rails of ladders which are spaced different distances.

Owing to the adjustability of the supporting hooks and the guide hooks on the lower and upper parts of the frame, this apparatus can be mounted on ladders which vary in width and thus renders the apparatus as a whole very flexible and avoids the necessity of providing frames or carriages of different widths to fit different widths of ladders.

The derrick whereby the hoisting tackle is mounted on this carriage may be variously constructed, but in its preferred form the same is constructed as follows:

The numeral 24 represents an upper bearing which forms part of a bracket 25 secured to the rear side of the upper frame bar 12 by means of rivets 26, as shown, or by electric welding. The numeral 27 represents a lower bearing which forms part of a bracket 28 secured to the lower frame bar 13 by rivets 29, as shown in Fig. 5, or other suitable fastening. The two bearings 24, 27 project forwardly from their respective brackets and are connected with each other by means of a bearing tube 30 which also operates to stiffen the carriage as a whole, this tube being preferably connected with the upper and lower bearing by means of electric welding.

The numeral 31 represents an upright hoisting shaft or mast which is arranged in the upper and lower bearings 24 and 27 and in the bearing tube 30 and is capable of turning horizontally therein. Near its upper end this shaft is provided with a stop collar 32 which rests on the upper bearing so as to limit the downward movement of this shaft and at its lower end this shaft is provided with a cotter pin 33 adapted to engage with the underside of the lower bearing 27 and prevent the shaft from rising. At its upper end this shaft is provided with a laterally projecting horizontal arm or beam 34 which is preferably formed integrally with the shaft 31 from a piece of round metal, such as iron. For the purpose of strengthening this derrick and holding the arm reliably in position relative to the shaft, an inclined brace 35 is employed which connects the central part of this arm with the shaft immediately above its collar 32.

At its outer end the arm 34 is provided with a hook 36 which is adapted to support the clevis 37 of the pulley or sheave 38 which together with the rope 39 passing around the pulley form part of the tackle whereby the load to be handled is raised and lowered. By swinging this derrick about the upright axis of the bearings on the carriage the tackle may be shifted horizontally for bringing the same into the position best suited for lifting the load.

Adjusting means are provided for retaining the derrick and the tackle mounted thereon in a definite position during the hoisting operation and thereby avoiding accidents while doing this work. The retaining means for this purpose shown in Figs. 1, 2, 3 and 4 are constructed as follows:

The numeral 40 represents a horizontal retaining plate of metal which is secured to the shaft 31 and preferably forming part of the collar 32 and provided in its curved outer edge with a segmental row of locking notches or recesses 41, 42. On opposite sides of the shaft 31 two detent or locking catches or dogs 43 are pivotally mounted on the upper frame bar 12 by means of rivets 44, or the like, so that either of these catches can be engaged with and disengaged from the locking recesses of the plate 40. These locking recesses are arranged in a row and the endmost recesses 42 extend tangentially from the peripheral edge of the plate 42 inwardly, while the intermediate locking recesses 41 are made wide at their inner ends and narrow at their outer ends, as shown in Figs. 3 and 4.

By this means either one or the other of the catches 43 may be engaged with the respective end recess or notch 42 at one end of the segmental row for holding the arm or beam of the derrick in one extreme of its horizontally turned position and it is also possible for either of the catches to engage one or another of the intermediate locking recesses which are of substantially keyhole or undercut formation so that when one of these catches is swung into one of these intermediate recesses, this catch will engage one of its sides with one side of this recess from the outer to the inner end thereof, while the opposite side of the catch will only engage its outer part with the outer part of the opposite side of this recess, as shown in Figs. 3 and 4.

By this means the rotatable shaft and arm together with the load connected therewith by means of the tackle may be reliably held in any position with reference to the axis of the derrick and thus permit of lifting the load with the greatest safety.

In the preferred construction of this hoisting attachment the bracket bearings 24, 27 and this bearing tube 30 forming the bearing in which the shaft or mast 31 is journaled are arranged on the carriage midway of its opposite vertical edges and the upper end of this shaft is extended upwardly a sufficient extent that when this carriage is mounted on the uppermost part of the ladder it is possible for the arm 34 to swing horizontally across the upper ends of the carriage and the ladder. Whenever, therefore, a load is to be hoisted from the ground to the roof of a building, such as a bundle of shingles or a roll of tar paper, the ladder is first rested against the eave of the roof at the desired angle and the hoisting apparatus is attached to the uppermost part thereof so the arm 34 can turn clear of the upper end of the ladder. The load is then attached to the tackle which is mounted on the arm 34 while the latter is turned to the front side of the carriage and ladder.

After the load has been elevated to its highest position the shaft 31 and arm 34 are turned so that the arm swings from the front side of the carriage and ladder over the upper ends of the same and then to the rear side thereof after which the load may be deposited on the roof of the building. The hoisting of the load from the ground to the roof can therefore be effected easily, quickly, conveniently, safely and economically.

Instead of using the adjusting device for the derrick shown in Figs. 1, 2, 3 and 4, the modified form of the same shown in Figs. 6 and 7 may be employed. In this modified form the retaining plate 40 is provided adjacent to its

outer curved edge 45 with a segmental row of openings 46 one or the other of which is adapted to receive a retaining pin 47 adapted to engage the front side of the upper frame cross bar 12 against which it is held by the weight of the load on the arm of the derrick and thereby prevent displacement of this arm during the lifting operation.

As a whole, this hoisting attachment is very simple in construction and capable of being produced at relatively low cost. The same is very compact and therefore can be stowed away when not in use and also capable of being conveniently transported from one job to another. For using this hoisting attachment the same can be very quickly mounted on various sizes of ladders which may be available on a job and after being erected this attachment together with the ladder forms a hoisting apparatus which permits of hoisting loads to and from the roof of a building or elsewhere with ease and facility and without endangering the operators.

I claim as my invention:

1. A hoisting attachment for a ladder having upright side rails and a plurality of horizontal rungs connecting the side rails, said attachment comprising a carriage slidable vertically on said ladder and having upper and lower cross bars and upright side bars connecting corresponding ends of the horizontal bars, upper and lower bracket bearings arranged on the upper and lower bars, a bearing tube connecting said bracket bearings, an upright shaft journaled in said bracket bearings and bearing tube, a collar arranged on said shaft and resting on said upper bracket bearing, and an arm projecting laterally from the upper end of said shaft.

2. A hoisting attachment for a ladder having upright side rails and a plurality of horizontal rungs connecting the side rails, said attachment comprising a carriage slidable vertically on said ladder, a shaft journaled on said frame to turn horizontally and provided with a supporting arm, and adjusting means for holding said shaft and arm in different angular positions relative to the axis of said shaft including a retaining plate mounted on said shaft and provided in its edge with a segmental row of locking recesses each of which is wide at its inner end and narrow at its outer end, and catches movably mounted on said frame on opposite sides of said shaft and each catch adapted to engage with one or another of said recesses in the said retaining plate.

3. A hoisting attachment for a ladder having upright side rails and a plurality of horizontal rungs connecting the side rails, said attachment comprising a carriage slidable vertically on said ladder, a shaft journaled on said frame to turn horizontally and provided with a supporting arm, and adjusting means for holding said shaft and arm in different angular positions relative to the axis of said shaft including a retaining plate provided with a segmental row of openings, and a retaining pin adapted to engage with one or another of said openings and to bear against said frame on either side of said shaft.

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