SCAFFOLDING WITH IMPROVED ELEVATOR MECHANISM

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Abstract

An elevator assembly is provided to be attached to a standard scaffold section and with the assembly including means for interconnecting adjacent track sections to grow with the scaffolding as the work continues upward. The track is adapted for support on the horizontal reinforcing member of the scaffold section and is held in spaced relationship with the leg of the scaffold on the work side adjacent the building being built. The track sections are characterized by being smooth and obstruction free and the carriage for providing the elevating action includes frictional gripper means for holding the carriage in position and cooperating frictional lift means for periodically raising the carriage. The work platform is supported by an outwardly extending arm and a platform for materials may be provided by detachable triangular frames. The track preferably comprises an elongated flat plate with a U-shaped backup channel for reinforcement. The gripper and lift means preferable comprise movable levers that are alternately actuated between a binding and non-binding position on the track and controlled by springs and a pivotal operating arm.

9 Claims, 8 Drawing Figures

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SCAFFOLDING WITH IMPROVED ELEVATOR MECHANISM

FIELD OF THE INVENTION

The present invention relates to elevator mechanisms, and more particularly, to an improved elevator assembly adapted to be attached to any standard scaffolding.

BACKGROUND OF THE INVENTION

There have been in the past several attempts to provide a scaffolding with an elevator mechanism incorporated therein in order to mechanically raise the workmen and material as the work on a building continues upward. This concept has for many years shown promise in terms of providing extra efficiency for the contractors, particularly in the bricklaying field. The workmen with an elevator can position the work platform at the most convenient height for laying the bricks and thereby avoid having to stretch to do the work from widely spaced positions. The concept of an elevator mechanism on scaffolding is not only more convenient for the worker, but the work may be performed much faster, and perhaps most importantly, can be performed in a safer manner.

The major previous attempts for providing elevator mechanisms for the construction trades have been limited insofar as I am aware to the concept of making a scaffold with a built-in elevator mechanism. This concept has thus required the contractors to go out and purchase new scaffolding if the elevator feature is desired to be employed. Most contractors have resisted this move since the standard "patent" scaffolding that they have is preferred, in terms of standardization within their own companies, that is, so that all sections of scaffold will mate with each other and therefore can be shuttled back and forth between their several projects as extra sections are needed. Furthermore, there are times when the scaffolding is needed without platform working space, such as where the scaffolding is erected to provide a tower support for a trash chute or other required functions. In these situations, it is much more economical to use standard scaffolding than a special built model with built-in tracks and other attachments for an elevator mechanism. Thus, I have identified the need for an elevator mechanism that can be readily attached to and removed from standard scaffolding.

Other requirements that have been pinpointed include (1) an extensible track which is smooth and free of obstructions that have proven in prior designs to be dangerous to the workmen and susceptible to failure; (2) an elevator mechanism that is very sturdy and easily elevated by the workmen themselves without need for outside electrical power or complicated drive mechanism; and (3) an elevator mechanism that has fail-safe characteristics in use for the safety of the workmen.

OBJECTIVES OF THE INVENTION

Accordingly, it is an object of the present invention to overcome the shortcomings of prior elevator mechanisms for scaffolding and to do so with a structure that can serve as an attachment to any standard scaffolding.

It is another object of the present invention to specifically provide a scaffold that employs a track that is substantially smooth and obstruction free for the safety of the workmen and to provide reliable operation.

It is still another object of the present invention to provide an elevator mechanism that operates without outside power or complicated mechanism, and thus may be built at relatively low cost and is simple in construction and is fail-safe.

It is still another object of the present invention to provide an elevator mechanism for a scaffolding wherein a specially designed lifting means and gripper means are automatically operated by a simple pivotal lever to raise the workmen and material to each desired incremental height as the work progresses.

BRIEF DESCRIPTION OF THE INVENTION

In accordance with the present invention, a scaffolding is provided with a new elevator assembly having advantages not heretofore known in the art. One of the important advantages results from easy attachment of the assembly to standard scaffold sections by a simple hook support engaging an upper horizontal reinforcing member of the scaffold section and a lower spacing member engaging the lower vertical leg of the section.

Each track section is advantageously made from an elongated steel plate that provides an obstruction free, smooth path of travel for the elevator carriage. The track is reinforced on the back side by a U-shaped channel to which is attached the supporting means for the assembly. The carriage has a highly efficient frictional gripping and lifting means in the form of two spaced levers having an opening therein that engages the track.

The first lever forms a means for frictionally gripping the track to hold the carriage and the attached platform in the position desired. The second lever also relies on frictional or binding relationship for gripping the track and provides a reaction point to lift the carriage as a new level is required. Springs are provided in engagement with the levers in order to properly position the same for alternate gripping and releasing of the track. Preferably, the opening for receiving the track is defined by opposed shoulders so that the track is engaged on both sides for safety and for efficient gripping. The carriage also includes guide fingers extending around the sides of the track to assist in guiding the carriage along the track, especially in the area of interconnection between adjacent track sections.

The gripper and lift lever are mounted for floating action in the carriage by springs. The springs also serve to assist in insuring the required alternate operation of the levers. For example, as the lift lever is being actuated by the operating arm and the connecting linkage, a spring held captive between the lift lever and the gripper lever tends to move the latter into the non-binding position in order that the platform can be easily moved upward. As the upward movement commences, the gripper lever is further urged out of binding relationship by the upward travel itself. As soon as the upward travel has been completed a lower spring maintains the gripper lever in the proper position to reestablish binding so as to thus prevent retrograde or downward movement. Release of the operating arm allows the captive spring to push the lift lever upward to obtain a new increment for further upward movement.

The track sections are interconnected through the back up channel member by means of a smaller channel fitted in the adjacent ends thereof. No projecting
attachesments are needed along the plate that forms the track.

Special detachable triangular frames may be mounted on the carriage in order to provide a material support platform at a height above and to the rear of the platform for the workmen.

Still other objects and advantages of the present invention will become readily apparent to those skilled in this art from the foregoing detailed description, wherein I have shown and described only the preferred embodiment of the invention, simply by way of illustration of the best mode contemplated by me of carrying out my invention. As will be realized, the invention is capable of other and different embodiments, and its several details are capable of modification in various obvious respects, all without departing from the invention. Accordingly, the drawings and description are to be regarded as illustrative in nature, and not as restrictive.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view showing an elevator assembly constructed in accordance with the principles of the present invention and attached to a standard scaffold section;

FIG. 2 is a top view showing the use of twin elevator assemblies mounted on adjacent standard scaffold section uprights and showing suitable arrangement of boards in dashed line outline forming the platforms;

FIG. 3 is an enlarged side view of the carriage means for the elevator assembly showing the carriage in the normal locked position;

FIG. 4 is a side view like FIG. 3, but taken in cross-section along line 4-4 of FIG. 5 to show internal parts, and with the parts in a raising or lifting mode for elevating the platform;

FIG. 5 is a top view of the carriage showing parts in cross-section and the manner in which the same is supported on the track;

FIG. 6 is a detailed side view of a portion of the track showing the interconnection of two adjacent track sections;

FIG. 7 is a detailed cross sectional view through the track showing the attachment of the support hook for the assembly, and

FIG. 8 is a cross-sectional view through the track showing the attachment of the curved spacer plate that completes the structure needed for mounting the track on the standard scaffold section.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference of FIGS. 1 and 2 of the drawings, it will be noted that an elevator assembly 10 constructed in accordance with principles of the present invention has been shown as attached to scaffolding of a standard construction. Only so much of the scaffolding that is necessary to be shown for a complete understanding of the present invention has been illustrated and includes a vertically extending leg 11, an upper horizontal reinforcing member 12, and lower horizontal reinforcing member 13. A second vertical leg (not shown) at the far end of the reinforcing members 12, 13, completes the formation of an upright of the scaffold section. Two of these uprights, designated U1, U2 shown in FIG. 2, and one or more X-frame stabilizers 14 complete the standard scaffold section with which the elevator assembly of the present invention is advantageously adapted to be used with. As shown by dashed line outline in both FIG. 1 and FIG. 2, suitable boards can be provided on the elevator assembly to form a work platform P1, and a material support platform P2 in a raised position and behind the work platform P1. On the platform P1, the boards can be overlapped for support, as depicted in FIG. 2, however, because of the presence of the supporting scaffolding uprights U1, U2, the platform P1 is contemplated as being in unitary sections (as shown) between said uprights. The platform P2 is also positioned so as not to interfere with the X-member stabilizer for the uprights U1, U2, as shown in FIG. 2.

The elevator assembly includes a track section, generally designated by the reference numeral T1, which is mounted on the uprights U1, U2 by an elongated hook 21 engaging the horizontal reinforcing member 12. Adjacent the lower member 13 a spacer member 22 mates with the vertical leg 11 to stabilize the track section. Above the track section T1 is coupled a second section T2, shown in dashed lines in FIG. 1. Additional sections can be added in readiness for movement of the platforms P1, P2 up as the work progresses. Of course, additional sections have been incorporated below and after use can be moved to an upper position for further use.

Positioned on the track section T1 is a carriage 25, that is more completely illustrated in FIGS. 3-5 and which will be discussed shortly. Extending beneath the carriage 25 is a support cross-bar 26 (see FIGS. 1 and 3) to which is attached cantilever arm 27. Supported by said cantilever arm 27 is a support arm 28 on which the planks forming the platform P1 are positioned (see FIG. 1). A retaining lip 29 is carried by the free end of the arm 28 in close proximity to wall W that is being worked on from the platform P1. This wall W can of course be a brick wall that is being built or any vertical object that is having to be worked on from the bottom up.

Extending upwardly from the ends of the cross-bar 26 are side support stub shafts 30 on which are mounted telescoping tube members 31 (note FIGS. 1 and 3). The tube 31 is one side of a triangular frame 32 that is detachably mounted by the stub shaft 30. As can be seen in FIG. 2, an identical frame F1 is mounted on the opposite side of the carriage 25. When necessary or desirable, two opposed frame members F1, F2 between adjacent scaffold uprights U1, U2 are installed to support the unitary platform P2. By making the frames F, F1 removable, the carriage 25 with the arm 28 attached is made easier to handle and can be utilized separately on a job where continuous supply of materials is not required. For example, on an operation involving cleaning of a building with sand blast material fed continuously through a hose, the frames F, F1 and the materials platform P2 would not be required.

The carriage 25 can climb the track 22 and thereby position the workmen at any location desired. As shown in FIG. 1, an operating lever 35 with a foot pad 36 is provided on each assembly 10 for easy engagement by the workers when raising to the next level. For best operation, workmen positioned at the two adjacent operating levers 35 are employed to pump the levers 35 and thereby raise a section of the platforms P1, P2 at a time. As shown in FIG. 3, a hinge 37 is provided to support the outer section of the lever 35 so that it may be pivoted up out of the way when not in use. A pin 38 and shoulder 39 cooperate to hold the sections
of the lever 35 in a straight line during the lifting operation.

The rear section of the lever 35 is mounted on the carriage 25 by a pivot pin 40 that extends across the full width, as can be seen in FIG. 5. The rear end of the lever 35 is formed as a yolk 41 and also extends across substantially the full width of the carriage 25 for stability. A drive link 42 attached through pivot pin 43 serves to connect the lever 35 and this in turn is effective to transfer the motive force to the carriage 25 in a manner which will be described below.

Of importance to consider before covering the actuating mechanism for the carriage 25 is the structure of the track section T1. The track sections are manufactured to correspond to the standard height of each scaffold section. As perhaps best shown in FIGS. 5 and 6 of the drawings, the track section T1 is formed by an elongated flat plate 45 that has welded thereto an elongated channel member 46. As can be seen in FIG. 5, the lateral edges of the flat plate 45 are embraced by the carriage 25 so that the carriage is supported in a cantilever fashion (see FIG. 3). It will be noted that the flat plate 45 is smooth along its full length (see FIGS. 1, 3 and 5) and thus does not provide any obstructions that would be likely to collect debris or that could provide a hazard to the workers on the platform P1. As the carriage 25 moves up the track plate 45, it can be seen that the same will be self-cleaning and any mud or foreign matter that might have stuck to the track T will be removed by a scraping action of the engaging parts. There are no holes or other crevices on the track that could collect dirt and possibly render the carriage 25 inoperative.

The lateral edges of the track T1 are embraced by upper and lower guide fingers 50, 51 on the carriage body as shown in FIG. 3. The guide fingers 50, 51 extend around to the back of the flat plate 45 and serve to aid in the guiding of the carriage 25 along the track. Particularly at a joint between track sections, the guide fingers 50, 51 are functional to assist in the transition over any slight gap that might occur.

A means is provided in the carriage 25 to grip the track T1 for support. This gripper means is represented by a first lever 55 pivotally and slidably positioned in a channel 56. At the other end of the lever 55 is provided an opening (see FIG. 4, not numbered) in engagement with the track T1. When the lever 55 is angled (at an oblique angle) upwardly (see FIG. 3) positive frictional engagement binds the lever 55 to the track. Adjacent the opening end, the gripper lever 55 is guided in a slot 58 to maintain positive engagement with the track by means of a follower 59. The lever 55 thus has a floating type up and down action primarily under the influence of the spring 60 mounted on a guide support 61 in the lower part of the carriage 25.

The manner in which the lever 55 engages the track T1 is best shown in FIG. 4. In this view, it can be seen that the opening through the end of the lever binds frictionally at points f1, f2. As the weight on the platforms P1, P2 increases, the holding force at the points f1, f2 further increases to assure maximum effectiveness and thus render the carriage 25 fail-safe.

In FIG. 5, the second lever, or lift lever 65 can be seen and in which an opening 66 is provided. The opening encompasses the track plate 45 since shoulders 68, 69 extend around the lateral edges (cf. lever 55, just discussed). The shoulders 68, 69 frictionally grip or bind on the track T1 when the second lever 65 is pivoted about upper guide follower 70 in the slot 58.

An urging means in the form of spring 71 is mounted between the gripper lever 55 and the upper lift lever 65. This assures that the operative right hand end (viewed in FIG. 4) of the lift lever 65 is substantially perpendicular or normal to the track T1 when the operating arm is not being actuated, and the opening 66 is thus not binding on the track in this instance thereby allowing upward sliding movement. As the operating lever 35 is moved downward however, the link 42 engaging the free end of the lever 65 is effective to first pivot the same so that the opening 66 is brought into the binding condition. The force is immediately concentrated at points f1, f2 and upon further downward movement the carriage 25 is raised by transmittal of the force to the support pivot pin 40 for said lever 35 and thence to the carriage housing. As the carriage 25 moves upward, the binding force of the lever 55 is temporarily released as necessary. For one thing, the compression force in the spring 71 is being increased to urge the lever 55 downwardly out of full binding engagement, and secondly, the upper lifting force is acting in the direction opposite to concentration lifting force is acting in the direction opposite to concentration of the forces at points f1, f2 whereby the opening can slide upward along the track.

When the maximum downward position of the lever 35 is reached, the foot pressure is released and the spring 71 immediately tends to rotate the lift lever 65 clockwise about the pivot pin 70 to release the binding friction and urge the lever 65 upwardly to the home position. As this is happening, the presence of the spring 60 has assured that the lever 55 is immediately ready to reassume its locking position and grips the track 45 to prevent retromovement of the carriage 25. When the position of FIG. 3 is reached, the operating lever 35 is now ready for another downward stroke, and thus the carriage 25 may move and lower increment up to a new position as may be required.

The interconnection between adjacent sections of the track T1, T2 comprises a small channel member 70 fitted within the adjacent channel 46, as best shown in FIGS. 5 and 6. The channel may be welded into position in one end and free to slide in telescoping relationship into the abutting end. Since the length of the track sections are the same as the scaffold sections, the flat plate 45 forming the track is continuous. The interface between the track sections need not be vertically aligned with the joint of the scaffold sections.

In FIG. 7, there is illustrated one method of mounting the hook 21 that fits over the top of the reinforcing member 12. The hook 21 is carried on a cross plate 75 and is held by a pair of bolt and nut assemblies 76 (see FIG. 1 also). Behind the cross plate 75 and mounted in suitable slots in the channel 46 is an L-shaped holder 77 with a cotter pin or the retaining means 78 at the opposite end. The holder 77 is seated against the bottom of the apertures and thus assures a positive holding of the track T. The provision of additional apertures 79 along the length of the track T allows for adjustment if required. Upon removing the bolt and nut assemblies 76, and dropping the hook from engagement with the connecting channel 70, the cotter pin 78 is removed and the holder 77 is withdrawn and may be relocated to establish the support for next section T2.
In a similar manner, spacing member 22 can be conveniently mounted adjacent the bottom of track sections T1, T2 for the additional lateral support needed. The mounting plate 80 and backup 81 may be positioned on the channel 46 as shown.

In view of the foregoing it can be seen that results and advantages not previously obtained with an elevator mechanism for scaffolding have been obtained. The assembly is mountable on standard scaffolding and can be used with track that is repositional. The track is smooth and without obstruction so as to provide a reliable climbing surface and so as not to provide a hazard to workmen. A fail-safe gripper lever 55 holds the carriage 25 in position and a second lever 65 may be operated in a cooperative manner in order to lift the assembly when required. Additional features including the guide fingers 50, 51 on the carriage 25, the interconnection between the sections of the track T1, T2 and the attachment of the hook 21 and the spacing member 2 are illustrated and described and should be carefully considered.

In this disclosure, there is shown and described only the preferred embodiment of the invention, but, as forementioned, it is to be understood that the invention is capable of use in various other combinations and environments and is capable of changes or modifications within the scope of the inventive concept as expressed herein.

What is claimed is:

1. An elevator assembly for attachment to vertically extendible scaffolding sections having support legs and horizontal reinforcing members comprising elongated track sections positionable adjacent corresponding legs on the work side of said scaffolding, means for detachably supporting said track sections on said scaffolding, means for interconnecting adjacent track sections to continuously vertically extend with the scaffolding as he work continues upward, said track sections being substantially smooth to provide an obstruction free rack, a carriage for support on each track, at least one horizontally extending arm on each carriage, a platform supported between adjacent arms to provide the elevated working space, frictional gripper means in each carriage for gripping said smooth track, cooperating frictional lift means in each carriage for raising the same and consequently elevating said platform when required, said gripper means comprising a first lever movably mounted in said carriage, an opening in said lever for loosely receiving a vertically extending operative portion of said track when extending normal thereto and first means for urging said lever into an oblique relationship with respect to said track to frictionally bind said operative rack portion to thereby hold said carriage against downward movement.

4. The elevator assembly of claim 1 wherein said track means comprises an elongated flat plate and an U-shaped back-up channel on the side of said plate opposite said carriage for reinforcing said plate and providing a mounting base therefor, and said interconnecting means comprises a smaller channel fitted in the adjacent ends of the channels to thereby form a continuous track.

5. An elevator assembly for attachment to vertically extendible scaffolding sections having support legs and horizontal reinforcing members comprising elongated track sections positionable adjacent corresponding legs on the work side of said scaffolding, means for detachably supporting said track sections on said scaffolding, means for interconnecting adjacent track sections to continuously vertically extend with the scaffolding as the word continues upward, said track sections being substantially smooth to provide an obstruction free track, a carriage for support on each track, at least one horizontally extending arm on each carriage, a platform supported between adjacent arms to provide the elevated working space, frictional gripper means in each carriage for gripping said smooth track, cooperating frictional lift means in each carriage for raising the same and consequently elevating said platform when required, said gripper means comprising a first lever movably mounted in said carriage, an opening in said lever for loosely receiving a vertically extending operative portion of said track when extending normal thereto, second means for urging said lever to a position said second lever in the normal position, and operating means for moving said second lever from a position normal to said track into an oblique relationship thereto to cause frictional binding and thereafter raising of said carriage for upward movement of said platform.

6. The elevator assembly of claim 5 wherein said track means comprises an elongated flat plate and an J-shaped back-up channel on the side of said plate opposite said carriage for reinforcing said plate and providing a mounting base therefor.

7. The elevator assembly of claim 5 wherein said first and second levers are mounted for floating action, said urging means including a first spring tending to move said first lever into the binding position to thereby maintain said carriage at all times at the selected height, and a second spring urging said second lever into the normal position to assure new stroke length with each actuation of said second lever by said operating means.

8. The elevator assembly of claim 7 wherein said second spring is mounted in a captive position between said first and second levers to encourage release of the first lever when the second lever is gripping.

9. The elevator assembly of claim 8 wherein said operating means includes a pivotal arm extending over said platform, linkage means interconnecting said arm and said second lever.