

A COMPACT FOLDING SCAFFOLDING APPARATUS

HAVING

AN IMPROVED METHOD OF HEIGHT ADJUSTMENTS

Field of the Invention

The present invention relates to a scaffolding apparatus which provides a platform of a relatively low height for indoor activities and construction projects.

Background Art

Conventional folding type of scaffoldings are disclosed in, for example, JPA 1974-42382 (referred to as the former below) or JPA 1989-80664 (the latter) which discloses a scaffolding used in indoor construction projects.

The former folding scaffolding is composed of a folding type platform, a freely transportable support frame, a lower connecting rod which is freely movable vertically and which provides a support to the connecting portion of the platform planks and two pairs of connecting arms which support the frame together with the lower connecting rod. For storage, the two pairs of arms and the lower connecting rod are removed and stored in the space between the planks and the frame.

On the other hand, the latter interior scaffolding is composed of a pair of platform planks which is folded upwardly in half and is stored in the space between the support frames.

The former scaffolding presented difficulties in folding and storage, because the two pairs of arms and the lower connecting rod are stored in the space between the planks and the frame. Therefore, this type of scaffolding required a large storage space.

Further, in the former scaffolding, the lower connecting rod supports the hinged portion of the platform planks at one point, and the load is designed to be distributed through the two pairs of arms to the frame. Therefore, when the load is concentrated at the hinged portion, there is a danger of deformation of the hinged portion itself, and of those contact regions on the frame and the arms.

Further, the height adjustment of the former scaffolding required at least two workers per scaffolding, and consequently, when a large number of scaffolding is involved, preparing the scaffolding for work was a labor-intensive process.

On the other hand, folding operation of the latter scaffolding required lifting of the platform planks together with the frames. Therefore, storage of scaffolding involved heavy lifting, and additionally there was a danger of the top-heavy scaffolding tipping, thus creating a seriously hazardous situation for such essential activity as storage.

Further, the height adjustment of the latter scaffolding required lowering of the vertically raised planks first to the horizontal position, before the leg height adjustments can be performed. Therefore, as in

the case of the former scaffolding, this scaffolding too required more than two workers per scaffolding for height adjustment, and the attendant problem of high manpower requirement.

Summary of the Invention

In view of the problems associated with the conventional scaffolding as described above, the present invention presents a compact, easily foldable scaffolding apparatus. Another objective is to present a scaffolding apparatus whose height can be adjusted easily by one person. Still another object of the invention is to present a scaffolding apparatus which supports the load evenly so as to avoid stress concentration regions and the resulting deformation of the apparatus.

The compact scaffolding apparatus of the present invention comprises the following components:

a horizontal platform constructed of a pair of left and right planks which are joined pivotably at the folding section having a folding axis around which the planks are folded so as to create a storage space therebetween;

four extendable main legs equipped with lockable casters and supporting the four corners of the horizontal platform,

a pair of extendable raisable legs supporting the folding section of the horizontal platform, and

a pair of slidable brackets which slides on the raisable legs and provides support to the horizontal platform through freely pivoting links, and

two pairs of connecting brackets which pivotably connects the raisable legs with the main legs through a connecting component which is disposed in and attached firmly to the outer portion of the main leg.

In the scaffolding apparatus as constructed above, preparation for storage or transport is carried out by closing the main legs together, which brings the left and the right planks of the platform to fold and rise upward which causes the raisable legs to move upward also, through the linking action of the connecting bracket. When the platform planks are folded completely vertically, the slide legs become stored in the space between the two planks, and the left and the right main legs fit together tightly below the raisable legs to provide self-standing scaffolding apparatus.

When the scaffolding is opened for use by pulling the main legs apart, the horizontal platform is supported at its four corners by the four extendable main legs, and the center folding section is supported by the pair of raisable legs.

The folding scaffolding structure as described above enables a compact storage of a bulky apparatus to be achieved by arranging all the primary structural components within a narrow space. The three primary components are a pair of left and right planks foldable, as in prayer hands, so as to create a storage space

therebetween; the four main legs with casters; and a pair of raisable legs which supports the folding section disposed in the central section of the platform.

Therefore, the invented scaffold does not require a large storage space required for the conventional scaffolding apparatus, and it can be moved about by one person even in a narrow space.

Furthermore, by laying the invented scaffolding apparatus on its side, thereby permitting other scaffolds of the same type to be piled on top, they can be stored and transported safely, irrespective of the orientation of the folded platform.

Further, because the folding section of the platform is supported not only by the raisable legs but also by the movable brackets, the invented scaffolding apparatus was able to solve the problem of the insufficient strength at the hinged section of the conventional scaffolding.

Further, because the raisable legs are suspended on the upper region of the scaffolding, the process of height adjustment can be carried out freely without any imposed stresses, and having adjusted its length to the requirement, the lengths of the main legs can then be adjusted one side at a time, so as to avoid unnecessary heavy lifting or having to lay the scaffold on its side for length adjustments as in the conventional scaffolding apparatus. The height adjustments of the invented scaffolding apparatus can be carried out by one person, thereby allowing a lesser number of workers to handle a

large number of scaffoldings and thereby reducing the manpower requirement.

By providing a mechanism for fastening the platforms sideways, plurality of platforms can be joined so as to increase the needed working area. Therefore, the invented scaffolding can serve not only as an indoor working platform at construction project sites, but it can be used in a variety of other applications such as ceremonial platform in office and factory assemblies, as simple working spaces in emergency situations and as a quick stage for local plays and productions.

Accordingly, the present invention presents a scaffolding apparatus which can be folded compactly, and which can be operated freely by one person in small spaces. The invented scaffolding apparatus can be transported readily and put to use safely in a large variety of applications.

Brief Description of the Drawings

Figure 1 is a front view of the scaffolding apparatus.

Figure 2 illustrates a partially closed scaffolding apparatus.

Figure 3 is a front view of the folded scaffolding apparatus for storage.

Figure 4 is a plan view of the platform of the scaffolding apparatus.

Figure 5 is a side view of the scaffolding apparatus.

Figure 6 is an enlarged view of the principal portions of the main legs.

Figure 7 is a cross sectional view of the connecting component of the scaffolding apparatus.

Figure 8 illustrates the steps (I) to (IV) of the process of adjusting the height of the scaffolding apparatus.

Preferred Embodiments of the Invention

The preferred embodiment of the invention will be explained in detail with reference to Figures 1 to 8.

The numeral 1 in Figure 4 refers to a platform plank used primarily for use in interior work and in assembling steel reinforcing network at construction sites. The plank 1 is a strong and light weight base made of an expanded metal 12 reinforced with a frame 10 and support pipes 11. There is no particular requirements on its size or materials of construction provided that the properties are sufficient for the application. The numeral 13 refers to a pair of suspension hooks for lifting the plank 1 together with the scaffolding apparatus.

The platform consists of a pair of left and right planks (hereinafter referred to as the plank 1) which are joined at the central section via a folding section so as to be freely foldable. As illustrated in Figure 1, when the platform is fully opened horizontally for use, it is supported at its left and right four corners with four main legs 2, each of which is provided with a caster 6. The length of the main legs 2 is freely adjustable so as

to be able to adjust the height of the plank 1 to suit the requirement. The preferred embodiment of the main legs 2 is based on a construction of a connecting component 20 to which one end of a square-shaped outer leg pipe 21 is attached so that the leg can swing. On the inside of the outer square pipe is a square shaped inner pipe 22, equipped with a caster 6, which can slide on the inside of the outer pipe, and can be fixed at any desired height by means of a locking means 23. As can be seen from Figure 6, the connecting component 20 is pinned to the plank 1 on the outer side of the square pipe 2 so that when the platform is closed and the planks are made vertical, the legs 2 can be folded together between the left side and right side planks, as shown in Figure 3.

The planks are folded for storage in such a way that the central section of the platform is raised vertically upwards to the top and the two planks fold together as if holding a pair of raisable legs 3 in prayer hands.

The raisable legs 3, which provides support to the central section of the platform, are able to move vertically while permitting the sliding component 7 to slide thereupon. As can be seen from Figure 2, one end of the raisable legs 3 is pinned to the planks 1 through a folding component 30 so as to permit the planks 1 to pivot about the pinned connection. The raisable legs 3 are constructed of a square-shaped inner pipe 32 slidable in an outer sliding pipe 31, as in the previously explained outer support legs 2. The height of the planks

can be adjusted by moving the inner pipe and locking the inner and outer pipes at any desired height.

Both types of legs, the main legs 2 and the raisable legs 3, are made so that the plank height is freely adjustable, but the main legs 2 are designed so as to permit the contracted length of the main legs 2 to be shorter than the extended length of the raisable legs 3.

Each of the raisable legs 3 is provided with a movable bracket 8 to provide additional support to the planks 1 when the platform is fully opened. The movable bracket is pin connected to the sliding component 7 so as to enable the sliding component 7 to slide along the axis of the raisable leg 3, when the scaffolding is to be opened or closed. The sliding component 7 is provided with a locking component 7A so as to enable locking of the sliding component 7 to the legs 3 when the platform is in the operating position, as shown in Figure 1.

The connecting bracket 4 shown in Figure 1 connects the main legs 2 with the raisable legs 3 and permits the connected portions of the main and support legs to rotate freely. Particularly, the connecting point of the bracket 4 to the main legs 2 is disposed at the outer portion of the main legs 2. As shown in the lower portion of Figure 6, the bracket 4 is rotatably pinned to a connecting component 40, which is protruding towards the outer direction of the scaffolding frame and is fixed firmly to the main legs 2. When the planks 1 are folded, the main legs 2 come together so that the raisable legs 3 are raised by the connecting bracket 4, to finally assume

the position in the folded view shown in Figure 3. It is possible to transport the scaffolding in the closed condition, by installing the inner pipe 22 so that the casters 6 face the outer direction, and protrude further than the connecting component 40.

The numeral 5 refers to a fastening device 5 which is used to join the adjoining planks 1 when it is necessary to have a large scaffolding working area, by joining a plurality of platforms horizontally. For example, in Figure 4, a paired fastening device 5 is shown attached to the mid-section of the left and right members of the frame 10. The paired fastening device 5 consists of a hook component 50, shown in Figure 7, whose length is adjustable, and a rectangular receptor 51 which is fixed on one end of the neighboring plank 1. The length of the hook component 50 can be varied by loosening the nut on the bolt 52, which passes through an oblong slot 53 in the component 50 and joins the frame 10 with the hook component, and adjusting its length to a suitable dimension, after which the bolt 52 is again tightened to secure the joined platform.

The height adjustment methods will be explained with reference to the steps (I) through to (IV) shown in Figure 8.

Step (I)

In the stored condition, the scaffolding apparatus is self-standing with the aid of the main legs 2 in the contracted condition. The raisable legs 3 are also in the contracted condition, and are

disposed on the upper section of the scaffolding, in the folding space of the planks 1 folded as in prayer hands. First, the length of the raisable legs 3 is adjusted to a desired length by dropping the inner pipe in the direction of the arrow.

Step (II)

By spreading the main legs 2 sideways towards left/right as appropriate, the planks 1 and the folding section are gradually lowered until the raisable legs 3 touches the ground. In performing such an opening operation, if one pair of the casters on the main legs 2 is locked, the opening operation can be performed by moving only the movable pair to the right as indicated in Step (II).

Figure 8.

Step (III)

While supporting the slanted scaffold with one pair of the main legs 2 and the extended raisable legs 3 so as to raise the other pair of main legs 2 in the air, the length of the raised pair is adjusted to the required length, as indicated by the arrow in Figure 8 Step (III). In this case, it is important to open the platform fully so as to provide a sufficient room for the length adjustment.

Step (IV)

While supporting the scaffold on the raisable legs 3 and the extended main legs 2, the length of the remaining pair of the main legs 3 is adjusted by dropping the main leg 2 in the direction of the

arrow shown. This last operation of height adjustment is almost automatic, when the preceding two steps are properly carried out so as to position the platform in a level position.



What is claimed is:

1. A compact portable scaffolding apparatus which can be operated by a person, and requiring small space for storage, said scaffolding apparatus comprising:

a horizontal platform comprising a pair of left and right planks pivotably joined at a central folding section having a folding axis around which the planks can be folded, thereby creating a storage space therebetween,

four extendable main legs equipped with lockable casters and supporting the four corners of the horizontal platform,

a pair of extendable raisable legs supporting said folding section of the horizontal platform, and

a pair of slidable brackets which slides on said raisable legs and provides support to the horizontal platform through freely pivoting links, and

two pairs of connecting brackets each pair of which pivotably joins each of the raisable legs with the main legs through a connecting component which is disposed in and attached firmly to the outer portion of the main leg:

wherein said scaffolding apparatus is operated for storage by closing the main legs together thereby folding the platform planks and raising the raisable legs to the region above the main legs, and storing said raisable legs in said storage space between the folded platform planks.



2. The portable scaffolding apparatus as claimed in claim 1, wherein each of said raisable legs are provided with a sliding component having a movable bracket so as to support the horizontal platform through the folding section and its associated component members.

3. The portable scaffolding apparatus as claimed in one of claims 1 and 2, wherein the contracted length of said main legs is shorter than the extended length of said raisable legs.

4. The portable scaffolding apparatus as claimed in one of claims 1, 2 and 3, wherein said planks are provided with a fastening means for joining and fastening the neighboring platforms to provide expanded working areas.

5. A process of operating a scaffolding apparatus as claimed in one of claims 1, 2 3, and 4, wherein the main legs and the raisable legs are all in the contracted condition and the raisable legs are stored in the storage space between the folded planks, said operation comprises the unfolding steps of:

(a) adjusting the length of the raisable legs to a suitable length;

(b) spreading the main legs sideways towards left and right, thereby opening the folded planks and lowering the raisable legs to touch the ground;

(c) supporting the fully opened apparatus with the extended raisable legs and one pair of the main legs



in the contracted condition so as to raise the remaining pair in the air and slant the apparatus,
(d) adjusting the length of the raised main leg to the required length,
(f) uprighting the scaffolding apparatus, and
(e) adjusting the length of the remaining pair of the main legs while supporting the scaffold on the extended raisable legs and the extended main legs, so as to level and support the platform in a horizontal position by four extended main legs and a pair of extended raisable legs.

6. A process of operating said scaffolding apparatus as claimed in one of claim 1, 2, 3 and 4, said operation comprises the closure steps of:

(a) locking one pair of casters disposed on a left or right side of the open platform frame,
(b) pushing against a pair of main legs disposed opposite to the locked casters so as to raise the folding section of the platform upward, and
(c) continuing to push the main legs together until the main legs fit tightly together in the locking position.

7. The compact folding scaffolding apparatus having an improved method of height adjustment substantially as herein described with reference to and as shown in the accompanying drawings.
