

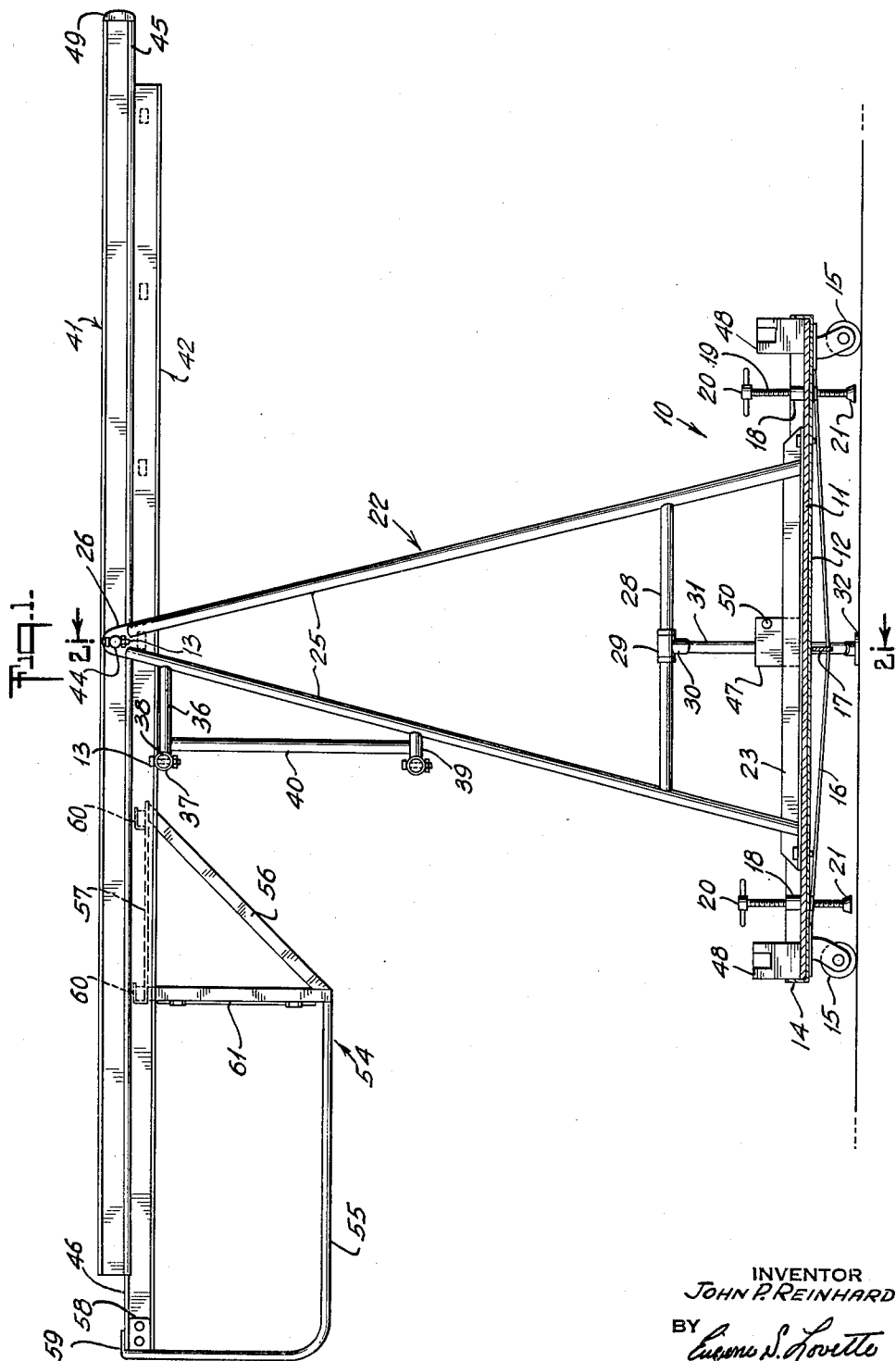
Nov. 7, 1961

J. P. REINHARDT
PERSONNEL WORK STRUCTURE CONVERTIBLE TO
EXTENSION LADDER AND SCAFFOLDING MEANS

3,007,540

Filed Oct. 16, 1959

3 Sheets-Sheet 1



INVENTOR
JOHN P. REINHARDT
BY
Eugene S. Lovette
ATTORNEY

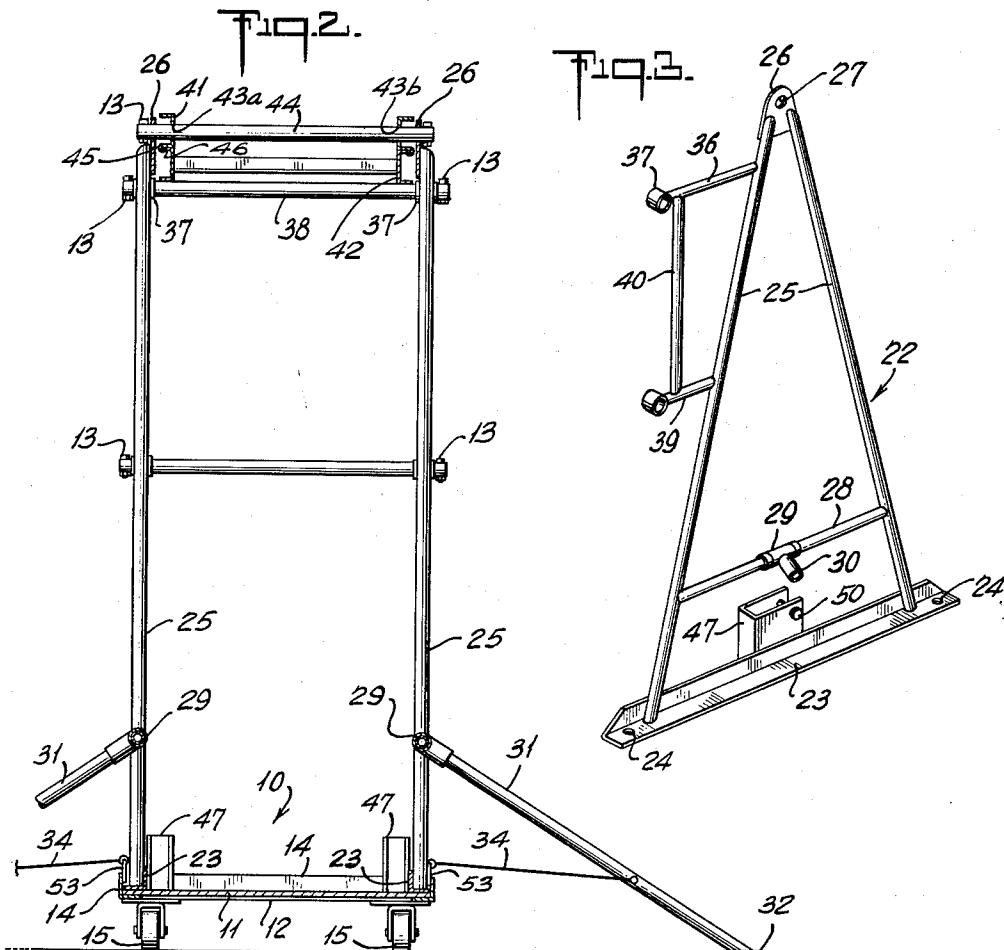
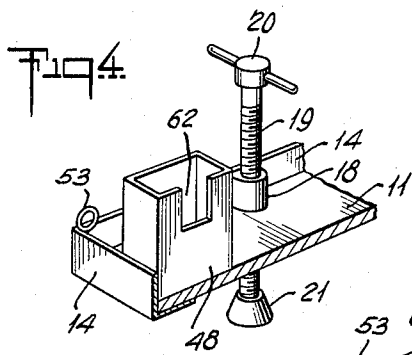
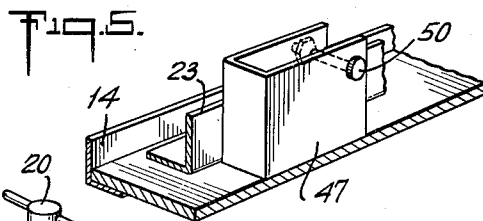
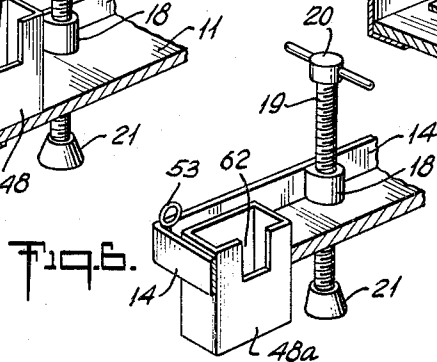
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INVENTOR
JOHN P. REINHARDT
BY *Eugene S. Kovtch*
ATTORNEY

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Fig. 7.

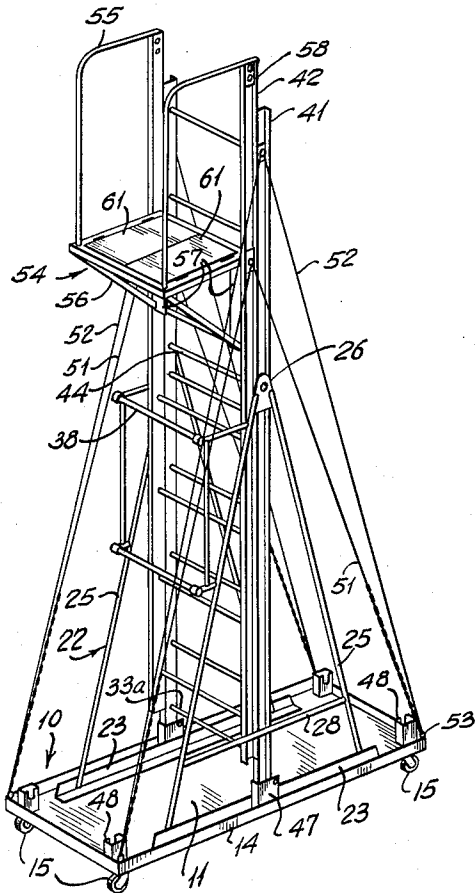


Fig. 8.

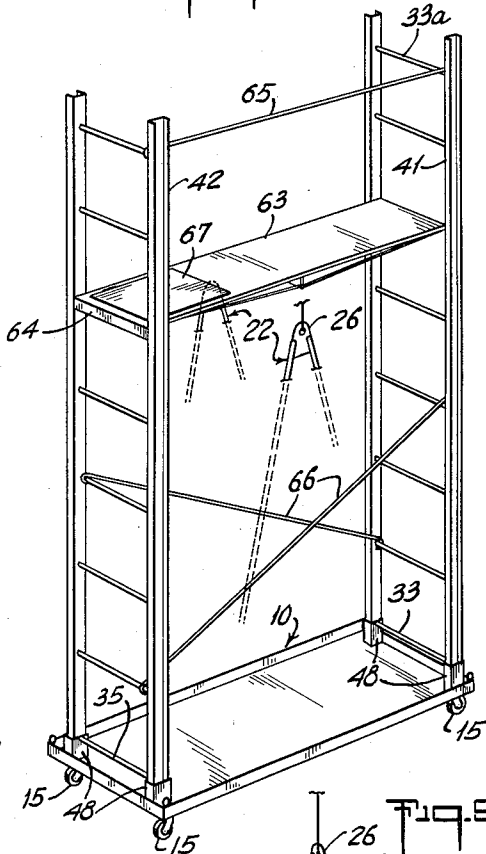


Fig. 10.

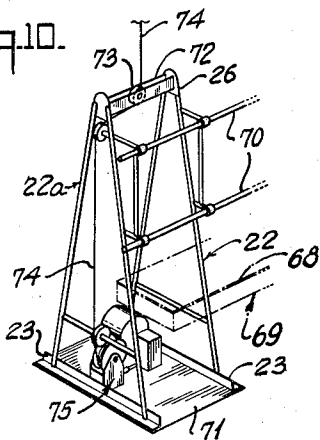
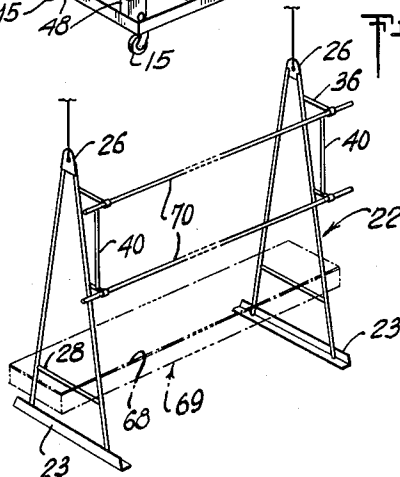


Fig. 9.



INVENTOR
JOHN P. REINHARDT
BY *Eugene S. Lovette*
ATTORNEY

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PERSONNEL WORK STRUCTURE CONVERTIBLE TO EXTENSION LADDER AND SCAFFOLDING MEANS

John P. Reinhardt, N.S. Jericho Turnpike, Box 354, Syosset, N.Y.

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The instant invention relates to work structure for supporting working personnel at selected heights, which structure may be readily transformed to perform the functions of an extension ladder, a variable height staging scaffold unit and a hanging scaffold in operative association with a dolly or truck means and which ladder may be detached therefrom and used as an ordinary extension ladder.

The features of the instant invention is to provide a relatively simple work structure which in one form of its assemblage is capable of supporting laddering means in a horizontal position when the work structure is stored during periods of not use or for passage through narrow passageways. Accordingly, the arrangement includes a truck or dolly which has alternate floor engagement means, the first of which includes casters for rolling the truck from position to position on the floor and the second includes retractable legs which when extended raises the casters from the floor so as to support the work structure in fixed position on the floor. The laddering means including a detachable work platform is supported between A frames detachably mounted to the truck and upon pivoting the laddering means in vertical position and latching same in such position, the extension ladder and the work platform at its upper end may be used by service personnel for performing their work at selected heights.

Upon removal of means employed for pivoting the laddering with respect to the supporting A frames, the laddering means may be separated into its individual ladder sections. The dolly includes ladder sockets and upon insertion of the individual ladder sections into the respective sockets, the ladder sections are held in upright spaced parallel relationship between which a scaffold bridge may be mounted for use by the working personnel. This embodiment establishes the staging scaffold. In another variation, the side frames may be detached from the dolly and suspended from above in spaced parallel relationship with the laddering means mounted on the suspended A frames which serve as stirrups for the laddering. A plywood deck laid over the laddering means permits walking by working personnel as a hanging scaffold. In addition, the structure and assembly permits one to use the ladder sections as ordinary extension ladders. The truck also serves the purpose of carting tools and other paraphernalia required by working personnel when being used as the base for the previously described assemblage.

It is the principal object of the instant invention to provide an elevated work platform supported by a movable base, which assemblage may be readily transformed into a staging scaffold or a hanging scaffold and which assemblage is relatively simple in structure in comparison to prior art devices so as to afford ease and economy in respect to fabrication, assembly, use by working personnel in diverse fields of activities.

It is a further object of the invention to provide a work structure for supporting working personnel, which includes laddering means pivotally supported between a pair of A frames detachably mounted to a truck wherein the laddering means may be pivoted to its horizontal position so that the assemblage may be stored during periods of non-use or move through narrow passageways, and wherein the laddering means may be pivoted to vertical upright position and latched in such position to serve as an extension ladder to which a detachable work platform

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is secured at its upper end, which platform is easily accessible to working personnel by climbing the extension ladder. To transform the assemblage into another form, the extension ladder is detached from the supporting frames and separated into its ladder sections whereby each section is supported upright in parallel spaced relationship by truck sockets for supporting a detachable scaffold bridge between selected rungs of the ladder sections to provide a variable height staging scaffold for working personnel.

In a further embodiment, the structure may be transformed into an overhang scaffold by detaching the A frames from the truck and employing same as stirrups individually hung from overhead in parallel spaced relationship and supporting the laddering means between the pair of stirrups with a deck cover over the laddering means for supporting the working personnel. The structure by means of an additional A frame may be transformed to a hanging scaffold incorporating a power winch mounted on the scaffold for lifting same.

Further objects and advantages will become apparent from the following description of the invention taken in conjunction with the figures, in which:

FIG. 1 illustrates a front elevation of the assemblage with the laddering means in horizontal position and with certain parts of the truck in section;

FIG. 2 is a side elevation taken along line 2-2 of FIG. 1;

FIG. 3 is a perspective view of one A frame;

FIG. 4 is a cutaway perspective view of the corner portion of the truck illustrating a ladder socket and floor engaging retractable leg thereat;

FIG. 5 is a cutaway perspective view of a portion of the truck showing the location of one of the center ladder sockets thereon for maintaining the laddering in upright position as shown in FIG. 7;

FIG. 6 is a modified version of a corner socket;

FIG. 7 is a perspective view of the assemblage wherein the laddering is in upright vertical position so that the work platform at its upper end is accessible for use by working personnel;

FIG. 8 is a perspective view of the assemblage wherein the ladder sections have been separated to define a support for a scaffold bridge mounted therebetween;

FIG. 9 is a fragmentary perspective view showing the assemblage wherein the A frames are detached and supported from above and used as stirrups for supporting the laddering means therebetween and thus defining a hanging scaffold; and

FIG. 10 is a fragmentary perspective view and should be considered in association with FIG. 9 and illustrates the addition of another A frame for supporting a power winch on the hanging scaffold of FIG. 9.

Reference is now made to the figures and in particular to FIGS. 1 through 6 which illustrate the combined truck, extension work platform, ladder and staging and hanging scaffold in assembled relationship in accordance with the invention. The assemblage is movable from place to place because it incorporates a rollable dolly or truck 10. Truck 10 is constituted by a flat rectangular shaped floor 11 made of suitable material, such as wood supported on a metal bottom plate 12. Four angle iron sections 14 are preferably permanently joined along the peripheral edges of the truck assembly. The assemblage may be rolled from one position to another on a floor by means of four swivel casters 15 mounted near the four corners of truck 10. Suitable brace re-enforcing structure is provided underneath truck 10, and includes spaced inclined braces 16. The outer ends of braces 16 are joined to plate 12 and the inner ends thereof are slanted downwardly and secured to a center web 17 depending from bottom plate 12.

Four spaced threaded collars 18, see FIGS. 1, 4 and 5, are joined to the upstanding inner sides of the longer pair of angle iron sections 14 near the four corners of truck 10. Four threaded bolts 19 are each provided with a handle 20, and each bolt engages an individual collar 18. The bottom of each bolt 19 carries a friction shoe 21. When bolts 19 are threadedly advanced downwardly through collars 18, the four shoes 21 will overlap casters 15 so as to rest on a floor whereby casters 15 will become ineffective. Thus, the rollable truck 10 and the assemblage carried thereby is transformed into an assemblage in fixed position on a floor.

Each long side of truck 10 is adapted to receive and support a detachable supporting structure such as A frame 22. The individual A frames 22 for the two sides of truck 10 are identical. FIGS. 1 and 2 illustrate the pair of A frames 22 in their respective upright positions mounted on truck 10. Each A frame 22 is made up of a section of angle iron 23 provided with spaced holes 24 seen best in FIG. 3. Holes 24 serve for the insertion of bolts therethrough to secure the A frames 22 to truck 10. Each frame 22 also includes a pair of inclined rods 25 joined at their lower ends to section 23. Rods 25 are joined together at their upper ends to a metal plate 26. Plate 26 is provided with a hole 27. A cross rod 28 is joined between the inclined rods 25 of each frame 22. A collar 29 turnable about its longitudinal axis is supported intermediate the ends of rod 28. Collar 29 carries a tubular and interior threaded socket 30. Socket 30 is adapted to receive the threaded end of an outrigger rod 31 which may be threadedly inserted into socket 30 or removed therefrom. Each outrigger end is provided with friction shoe 32 for resting on a floor. A tie rope or rod 34 is joined between the outriggers 31 and available parts or extensions of truck 10, whereby during use of the assemblage, shoes 32 hold firm to the floor and re-enforce the upright frames 22. When frames 22 are fastened along their respective opposite sides of truck 10, these supporting structures and respective inclined rods 25 thereof are held in opposed spaced relationship and substantially in vertical planes.

As seen from FIG. 2, frames 22 are joined to truck 10 with the upright sides of angle iron sections 23 spaced from the upright sides of angle iron sections 14. Through holes in the floor and plate 11, 12 of the truck are aligned with holes 24 to permit bolted attachment and removal of frames 22 with respect to truck 10. The arrangement is also such that frames 22 are symmetrically spaced from the opposite pair of shot side walls of truck 10. The attached outriggers 31 also can be swung within the area of truck 10 because collars 29 are turnable or rolling passage of the assemblage through a narrow passageway or storage.

Laddering is supported horizontally at the top of frames 22 when the assemblage is being stored during periods of non-use, or for rolling passage through a narrow passageway. Laddering support is provided by a pair of parallel spaced horizontal rods 36, 36 each rigidly joined at its inner end to an individual inclined frame rod 25. Rods 36 are suitably spaced from the top of frames 22 to maintain laddering substantially horizontal as illustrated in FIGS. 1 and 2, since the outer ends of rods 36 are joined by a re-enforcing cross rod 38 for supporting the laddering means as seen in FIG. 2. The outer ends of rods 36 terminate in hollow collars 37 for receiving and supporting cross rod 38 horizontally. Rod 38 may be locked in position by any convenient method, i.e. a nut-bolt arrangement 13, passing through the ends of rod 38 outside collars 37. This permits easy removal of rod 38 when frames 22 are detached from truck 10. A second pair of shorter rods 39 individually extend horizontally from the aforesaid inclined rods 25 and below longer rods 36. To re-enforce the laddering support structure, horizontal rods 36 are individually joined with lower rods 39 by individual upright rods 40. The ends of rods 39 also have hollow ring shape collars 37.

The laddering consists of two substantially standard extension ladders 41, 42 preferably of aluminum. Upper ladder 41, as viewed in FIG. 1, is provided with aligned openings 43a, b in its opposed sidepieces, seen best in FIG. 2. A pivot rod 44 passes through openings 43a, b and holes 27 of each plate 26 so that the laddering is pivotal about the axis of rod 44. By any suitable bolt-nut arrangement, such as bolt 13 passing through the ends of rod 44 on the outer sides of plates 26, ladders 41, 42 are held in pivotal relationship between frames 22. The laddering is designed so that when it is horizontal, as shown in FIGS. 1 and 2, its weight or center of gravity is spaced well to the left of the vertical center line of structures 22, which center line passes through pivot rod 44 as viewed in FIG. 1, whereby the laddering will rest upon cross rod 38 and remain in this portion until manually swung clockwise to an upright position as shown in FIG. 7. The sidepieces of ladders 41, 42 are U-shaped and the troughs thereof face outwardly away from each other. The long flat abutting faces of the laddering sidepieces are held in sliding relationship by reason of having one edge 45 of the upper ladder sidepiece turned around and under the edge 46 of the lower ladder sidepiece. This is seen in the sectional portion of FIG. 2. Ladder rungs are depicted as 33 and 35.

The assemblage is easily converted to an upright extension ladder in the following manner. A ladder support socket 47 is welded or otherwise joined to the upright inner sides of the individual angle sections 23 of frames 22. In addition to sockets 47, four support sockets 48 are individually joined to the truck assembly at the four corners thereof. Socket members 47, 48 are substantially upright and tubular with hollow interior rectangular cross-sections. Sockets 47, 48 are of suitable longitudinal depth to accommodate slidingly the ladder ends when inserted therein. Center sockets 47 do not have narrow side walls on the right hand sides of the assemblage as seen in FIGS. 3, 5 and 7. This permits the ends 49 of the upper ladder sidepieces to swing into register with the individual interiors of sockets 47 as the laddering is pivoted clockwise from horizontal position to vertical upright position. The lowermost rung 33a of ladder 41 is spaced sufficiently from ladder ends 49 to permit same to swing into the interior of sockets 47. In addition, ladder ends 49 are rounded to effect smooth sliding contact with truck floor 11 should such contact occur as ladder ends 49 enter the individual sockets 47.

The upright laddering, shown in FIG. 7, will pivot back to its horizontal position unless latched in upstanding position. Hence, socket members 47 have openings in its opposed walls for receiving a bolt 50 (FIG. 5) joined thereto to latch ladder ends 49 in the individual sockets after entering same. Ladder 42 may be raised or lowered with respect to ladder 41 in any conventional manner. Further bracing for the expanded laddering is provided by a pair of guy cables 51, 52 fastened to the individual laddering sidepieces and tied to hooks 53 secured to the four corners of angle sections 14. Cables 51 include chain sections, hence are adjustable for desired length. Guy cables 54 joined to outriggers 31 also may be tied to hooks 53. The upper end of ladder 42 carries a detachable work platform 54. When platform 54 is attached to the laddering, its center of gravity is shifted to the left to maintain the laddering horizontal when in its FIG. 1 position. Work platform 54 includes handrails 55 and inclined braces 56 which are joined to vertical members 57 depending from the rear of platform 54 as seen in FIG. 7. The inner upper ends of rails 55 have plates 58 for register into the troughs of the individual ladder sidepieces upon mounting platform 54 to ladder 42. Plates 58 may be bolted to the ladder. The platform structure also includes hooks 59, 60, whereby hooks 59 are adapted to hook over the upper ends of the ladder whereas hooks 60 are adapted to hook over ladder rungs 35. During use of platform, its vertical members 57 are

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in press contact against ladder rungs 35. Platform 54 is constituted by doors 61 to permit an easy mounting to same. As seen in FIG. 7, upon climbing to platform 54, the person is within the area of truck 10 to avoid overbalance of the apparatus. Work platform 54 does not interfere with the raising or lowering of ladder 42.

The foregoing assemblage offers at least three versions of scaffolding. To arrive at the scaffold depicted in FIG. 8, the laddering is detached from the pair of frames 22 by withdrawal of pivot rod 44. Platform 54 may be removed from ladder section 42. The individual ladders 41, 42 are separated from each other and one section is inserted upright in one pair of end sockets 48 and the other ladder section is inserted upright in the other pair of end sockets 48 as shown in FIG. 8. The confronting inner walls of end sockets 48 are provided with slots 62 as seen in FIGS. 5 and 6, which slots are adapted to receive ladder rungs 33, 35 upon insertion of the ladder ends in the sockets. A scaffold bridge 63 of suitable rectangular shape and material is provided with downwardly turned opposite ends 64. Bridge 63 is mounted with its ends 64 hooked over selected ladder rungs 33, 35 as shown in FIG. 8. Bridge 63 is provided with a handrail 65 hooked between higher ladder rungs and with braces 66 hooked diagonally between ladder rungs below bridge 63. A trap door 67 on bridge 63 provides easy access to same within the area of truck 10 and thus avoids overbalance of the assembly. The scaffold depicted in FIG. 8 will stand firmly on a floor by lowering bolts 19 to raise casters 15 off the floor. By tying tackle to holes 27 of frame plates 26, the unit may be used as a hanging scaffold.

FIGS. 9 and 10 also illustrate hanging scaffolding. Frames 22 are detached from truck 10 and then are used as stirrups as seen in FIG. 9. The ladder sections with a plywood deck 68 secured to the ladder rungs form a scaffold bridge 69 resting on frame crossbars 28. The scaffold may be lifted by an externally located power winch, block and tackle, or other conventional means. In this embodiment, long guard rails 70 are passed through collars 37 and fastened thereat. For lifting the scaffold of FIG. 9 by a power winch mounted on the scaffold, an additional A frame 22a is added to one end of the scaffolding as shown in FIG. 10. Added A frame 22a is joined to adjacent frame 22 by a platform 71 and a joining member 72. Platform 71 is connected to angle sections 23 of frames 22, 22a and member 72 is connected to plates 26 thereof. Member 72 includes a wheel 73 for tackle 74 operated by a winch 75 supported on platform 71.

The metal parts of truck 10, work platform 54 and scaffold bridge 63 are preferably made of welded steel construction for greater strength and stability. The ladder sections 41, 42 are preferably made of aluminum and can be removed from the assembly and used as an ordinary extension ladder. Moreover, truck 10 may be used as a dolly upon detaching the laddering therefrom.

With respect to the staging scaffold shown in FIG. 8, when the ladders are inserted in the individual pairs of sockets 48, it will be understood that the bottom ends of the ladders need not necessarily rest on the truck floor, but may be lifted off from the floor by reason of the fact that the lower ladder rungs are supported by slots 62. FIG. 6 shows a modification for sockets 48. In this instance, although sockets 48a are joined to the truck for example by being welded to the upstanding inner sides of angle sections 14, sockets 48a extend through the truck floor and the bottom ends of sockets 48a are closed.

It is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. Adjustable work platform apparatus comprising, a four sided dolly having a dolly floor, first and second means for maintaining said dolly relatively horizontal with respect to a building floor or the like, said first and

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second means being alternatively operative for engaging the building floor, said first means including wheels for allowing said dolly to roll over said building floor in any desired direction, said second means including individual screw members carried by said dolly, selectively advancing said screw members to engage said floor causes said dolly wheels to raise therefrom, whereby said dolly is maintained in a fixed selected position on the building floor, a pair of A frames, each A frame having a pair of inclined rods forming an apex at the upper ends thereof, said frame rods having lower ends spaced relatively far apart, each A frame having a plate member joined to the upper rod ends thereof, each A frame having an angle member joined to the lower rod ends thereof, each A frame having a cross-member joined to the rods thereof intermediate the upper and lower rod ends, means for temporarily securing each angle member along individual ones of opposite first and second dolly sides for standing said A frames vertically upright in parallel spaced apart and confronting relationship along the individual first and second dolly sides, a pair of upright sockets wherein each socket is supported alongside an individual angle member and adjacent said dolly floor, said sockets being selectively located between the lower rod ends of the individual A frames, each socket having three upright side walls and an open fourth side, first and second ladder sections having engageable side pieces for forming extension laddering means, said laddering means being between said upright A frames, said plate members and the side pieces of a first ladder section having aligned openings, a pivot rod extending through said aligned openings for pivoting said laddering means between relatively horizontal and vertical positions, said adjustable work platform apparatus being equipped for storage when said laddering means is in its horizontal position, said apparatus is equipped for supporting a person at selected heights when said laddering means is in its vertical position, the open sides of said sockets facing the same direction to allow entry of individual ones of the lower ends of said first ladder section into the individual sockets upon pivoting said laddering means to its vertical position, said ladder section ends nesting in said sockets when said laddering means is vertically upright, means for latching the nested ladder section ends in said sockets, a work platform attached to the upper end of said second ladder section for supporting a person thereon at a desired height above said dolly upon selectively extending said laddering means, outrigger means detachably secured to individual ones of said cross-members and having ends for resting on the building floor for bracing said adjustable work platform apparatus, a pair of guide cables connected from the upper ends of each of said laddering means side pieces to individual ones of said dolly sides for bracing said apparatus, a pair of outstanding arms on one side of the pivot axis defined by said pivot rod, each arm being carried by an individual one of said A frame rods, aligned sockets at the outer portions of said arms, and a support bar temporarily carried by said arm sockets, both of said arms extending in like direction from said A frames, said support bar extending across said laddering means and off set with respect to said pivot axis to support said laddering means when it is pivoted to its horizontal position at which time said bar is spatially between said pivot axis and the work platform carried by said second ladder section, whereby the horizontally positioned laddering means rests on said bar.

2. Apparatus as defined in claim 1 for forming a lengthwise scaffold wherein, said dolly sides define four dolly corners, each of said ladder nesting sockets along said first and second dolly sides being intermediate individual pairs of such corners, four additional upright ladder nesting sockets carried by said dolly floor, the two corner sockets along the first dolly side forming individual pairs with the two individual corner sockets along

said second dolly side wherein each of such pairs of corner sockets are equipped to receive the lower ends of individual ones of said ladder sections, the individual ladder sections being equipped for separation upon detaching of said laddering means from said A frames by removal of said pivot rod, the lower ends of each separated ladder section being nested in said individual pairs of said corner sockets, whereby said ladder sections are held vertically upright in parallel spaced and confronting relationship, each of said corner sockets being defined by four upright walls, confronting walls of the corner sockets defining said pairs having recesses for straddling and clearing a ladder rung upon standing the ladder section ends in such pair of corner sockets, lengthwise bridge means having opposed ends attached to selected rungs of the individual ones of said upright ladder sections for supporting a person on said bridge means, a rail member having opposed ends hooked over selected rungs of individual ones of said upright ladder sections above said bridge means, and lengthwise brace means having opposed ends hooked over selected rungs of individual ones of said upright ladder sections below said bridge means.

3. Apparatus as defined in claim 1 for providing a hanging scaffold upon detaching said pair of A frames and said laddering means from said dolly, means connected to the individual plate members for suspending said pair of A frames from above in vertical upright parallel spaced and confronting relationship, supporting said laddering means horizontally between said pair of A frames, said laddering means having opposite end portions resting on individual ones of said cross-members of said suspended A frames, deck means resting on said horizontally supported laddering means to permit a person to walk therealong, said A frame arms extending outwardly

therefrom in like directions, a lengthwise rail member having opposite ends temporarily attached to the individual arm sockets for defining railing means above said deck means.

4. Apparatus as defined in claim 1 wherein said work platform comprising, a platform floor projecting substantially perpendicular from said upright laddering means, said platform floor including trap door means permitting access to said work platform by a person climbing up said ladder sections wherein the laddering means and said work platform being within the area of said dolly so as to prevent off balance of said apparatus upon mounting said work platform.

5. Apparatus as defined in claim 3 further including, an additional A frame, said additional A frame being closely spaced in parallel confronting relationship with respect to one of the aforesaid pair of A frames, said additional A frame being off set from one end of said horizontally supported laddering means, a platform suspended between the lower rod ends of said closely spaced A frames, a connecting member temporarily attached between the frame plates of said closely spaced A frames, and power winch means on said last-mentioned platform for raising and lowering said hanging scaffold.

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