

April 9, 1963

J. F. ROBERTSON  
SCAFFOLD

3,084,761

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4 Sheets-Sheet 1

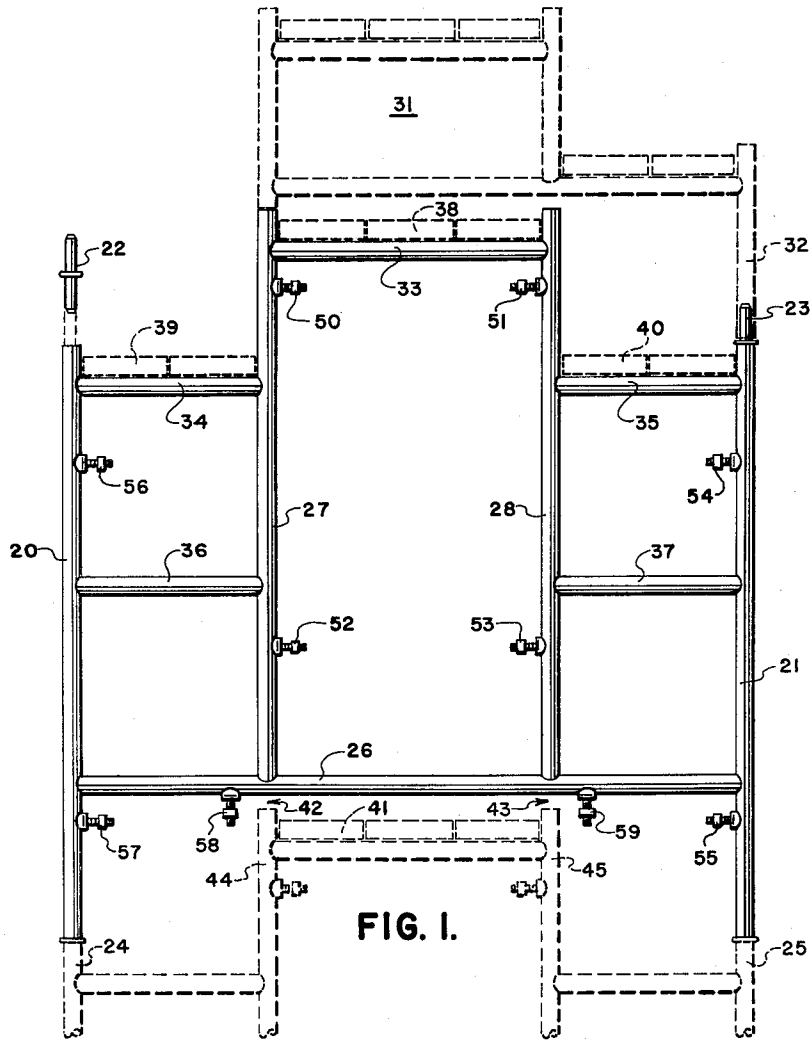


FIG. I.

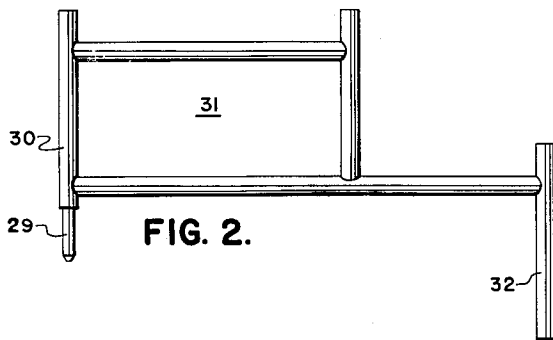


FIG. 2.

INVENTOR.  
JOSEPH FRANKLIN ROBERTSON

BY

*B. B. Olive*  
ATTORNEY

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J. F. ROBERTSON

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4 Sheets-Sheet 2

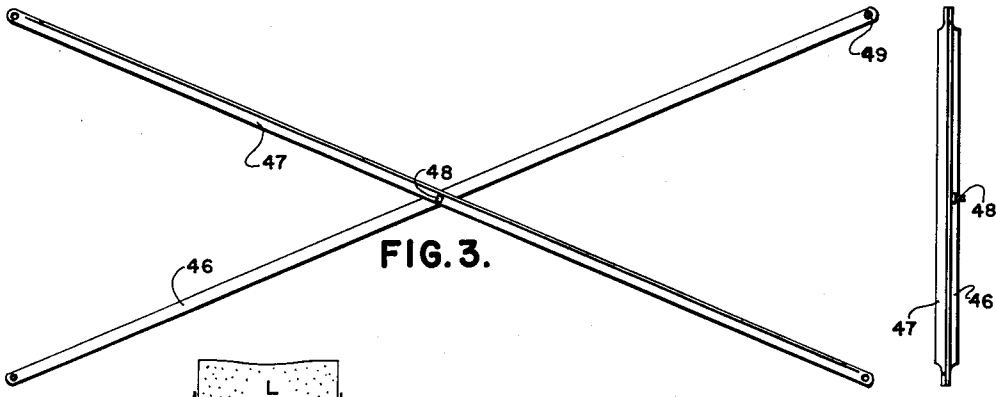


FIG. 3.

FIG. 4.

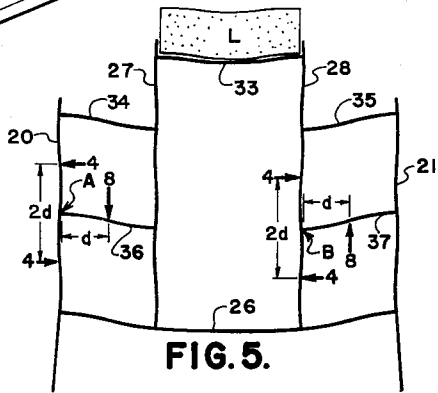


FIG. 5.

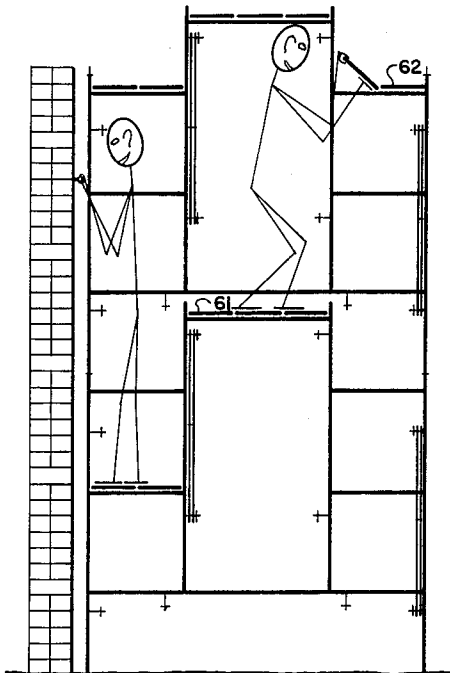


FIG. 7.

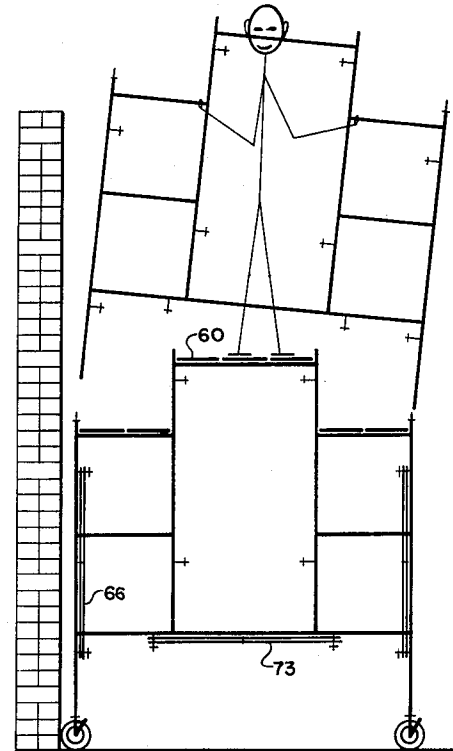


FIG. 6.

INVENTOR.  
JOSEPH FRANKLIN ROBERTSON

BY

*B. B. Olive*  
ATTORNEY

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J. F. ROBERTSON

3,084,761

SCAFFOLD

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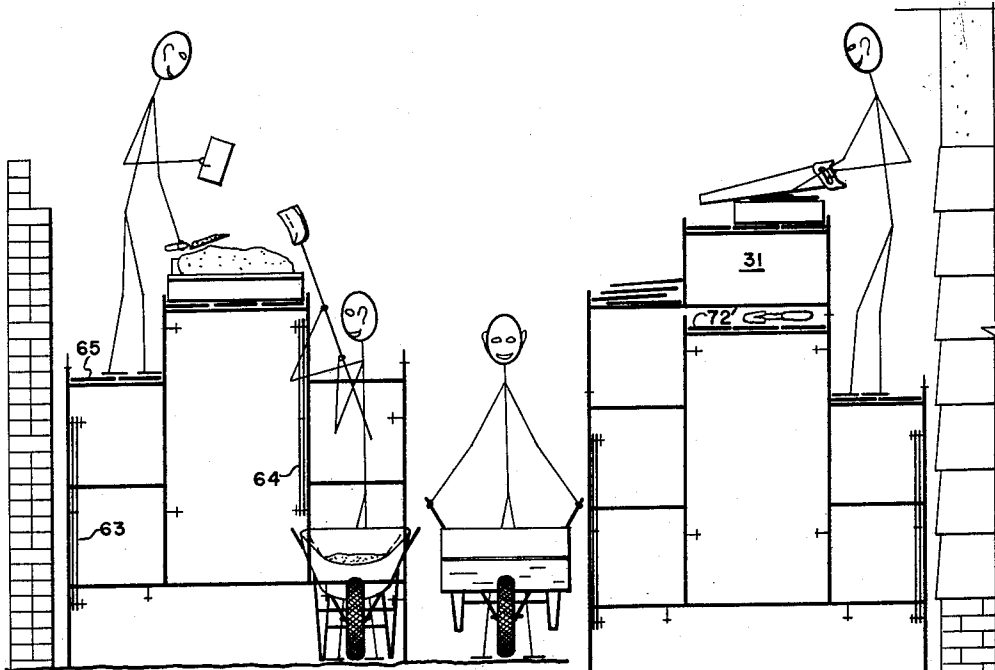


FIG. 8.

FIG. 11.

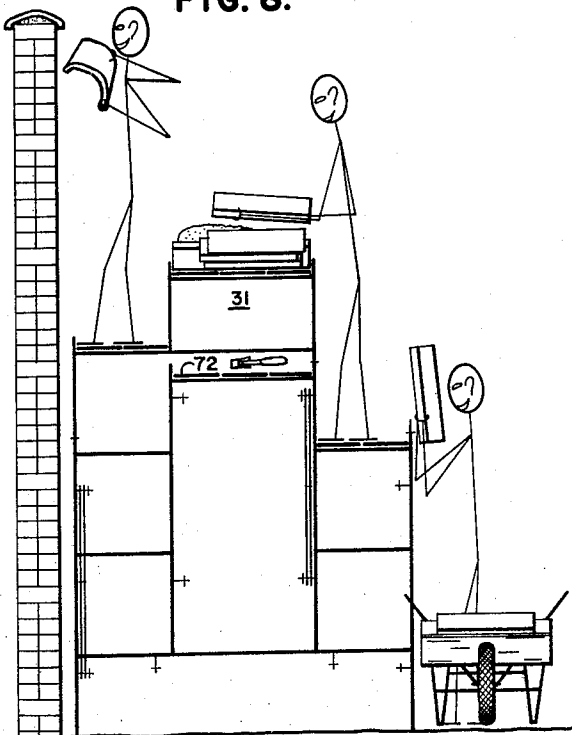


FIG. 9.

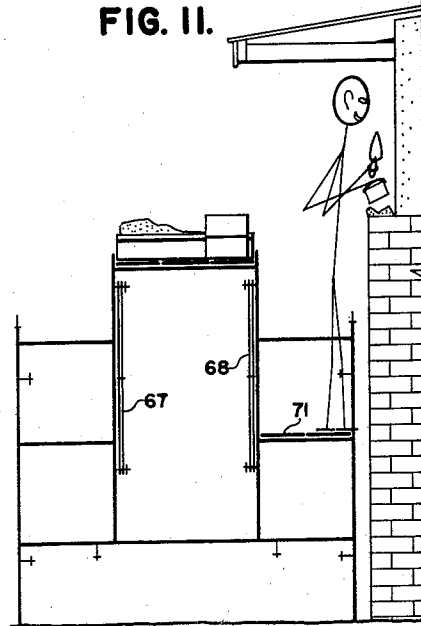


FIG. 10. INVENTOR.

JOSEPH FRANKLIN ROBERTSON

BY

*B. B. Olive*

ATTORNEY

April 9, 1963

J. F. ROBERTSON

3,084,761

SCAFFOLD

Filed March 23, 1962

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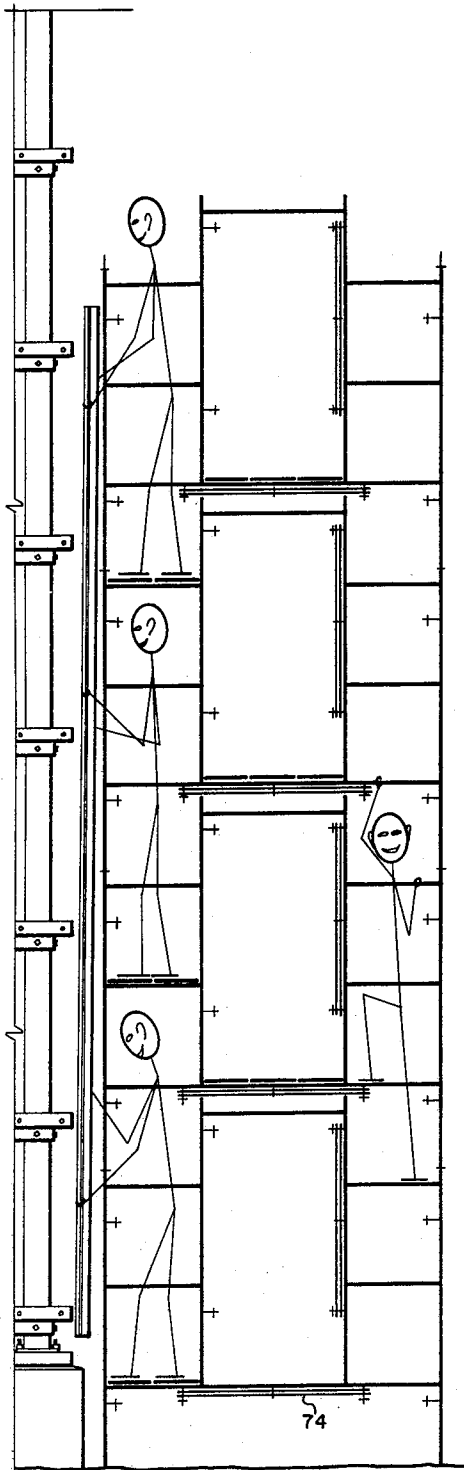


FIG. 12.

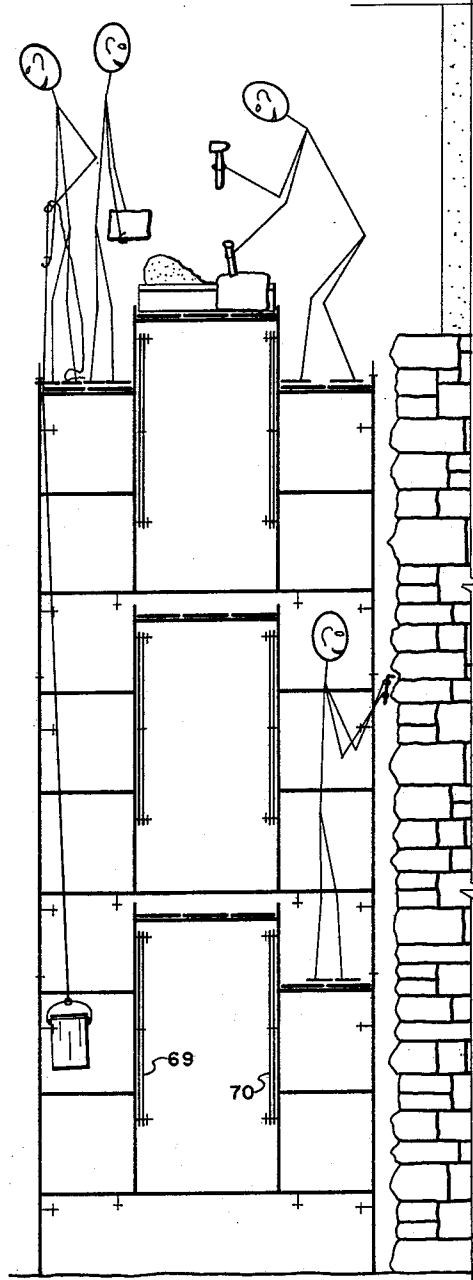


FIG. 13.

INVENTOR.

JOSEPH FRANKLIN ROBERTSON

BY

*B. B. Olive*

ATTORNEY

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3,084,761  
SCAFFOLD

Joseph Franklin Robertson, Rte. 6, Burlington, N.C.  
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2 Claims. (Cl. 182-178)

This invention relates to knock-down tubular scaffolds of the type used by brick masons, carpenters, painters and the like.

A principal objective is to provide an improved scaffolding end frame which has a means to support an inside walkway for the skilled help, an outside walkway for the unskilled help who service the scaffold, a work materials platform which is elevated above and between the walkways and a substantially tall and unobstructed walkway below the work materials platform.

Another objective is to provide a scaffold which has a substantially unobstructed walkway and a minimum of bracing at the work level and location immediately adjacent the structure being worked on.

Another objective is to provide a scaffold which has a multiplicity of vertical and horizontal bracing arrangements, making the scaffold adaptable to various work environments.

Another objective is to provide a scaffold which has a large load carrying capacity with the load being distributed as uniformly as possible to members of the end frames.

Another objective is to provide a scaffold in which the end frames are symmetrical and form both inside and outside ladders to the work level.

These and other objectives will appear as the description continues. In general, the invention comprises an improved scaffold end frame with a novel bracing arrangement. This improved end frame comprises a first pair of posts through which the load is transmitted downward from frame to frame, a lower long horizontal bar which connects these posts substantially above their lower extremities, a second pair of spaced posts which are located between the first pair of posts and rest on and connect to the lower bar and extend substantially above the upper extremities of the first pair of posts, a short horizontal bar that connects the second pair of posts just below their upper extremities, and additional short horizontal bars which are vertically spaced above the lower long bar and connect to one of the first posts and one of the second posts to which they are adjacent. Scaffolding end frames made according to the invention inherently provide a work platform support elevated above and between inside and outside walkway supports. The construction also inherently provides a pair of ladders leading to each such walkway and support for a substantially tall passageway beneath the work platform.

Conventional cross bracing may be used with the end frame of the invention in that provision is made for a plurality of brace connections to the frame such that conventional bracing as well as the improved rigid bracing can be used in various inside and outside and vertical and horizontal positions, making the scaffold adaptable to different work environments.

Prior art practices have taught various desirable practices in scaffolding. Harwell Patent 2,923,374 shows, for example, in his FIGURE 1 the ladder effect on one side of the scaffold and in his FIGURE 9 the desirability of having an elevated work platform between unobstructed walkways adjacent the building and opposite the building side of the scaffold. Weisz Patent 2,435,171 shows the idea of a relatively large lengthwise passageway below the work platform to facilitate erection and work. Other prior patents point up the advantages of symmetrical and identical end frame sections. Humphrey Patent 2,805,901

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deals to an extent with the concept of distributing load over both long and short bars in the end frame. However, what is lacking in the prior art is that no end frame or scaffold construction has to date possessed, so far as I am aware, all of the several features mentioned. The prior art constructions have required certain features to be compromised for others. In contrast, the principal achievement of the present invention is that all of the objectives and features mentioned as well as others are inherently achieved in a single scaffold construction which leads to ease of erection, efficient operating procedures and adaptability to different work environments.

Proceeding to a more detailed description, in the drawings:

FIGURE 1 is an elevation of an end frame constructed according to the invention.

FIGURE 2 is an elevation of a carpenter's frame that may be used with the end frame.

FIGURE 3 is an elevation of a type of conventional bracing that may be employed with the end frame.

FIGURE 4 is an end elevation of the brace of FIGURE 3.

FIGURE 5 is a load distribution diagram for the end frame.

FIGURE 6 is a schematic elevation illustrating assembly of a plurality of the end frames to form a scaffold and one bracing arrangement.

FIGURE 7 is a schematic elevation illustrating adaptability of the end frames to placement of scaffold boards at upper levels.

FIGURE 8 is a schematic elevation illustrating use of the end frames in scaffolding at ground level work.

FIGURE 9 is a schematic elevation illustrating one mode of employing the carpenter's frame of FIGURE 2 and adaptability of the end frames to work materials transfer at multi-levels.

FIGURE 10 is a schematic elevation illustrating an alternative walkway and bracing arrangement in a scaffold formed of the end frames.

FIGURE 11 is a schematic elevation illustrating another mode of employing the carpenter's frame of FIGURE 2.

FIGURE 12 is a schematic elevation illustrating employment of vertical and horizontal bracing in a multi-level outside scaffold.

FIGURE 13 is a schematic elevation illustrating employment of vertical bracing as shown in FIGURE 10 in a multi-level outside environment.

Reference is made to FIGURE 1 and the novel end-frame construction. Explanation will be made first of how the frame is physically constructed, after which an explanation will be made of how a load is distributed over the frame and to the outside posts and, finally, several examples will be given which illustrate the unique adaptability of the frame to the most common work environments encountered in scaffolding. The end frame itself includes two tubular posts 20, 21 which are adapted to receive double-nose coupling pins, indicated at 22 in a lifted out position and at 23 in an inserted position. As the scaffold is built up, section by section, posts 20, 21 will, by means of the described coupling pins, be connected to and placed on top of similar vertical posts as illustrated by the partially cut-away posts 24, 25 indicated in dotted lines below posts 20, 21.

Extending between and connected to posts 20, 21 and at points substantially above their lower extremities is a long horizontal tubular bar 26. Spaced inwardly from posts 20, 21 and connected to bar 26 is a second pair of tubular posts, 27, 28 whose upper extremities extend substantially above the previously mentioned first pair of posts 20, 21. Posts 27, 28 are hollow and adapted

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to receive the end of nosing pin 29 fixed within the tubular member 30 of the carpenter's frame 31 illustrated by itself in FIGURE 2 and in dotted lines in FIGURE 1. In addition to being secured through member 30, it will be noticed that carpenter's frame 31 is further secured by reason of the double nose pin 23 extending into tubular member 32 as best shown in FIGURE 1. FIGURES 8 and 11, later referred to, illustrate more specifically how carpenter's frame 31 is used with the end frame of the invention.

To continue the end frame description, the inner posts 27, 28 are joined together near their upper extremities by a short horizontal bar 33 and are further joined to the respective adjacent outside posts 20, 21 by short horizontal bars 34, 35 which connect the upper extremities of the outside posts 20, 21 to the respective adjacent posts 27, 28. Vertically spaced between the previously mentioned long horizontal bar 26 and the aforesaid short bars 34, 35 are additional short horizontal bars 36, 37, which, as brought out later in the description, assist materially in stiffening and increasing the load carrying capacity of the end frame.

With the end frame construction described above, certain inherent scaffold features are obtained. Among these is the feature of having the work platform indicated by the dotted line boards 38 elevated above and between two walkways indicated by the dotted line boards 39, 40. The construction also makes possible the provision of a ladder on both sides of the work platform as formed by the short horizontal bars and those portions of the long horizontal bars residing beneath the short bars. The construction further inherently provides a walkway indicated by the dotted line boards 41 immediately beneath the work platform 38. By utilizing the uninterrupted space between short bar 33 and long bar 26 and an ordinary end frame height of about five feet, the average worker can thus move freely below the work platform from one end of the scaffold to the other in a slightly stooped position. This aspect of the invention will also be seen in several of the somewhat schematic figures later referred to.

Another inherent characteristic of an end frame constructed as described above is that the load tends to be distributed so as to produce only slight deflections in the post members. This is seen in FIGURE 5, in which L represents a uniform load that is applied to the end frame. As illustrated in the diagram, load L is first transmitted to the inner posts 27, 28 by bar 33 from which it is distributed through the horizontal bars 34, 35, 36, 37, 26 to the outside posts 20, 21. Because of the symmetry of the end frame this load distribution takes place evenly over the posts. To look at this further, the induced forces are somewhat arbitrarily indicated in FIGURE 5 by the distances "d" and forces "4" and "8." Since the sum of the moments around points A and B equal zero, the horizontal induced forces can be shown to be approximately half that of the vertical induced forces which results in the deflection of the posts being approximately half that of the horizontal bars. It should be particularly noticed that unlike the relatively long horizontal bars that appear in many conventional end frame constructions, the short bars of this invention through the rotating action induced at the connections between the short bars and posts enable substantially heavier loads to be carried by the scaffold than is the case where only long horizontal bars are employed. To this same end and as is mentioned later in the description, the end frame of the invention also allows the bracing to be connected to the end frames directly below the load.

In further regard to the loading of the end frame, it should also be noted that each end frame allows sufficient space between its lower horizontal bar 26 and the tops of the inner posts of the end frame beneath so as to insure that the loads placed on the upper end frames are

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always transmitted downwardly only through the outer posts. This feature of the construction can be seen by noticing in FIGURE 1 that the spaces indicated at 42, 43 allow for the lower horizontal bar 26 to bend under load without touching the tops of the inner posts 44, 45 of the end frame below. Thus as the upper end frame is loaded, the load will be transmitted to the inner posts of the upper end frame, then through the horizontal bars of the upper end frame to the outside posts of the upper end frame and then to the outside posts of the end frame next below.

Of particular interest to the erection of the end frame described is the provision made for bracing. In this regard, the invention is adapted to use the conventional angle-iron type cross bracing such as the angles 46, 47 indicated in FIGURE 3 and FIGURE 4 and which are pivotally connected by suitable bolt means as at 48 and which includes suitable connecting holes as at 49.

Referring back to FIGURE 1, every end frame made according to the invention is preferably provided with certain basic scaffold connecting points. Accordingly, in FIGURE 1 it will be seen that scaffold connections are provided at 50, 51, 52, 53, 54, 55, 56, 57, 58 and 59. While the actual form of connecting device may vary, I have chosen to illustrate the connection as a simple threaded stud and nut arrangement. With these ten points of connection, it becomes possible, as later illustrated to brace both horizontally and vertically and to place the vertical bracing relatively inwardly or relatively outwardly of the scaffold. A standard distance between pairs of connecting points is maintained so that the same brace will fit all paired points.

To better understand the applications of the invention and how the several well known scaffold features are obtained in a single construction, reference is next made to FIGURES 6 through 13. In FIGURE 6, there is somewhat schematically illustrated how the scaffold is built up with the end frames of the invention. The bracing illustrated will be discussed later and is such as might be employed for a rolling inside scaffold. In particular, it will be noted that frame symmetry allows the worker to balance the frame easily which helps speed up erection time. Once the upper end frame is in place as indicated in FIGURE 7, what was the work platform for the lower end frame as indicated at 60 in FIGURE 6 can now serve as a walkway indicated at 61 in FIGURE 7 for the previously mentioned large passageway in which the worker is shown in a slightly stooped position in FIGURE 7. By following this procedure of using the previous work platform as an erection walkway for the next level of scaffolding, the worker is given a means for rapidly placing the new walkways such as that indicated at 62 in FIGURE 7.

Referring further to FIGURE 8, I have illustrated use of conventional bracing of the type shown in FIGURE 3 as well as use of some of the bracing connections previously mentioned in regard to FIGURE 1. In this figure, the conventional angle bracing is shown connected in a vertical position immediately adjacent the work as at 63 in FIGURE 8 and also inside the large passageway as at 64. The advantages of this form of bracing can be seen in FIGURE 8 in that the unskilled are able to work between the end frames at the ground and upper level thus greatly facilitating placing of the work materials. It will also be observed in these figures that the end frame construction of the invention provides an uninterrupted lengthwise walkway adjacent the work as at 65 so that the work materials, such as a mortar board, are at an optimum level.

Where work is taking place at ground level or at several vertical levels, a brace such as that indicated at 63 in FIGURE 8 or at 66 in FIGURE 6 might interfere with the placement of materials. To meet this condition, the bracing may be arranged on the end frames as in FIGURES 10 and 13 where the bracing as indicated at 67, 68, in

FIGURE 10 and at 69, 70 and similar positions in FIGURE 13, is placed entirely within the large passageway area thus leaving both the skilled and unskilled worker freedom to move in between the end frames. With particular reference to FIGURE 13, it can be seen that the end frames of the invention when braced as described, facilitate both work and supply operations as exemplified by the workman being free to pull supplies up between the end frames. Another feature brought out particularly by FIGURE 10 is that the ladder effect provided by the end frames on both sides of the scaffold readily enables adjustment of the walkway elevation to the particular work situation. This is illustrated by the use of the middle horizontal bars to support the lower level boards indicated at 71 so as to avoid overhanging eaves.

Where the work platform itself needs to be elevated to a more comfortable position such as for carpentry or masonry work, the carpenter's frame illustrated in FIGURE 2 may be employed as illustrated particularly in FIGURES 9 and 11. In these figures, the carpenter's frame 31 is shown mounted above the normal work platform indicated at 72, 72' such that the carpenter's work can be carried on at the higher more comfortable elevation with his tools being stored on the normal work platform 72 or 72'.

Reference is next made to FIGURES 6 and 12 which show adaptability of the end frame structure of the invention to smooth floor interior and substantially high situations where the scaffold is preferably braced both vertically and horizontally. In particular, it will be noted here that provision is made for use of horizontal bracing as indicated at 73 in FIGURE 6 and at 74 and similar positions in FIGURE 12. The scaffold frames thus become fixed and incapable of moving parallel to each other.

Another advantage of a scaffold formed from end frames of the invention is that work may be efficiently carried on at several levels as pictured in FIGURES 12 and 13 and without interference from the bracing itself. By using either vertical bracing exclusively or a combination of vertical and horizontal bracing as shown in FIGURE 12, free work areas are provided such as for applying metal siding to a steel frame as depicted by FIGURE 12. Particularly in connection with heavy materials such as stone, the end frames of the invention also offer the additional advantage of being able to brace directly beneath the load.

From the description, it can thus be seen that a scaffold formed of end frames constructed as shown and adapted to be braced as described meets the objectives first set forth and gives all of the several known desirable scaffolding features in a single structure.

Having thus describing my invention, what I claim is:

1. A scaffold end frame comprising an outside pair of spaced posts; a horizontal base bar joining said posts a predetermined distance above the lower extremities thereof, said base bar being the sole frame member joined to both said posts; a second pair of relatively widely and symmetrically spaced posts mounted on said bar inside

of said first posts and extending above said first posts a distance slightly less than said predetermined distance; a horizontal platform bar joining said inside posts at the upper extremities thereof whereby to provide a work platform support and to define with said inner posts and base bar a relatively large passageway below said platform, said inner and outer posts and base bar being so arranged that said passageway is preserved when said end frame supports another end frame of like construction; horizontal walkway bars joining each respective outer post at the upper extremity thereof to the respective adjacent inner post whereby to provide walkway supports on both sides of and below said work platform support, said predetermined distance defining the difference in elevation thereof; and horizontal stiffening bars centrally mounted between said walkway and base bars and joining at said location each respective outer post to the respective adjacent inner post, said base, walkway and stiffening bars collectively forming a ladder section on both sides of said platform support.

2. A scaffold comprising superimposed end frames, connecting means between said frames and bracing, said end frames each comprising an outside pair of spaced posts; a horizontal base bar joining said posts a predetermined distance above the lower extremities thereof, said base bar being the sole frame member in each of said frames joined to both said posts; a second pair of relatively wide and symmetrically spaced posts mounted on said bar inside of said first posts and extending above said first posts a distance slightly less than said predetermined distance; a horizontal platform bar joining said inside posts at the upper extremities thereof whereby to provide a work platform support and to define with said inner posts and base bar a relatively large passageway below said platform, said inner and outer posts and base bar being so arranged that said passageway is preserved when said end frame supports another end frame of like construction; horizontal walkway bars joining each respective outer post at the upper extremity thereof to the respective adjacent inner post whereby to provide walkway supports on both sides of and below said work platform support, said predetermined distance defining the difference in elevation thereof; and horizontal stiffening bars centrally mounted between said walkway and base bar and joining at said location each respective outer post to the respective adjacent inner post, said base, walkway and stiffening bars collectively forming ladder sections on both sides of said platform support.

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