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SCAFFOLD

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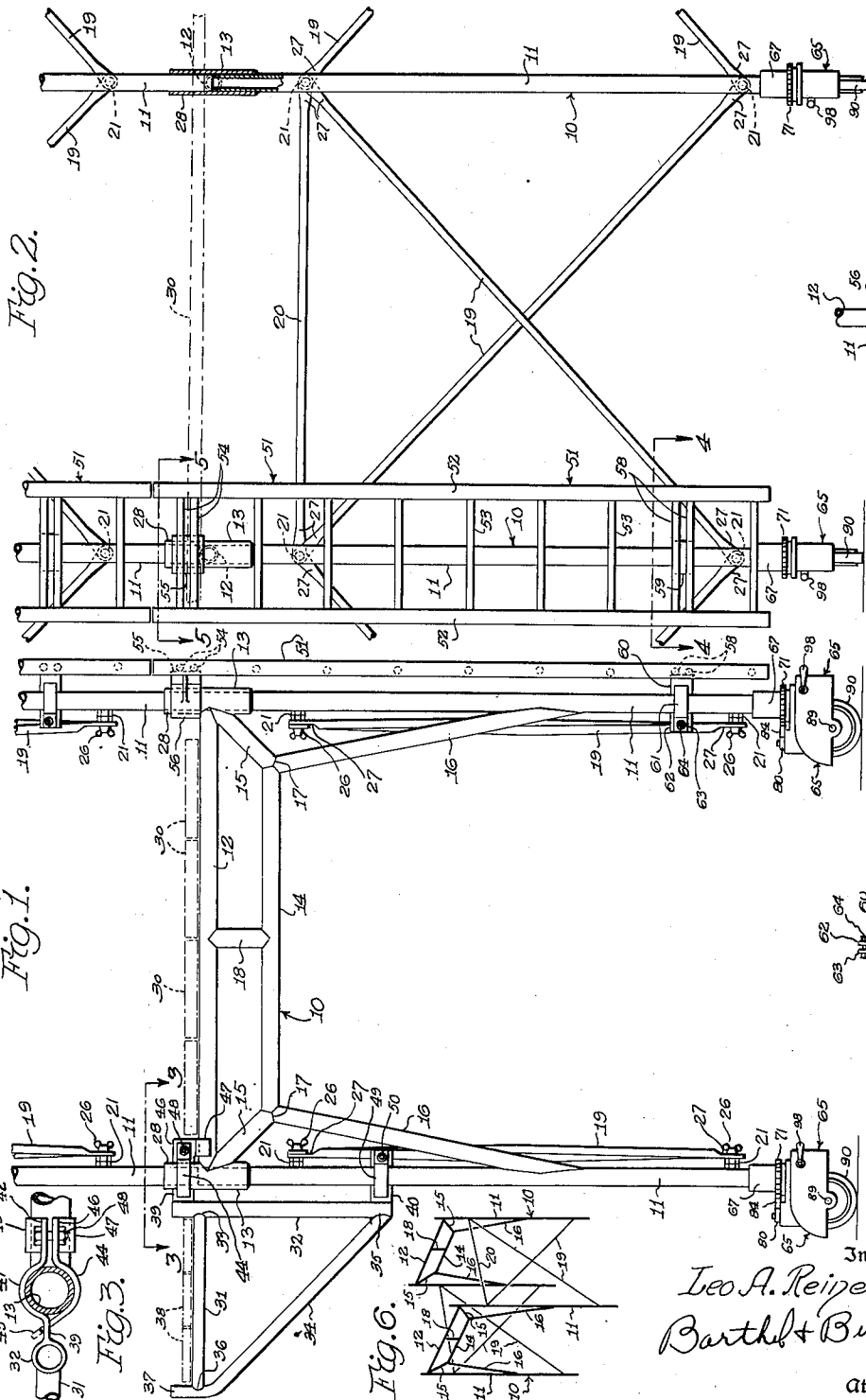


Fig. 2.

Fig. 1.

Fig. 3.

Fig. 6.

Fig. 5.

Fig. 4.

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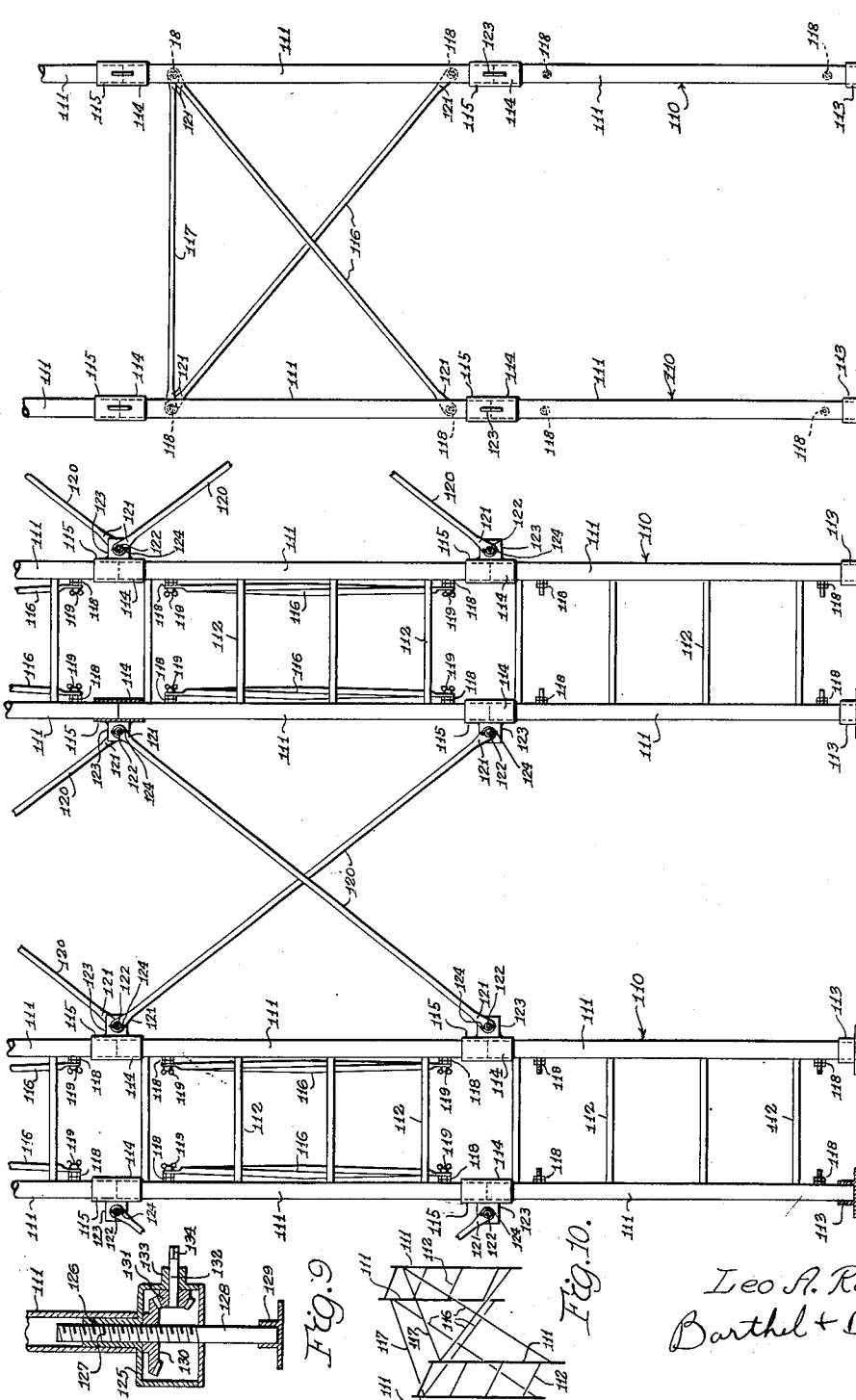


Fig. 8.

Fig. 7.

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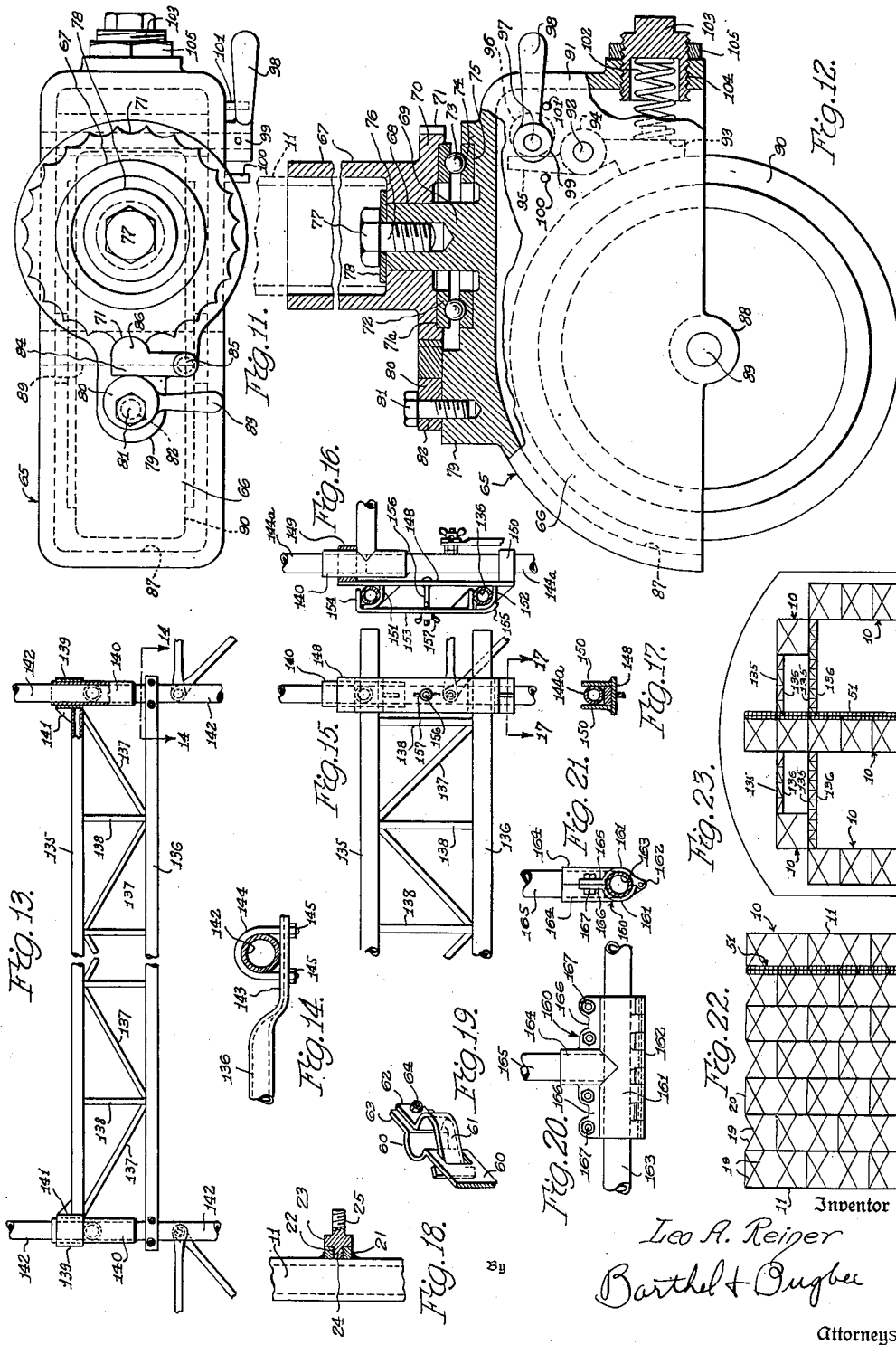
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UNITED STATES PATENT OFFICE

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5 Claims. (Cl. 304-2)

The present invention relates to scaffolds, and more particularly to scaffolds formed of detachable units.

The primary object of the invention is to provide a scaffold of the above mentioned type capable of being easily assembled and knocked down to facilitate the easy transportation of the scaffold to various locations.

Another object of the invention is to provide a scaffold structure formed of a series of units demountably connected which units are constructed of tubular material so that the joints may be easily assembled during erection in a minimum amount of time.

Another object of the invention is to provide a scaffold of the underpass type to allow for the passage of the workmen and building construction materials by arranging the units in spaced relation and connecting the units by detachable truss rods.

Another object of the invention is to provide a scaffold formed of a series of spaced units held in position by truss rods which have their ends detachably connected to threaded studs welded to the units by securing a double ended threaded member to the threaded stud so that the threaded member may be reversed if desired to provide a relatively long and short stud member for receiving the truss rods.

Another object of the invention is to provide an intermediate brace member for connecting units between the junctures thereof to facilitate the use of the scaffold in auditoriums, churches and the like of relatively large interior areas.

Another object of the invention is to provide a demountable sectional scaffold having caster supports which may be locked against movement by brake devices so that the swinging movement of the caster relative to the sectional unit may be prevented as well as the caster itself.

Another object of the invention is to provide a scaffold constructed of sectional ladder units braced throughout their lengths at the point of juncture thereof and connected to a series of ladder units arranged in parallel relation and braced relative thereto by suitable truss rods detachably connected to the ends of the ladder units.

Other objects and advantages of the invention will become apparent during the course of the following description of the accompanying drawings wherein:

Figure 1 is a side elevation of one of the scaffold units of the underpass type.

Figure 2 is a front elevation of the same showing

the manner in which the units are separably connected and illustrating a ladder attached to one of the vertical standards at the point of juncture thereof.

Figure 3 is a horizontal cross sectional view taken on line 3-3 of Figure 1 looking in the direction of the arrows showing the manner in which an additional runway space may be coupled and supported by the spaced scaffold units.

Figure 4 is a horizontal cross sectional view taken in line 4-4 of Figure 2 looking in the direction of the arrows illustrating the manner of attaching and clamping the lower end of the ladder in position.

Figure 5 is a horizontal cross sectional view taken on line 5-5 of Figure 2 looking in the direction of the arrows showing the manner in which the ladder is supported adjacent one of the separable connections.

Figure 6 is a perspective diagrammatic view showing the manner in which the units are coupled longitudinally for each course of scaffolding by crossed truss rods.

Figure 7 is a front elevation of the modified form of the invention showing a series of sectional ladder units connected by laterally extending truss rods.

Figure 8 is an end elevation of the modified form of the invention shown in Figure 7 showing the manner in which the ladder units are connected by transversely extending truss rods.

Figure 9 is a vertical cross section showing a modified support to facilitate the adjustment and leveling of the scaffold units.

Figure 10 is a perspective diagrammatic view showing the manner in which the ladders are connected by transversals extending diagonally and horizontally between the ladder units.

Figure 11 is a top plan view of a caster support for the form of the invention shown in Figures 1 and 2 illustrating the brake lock for preventing rotational movement of the caster.

Figure 12 is a side elevation partly in section illustrating the caster brake and the manual operator therefor.

Figure 13 is a front elevation of an intermediate connecting member or truss to connect a series of units superposed in tower formation illustrating in detail the manner in which the ends of the truss are connected to the junctures of the units.

Figure 14 is a horizontal cross sectional view taken on line 14-14 of Figure 13 looking in the direction of the arrows illustrating in detail the

manner of clamping the lower ends of the truss member in position by means of a U-bolt.

Figure 15 is a front elevation of a clamping device for attaching the intermediate truss member at various locations along its length to the vertical standards of the sectional scaffold units.

Figure 16 is a side elevation of the clamping member illustrating the manner in which the same is positioned at the juncture of the demountable scaffold units.

Figure 17 is a horizontal cross sectional view taken on line 17-17 of Figure 15 looking in the direction of the arrows showing the manner in which the lower portion of the clamping member is held in place against lateral movement.

Figure 18 is a side elevation of one of the sectional unit vertical standards showing a threaded stud attached thereto for receiving a double ended anchoring screw.

Figure 19 is a fragmentary perspective view of a clamping strap for connecting ladders and additional elements to the scaffold units.

Figure 20 is a front elevational view of a clamping member which may be employed for connecting runway supporting bars or truss bars intermediate the lengths of the scaffold units.

Figure 21 is an end elevation showing the manner in which the clamping halves are hingedly connected for embracing one of the scaffold units and a horizontal bar such as a runway supporting bar.

Figure 22 is a diagrammatic view showing a series of scaffold units connected throughout their lengths by spaced diagonal truss bars and,

Figure 23 is a diagrammatic view showing a series of scaffold units arranged in the form of towers connected by intermediate brace trusses to facilitate the use of the scaffold in structures of large area such as churches and auditoriums.

In the drawings, wherein for the purpose of illustrating the invention and wherein like reference characters will be employed to designate like parts throughout the same, attention is first directed to Figures 1 to 6 inclusive and 11 and 12 wherein is shown a preferred embodiment of the invention and wherein the reference character 10 will generally be employed to designate a scaffold unit including vertical standards 11 connected to the top by a horizontal bar 12 the ends of which are provided with sleeves 13 for receiving a portion of the free upper end of the vertical standard 11. The horizontal bar 12 is welded or otherwise secured at its ends to the sleeves 13 and a parallel base bar 14 likewise has its ends connected to tubular stock 15 welded to the sleeves 13 as clearly shown in Figure 1. Brace bars 16 have their lower ends beveled for being attached as by means of welding to the vertical standards 11 and have their upper ends welded as at 17 to the juncture of the tubular brace bars 14 and 15. An intermediate brace 18 supports the horizontal bars and holds them in spaced relation.

Each of the units above described, is preferably formed of tubular stock welded at the joints to provide a relatively rigid frame unit capable of supporting excessive weight and load as well as stresses and strains. It is intended, to provide a series of such units arranged as shown in Figure 6 for connecting in parallelism by means of diagonal truss rods 19 and horizontal connecting rods 20. The free ends of the truss rods 19 and 20 are detachably connected to studs 21 including a threaded member as shown in Figure 18 welded or otherwise secured to the vertical stand-

ards 11 adjacent the ends thereof. There being one stud 21 provided for the lower end of each diagonal truss bar and a threaded stud member for attachment with the upper ends of the diagonal truss bars as well as the ends of the horizontal bars 20. Each stud member 21 is threaded as at 22 for receiving a double ended bolt 23 having a relatively shortened end 24 and an opposed end 25 of a greater length so that the double ended bolt 23 may be reversed depending upon whether the bolt is used for anchoring the lower ends of the truss rods or the upper ends in which case, it would be necessary to employ the threaded portion of the nut having a greater length as at 25. After the ends of the truss rods 19 have been placed upon the double ended bolt, a wing nut 26 is threaded thereon to securely hold the truss rods in position. The free ends of the truss rods 19 and 20 are flattened as at 27 to facilitate the easy attachment of said ends to the double ended bolt.

It is to be noted, that the tubular connecting elements 13 extend well above the horizontal connecting bar 12 as at 28 for receiving the lower end of a superposed unit as shown in Figures 1 and 2. It is proposed, to construct each scaffold unit 10 so that the connecting sleeves 28 will receive the lower end of a superposed scaffold unit and thereby support the same so that the units may be quickly and easily demounted or assembled at different locations of construction.

A runway formed of planking 30 may be supported by the horizontal connecting bars 12 and an additional runway portion or support may be provided and comprises a triangular frame unit including a horizontal bar 31 connected to a vertical supporting bar 32 by being welded or the like thereto as at 33. A brace bar 34 has its lower end connected to the vertical bar as at 35 by welding or the like while the upper end is connected to the horizontal bar 31 by means of a weld joint 36. The extreme free end of the brace bar 34 is extended as at 37 to provide a limiting stop for additional planking or runway boards 38 supported by the horizontal bar 31. The upper and lower portions of the vertical bar 32 are provided with brackets 39 and 40 and the bracket 39 has an arcuately curved extension 41 which terminates in a strap portion 42 having a downwardly depending horizontal connecting bar engaging portion 43. A complementary strap portion 44 has one of its ends as at 45 keyed in a slot in the bracket 39 while its opposite end terminates in a strap portion 46 complementary with the strap portion 42. A depending horizontal connecting bar and bracing portion 47 depends from the strap portion 46 and a bolt 48 is provided for clamping the parts 41 and 42 about the sleeve 13 while the depending portions 43 and 47 embrace the end of the horizontal connecting bar 12.

The lower bracket 40 is formed with a strap portion similar to the strap portion 41 and a clamping strap 49 is keyed therein and is anchored to the free end of the bracket strap by means of a bolt or the like as at 50.

Certain scaffold units are provided with ladders generally designated as at 51 and said ladders include stiles 52 connected by a series of spaced rounds 53. Each ladder unit 51 is of substantially the same length as the scaffold unit so that when the scaffold units are coupled in superposed relation the ladder units 51 will be coextensively arranged. The ladders are at-

tached to the scaffold units by means of horizontal bars 54 carrying intermediate brackets 55 provided with collars 56 for being telescopically received on the upper ends 28 of the sleeves 13. The collars 56 are slightly larger in diameter than its corresponding sleeve so that the collar will snugly fit thereon. The lower end of each ladder unit carries a pair of spaced horizontal bars 58 to which is attached a bracket 59 having an arcuately curved clamping strap 60 to which is attached a cooperating clamping strap 61 keyed thereto as at 62. The free ends of the clamping straps 60 and 61 as at 62 and 63 respectively are drawn together by means of a bolt 64 so that the lower end of the ladder unit will be supported in a rigid manner and will be prevented from rotation about the axis of the vertical standards 11.

It is intended to provide each of the lower scaffold units 10 with swinging casters 64 and said casters provide a casing 66 having a tubular extension 67 for receiving the lower ends of the vertical standards 11. There being one caster unit provided for each scaffold unit and since all of said casters are identical only one will be described in detail. By reference to Figures 11 and 12, wherein is shown one of the casters in detail, it is to be noted that the tubular extension 67 is provided with a central bore 68 for receiving an internally threaded boss 69 formed integral with the housing 66. The lower portion of the tubular extension 67 is annularly flanged as at 70 and is provided with a series of notches or the like 71 for receiving a locking element which will be hereinafter more fully described. A recess 71a is formed in the underface of the annular flange 70 and is adapted to receive a ball race 72 so that the tubular extension 67 may be supported on anti-friction bearings 73 rolling in a ball race 74 received in a recess 75 of the casing 66. An anchoring bolt 76 is threaded in the internally threaded boss 69 and the head thereof as at 77 abuts a washer 78 which overlies the floor of the tubular extension to prevent displacement and separation thereof from the casing 66. The casing is provided with a relatively flat top wall 79 on which is positioned a cam 80 secured in place by means of a bolt 81 extending through the eccentrically formed opening 82 in the cam so that rotation thereof by means of a manual operating lever 83 will move the lever 84 toward and away from the annular flange 70. The locking lever 84 is pivoted to the relatively flat wall 79 as at 85 so that the free end will be interposed between the cam 80 and the annular flange 70. A bolt portion 86 is formed on the free end of the pivoted lever 84 and is curved to fit the contour of the notches 71 in the annular flange 70.

A boot 87 is formed on the housing 66 and is provided with oppositely disposed bearings 88 for receiving a stub axle 89 upon which is rotatably mounted a caster wheel 90. The rear portion of the boot 87 is offset as at 91 so that a shaft 92 may have its free ends journaled in the side walls of the boot. A brake element 93 is pivotally carried by the shaft 92 by means of a bearing portion 94 and formed integral with the bearing portion 94 is an operating arm or extension 95 located in the path of a cam 96 likewise mounted on a shaft 97 journaled in the side walls of the boot 87. An operating lever 98 has its inner end provided with a collar 99 for being attached to the shaft 97 and a stop pin 100 projects from the side wall of the boot 87

to limit the movement of the operating lever 98 in one direction while a similar stop pin 101 mounted opposite the stop pin 100 limits the swinging movement of the brake operating lever 98 in the other direction. A coil spring 102 has one of its ends abutting the brake block 93 while the opposite end is received in a cavity formed in a screw threaded plug 103 threaded in a suitable opening 104 in the offset portion of the boot 87. A lock nut 105 is threaded on the plug 103 so that the plug may be adjusted to increase or decrease tension on the coil spring 102 and then lock in position by the locking nut 105.

In the form of the invention shown in Figures 7 to 10 inclusive, the scaffold units comprise ladder sections 110 comprising stiles 111 connected by spaced ladder rounds 112. Foot pads 113 are provided for the lower ends of the lower ladder sections 110 while the upper ends of the stiles 111 are provided with sleeves 114 similar to the sleeves 13 in Figures 1 and 2. The upper ladder units 111 or stiles have their lower ends received in the sleeves 114 in an upwardly projecting portion 115 and said ladder sections are preferably formed of tubular stock to facilitate easy construction and the assemblage of the various elements. The ladder units are adapted to be arranged as shown in Figure 8 to form an under-pass scaffold structure as shown in Figure 10. It is proposed to arrange the scaffold ladder units 110 one above the other in superposed relationship and to connect the same by diagonally extending truss bars 116 and horizontal truss bars 117. The truss bars are formed of tubular material and are flattened at their free ends for receiving anchoring studs 118 similar to the anchoring studs shown in Figure 18. Wing nuts 119 are provided for securing the free ends of the truss bars 116 and 117 in position.

After an underpass scaffold tower has been constructed, a number of such towers are connected together longitudinally throughout their length by diagonal truss bars 120 the free ends of which are flattened as at 121 for receiving a bolt 122 carried by a lateral extension 123 formed integral with the connecting sleeves 114. A wing nut 124 may be threaded on the free end of the bolt 122 to securely hold the truss bars 120 in place. It is intended to brace the ladder scaffold units in such a manner that the horizontal truss rod 117 may be used for supporting planking at variously spaced intervals throughout the length of the tower structure.

If desired, the stiles 111 may be provided with a casing 125 having a tubular extension 126 telescopically received in the lower end of the lowermost scaffold unit or stile 111 and threaded in said tubular extension 126 is a screw threaded shaft 127 the lower end of which projects through an opening in the lower wall of the casing 125 as at 128 and is provided with a foot or pad 129. Threaded on the screw threaded rod 127 is a bevel gear 130 having its teeth in mesh with a bevel gear 131 mounted on a shaft 132 journaled in a tubular bearing extension 133 in the casing 125. The outer end of the shaft 132 is squared as at 134 for receiving a wrench or the like to effect rotation of the bevel gear 130 and thereby raise or lower the scaffold unit so that the same will be leveled with respect to the surface upon which it is supported.

An intermediate member for connecting a series of scaffold units is provided and attention is directed to Figures 13 to 17 inclusive wherein the mode of connecting the intermediate unit is

shown in detail. The intermediate unit comprises spaced parallel bars 135 and 136 braced throughout their length by diagonal brace bars 137 and transverse brace bars 138. The free ends of the bars 135 are provided with collars 139 for receiving a sleeve 140 similar to the sleeve 13 shown in Figures 1 and 2 and the sleeve 114 shown in Figures 7 and 8. Brace webs 140 connect the collars 139 with the horizontal bars 135 to strengthen the structure and prevent lateral swaying of the scaffold tower vertical standards 142. In the form of the invention shown in Figures 13 to 17 inclusive, the scaffold sections assume the form of the invention shown in Figures 7 and 8 and are intended to represent the extreme upper ends of scaffold sections which are desired to be connected. The lower horizontal bar 136 has its free ends flattened and offset as at 143 so that the same may be provided with spaced openings for receiving a U-bolt 144 the ends of which project through said openings and are fastened in place by nuts 145. The U-bolt 144 embraces the upper end of one of the uppermost scaffold units to rigidly secure the unit in position relative to another scaffold unit.

Where it is desired to support the intermediate portion of the intermediate brace or truss, a clamping plate 148 is secured to a point of juncture of the scaffold units by providing a collar 149 on one end thereof for encircling one of the connecting sleeves 140. The lower end of the plate 148 is provided with spaced straps 150 which straddle the lower scaffold standard 144a as shown in Figure 17. The straps 150 may be secured in place by welding or the like and said plate 148 is provided adjacent its upper end with hooks 151 and 152 for embracing the upper and lower horizontal bars 135 and 136 of the intermediate truss member. A clamping plate 153 has one of its ends return bent as at 154 and its opposite end curved as at 155 for embracing the horizontal pipe 136 and the hook member 152 respectively. A clamping bolt 156 is secured to the plate 148 and has its threaded end projecting through an opening in the clamping plate 153 so that a wing nut 157 may be threaded thereon to securely draw the intermediate truss into position.

In Figure 19, there is shown a strap connection similar to the connection employed for anchoring the lower end of the ladder 51 shown in Figures 1 and 2 and said strap connection is shown in detail for the purpose of illustrating the manner in which the same may be applicable for fastening such items as the ladder 51 or the additional runway support for supporting the planking 38.

In Figures 20 and 21, there is shown a tubular element connecting member 160 comprising complementary hinged sections 161 hinged as at 162 for embracing one of the horizontal bars 163 of a scaffold structure. Formed integral with each complementary hinged section 161 is a semi-circular portion 164 which is adapted to cooperate with its complementary portion for embracing a tubular scaffold element 165 at right angles to the scaffold element 163. The complementary hinged sections 161 are flanged as at 166 for receiving bolt fasteners 167. This connector may be used in locations where it is desired to apply additional truss bars or to connect scaffold units at points wholly independent of the diagonal truss bars.

In Figures 22 and 23 there is shown the manner in which the scaffolding illustrated in Fig-

ures 1, 2, 7 and 8, may be employed for building up a tower along a wall or within a church structure or auditorium. In Figure 22, the scaffolding is built up of sections 10 having a ladder 51 extending the full height of the tower and said sections are braced by the horizontal truss bars 20 and diagonal truss bars 10. The vertical standards 11 are connected at spaced points or intervals to produce the continuous structure as shown in Figure 22.

When the scaffolding shown in Figures 7 and 8 is employed in locations such as a church or auditorium as shown in Figure 23, the ladder sections 110 are superposed one on the other and by the use of intermediate truss bars 135 and 136, the spaced scaffold towers 110 may be connected adjacent their upper ends so that runways may be adequately supported to facilitate the workmen preparing the walls or ceiling of said structure. The intermediate trusses formed by the spaced parallel bars 135 and 136 may be connected to the vertical standards of the scaffold units by means of the connections shown in Figures 13 and 17 inclusive and by arranging the units and the intermediate connecting bars in various fashions, a number of different scaffold structures may be provided.

It is to be understood, that the forms of the invention herewith shown and described are to be taken as preferred embodiments of the same and that various changes in the shape, size and arrangement of the scaffold units and parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

What I claim is:

1. A scaffold structure comprising a series of tubular scaffold units arranged in end to end relationship, coupling sleeves secured to the upper ends of said units to provide a socket for the lower ends of adjacent units and for detachably connecting the ends of said units, threaded members secured to the tubular units at equidistant points, threaded studs having opposed threaded portions for being alternately received in the threaded members whereby said studs may be reversed and interchangeably threaded in said threaded members, and truss bars adapted to be secured to said threaded studs and threaded members.

2. A scaffold comprising a series of tubular scaffold units arranged vertically in end to end relation, connecting sleeves for coupling the ends of said units together, threaded members secured to said tubular members, threaded studs having opposed reversible threaded portions adapted to be threaded in said threaded members for interchangeable use, and truss bars for connecting independent units removably secured to said threaded studs and threaded members.

3. A scaffold comprising a series of separably connected tubular scaffold units arranged in superposed relation to form a tower, telescopic tubular sleeve connections secured to the upper ends of the units to provide a socket for receiving the opposite end of an adjacent unit for the ends of said sections, screw-threaded members rigidly mounted on the vertical members of said units, screw-threaded studs removably mounted in said screw-threaded members, horizontal and diagonal truss bars detachably fastened to said screw-threaded members and studs and caster supports removably and interchangeably secured to the lower ends of said scaffold units.

4. A scaffold comprising a series of tubular

scaffold units arranged in superposed relation, each unit comprising a frame portion having vertical standards and a connecting bar for supporting a runway, tubular sleeve connectors for the upper ends of the tubular standards to form a socket for receiving the lower end of an adjacent unit, casters removably and interchangeably secured to the lowermost ends of the lower scaffold units, threaded connections arranged in spaced relation on each unit, threaded studs adapted to be interchangeably mounted in the threaded connections, transversely extending truss rods detachably secured to the threaded studs and fastenings and longitudinally extend-

ing diagonal truss bars connecting said units.

5 A scaffold comprising a series of sectional tubular scaffold units arranged in superposed relation to form two or more scaffold towers, a tubular sleeve secured to the upper ends of each unit forming a socket for the opposite end of an adjacent unit and to form a supporting surface, means for bracing said towers throughout their length and detachable connecting brace members having collars at each end for being secured on the tubular sleeves on the upper ends of said units whereby said detachable brace connecting members may be interchanged.

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