June 7, 1949. A. H. HAWES 2,472,423

SCAFFOLDING

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FIG. 1.

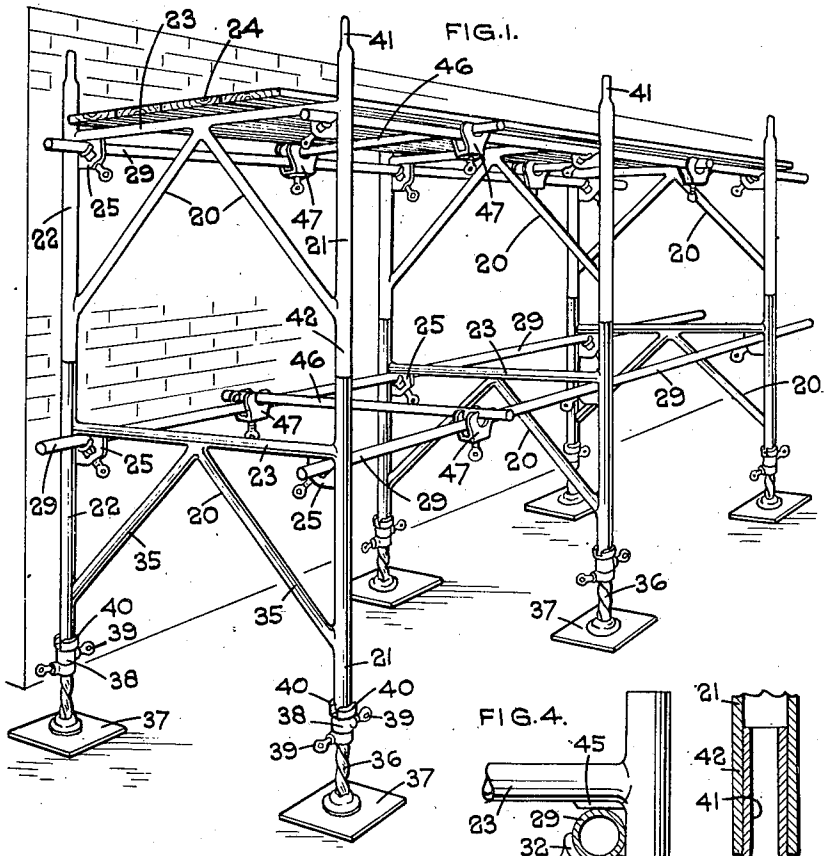


FIG. 4.

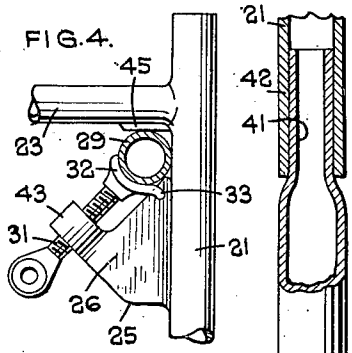


FIG. 2.

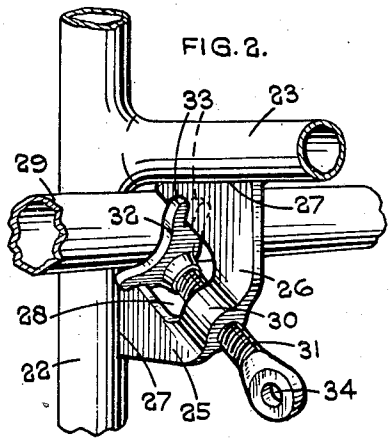
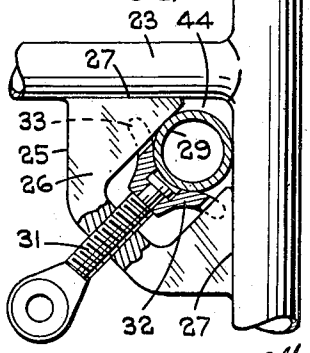


FIG. 3.



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SCAFFOLDING

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FIG. 5.

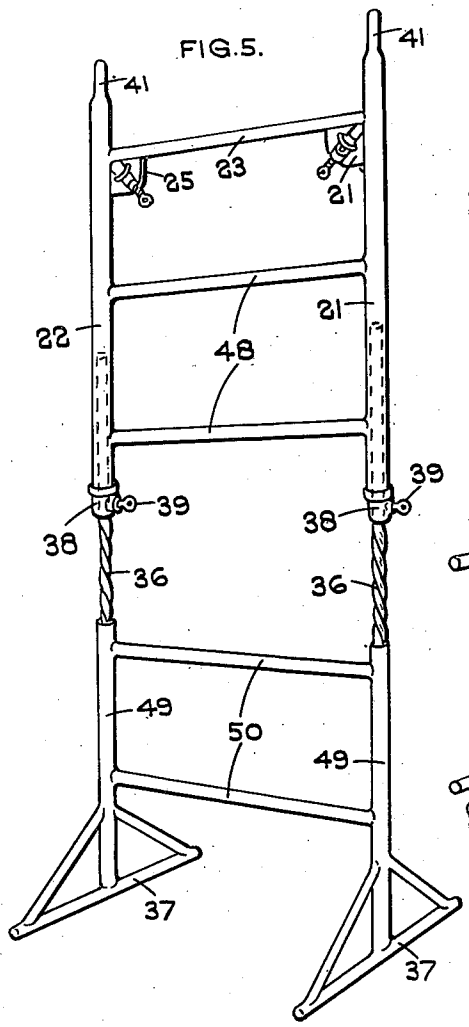


FIG. 6.

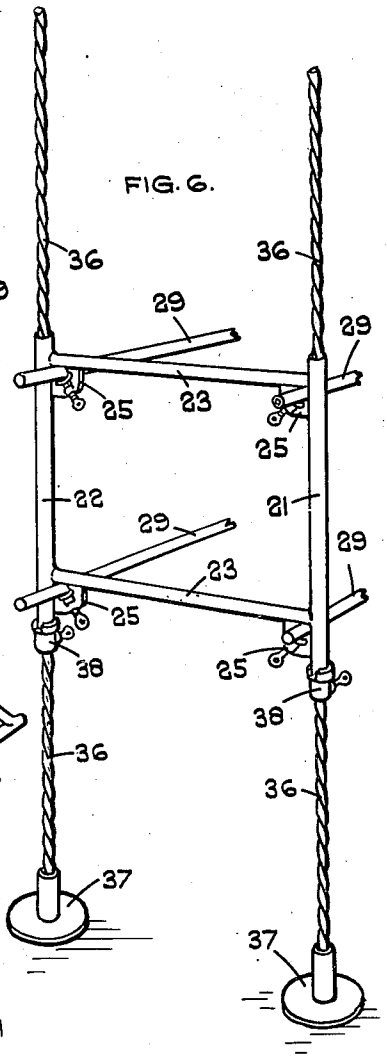
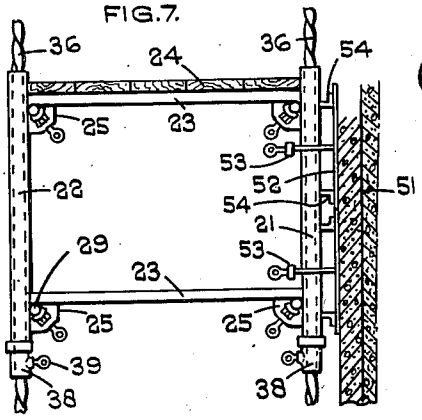


FIG. 7.



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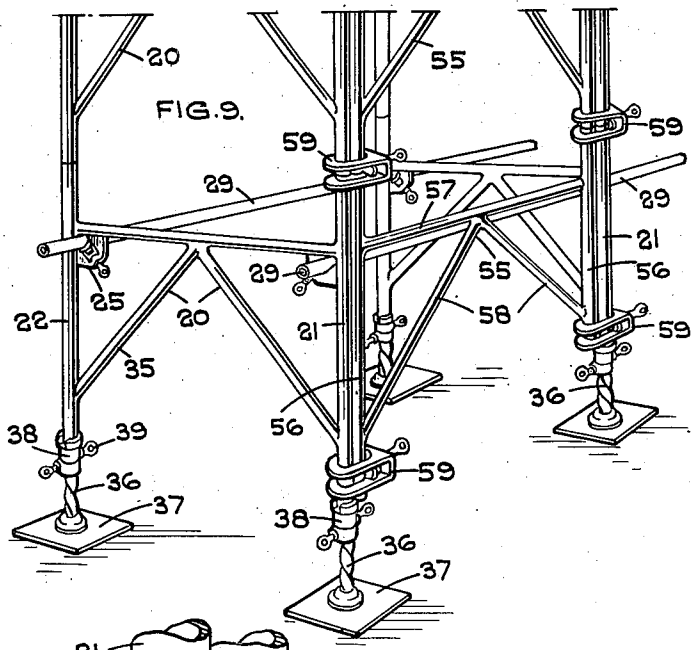


FIG. 9.

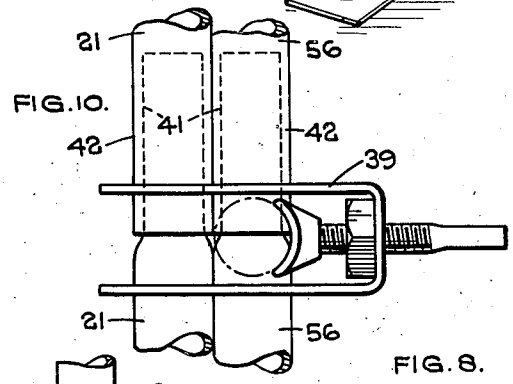


FIG. 10.

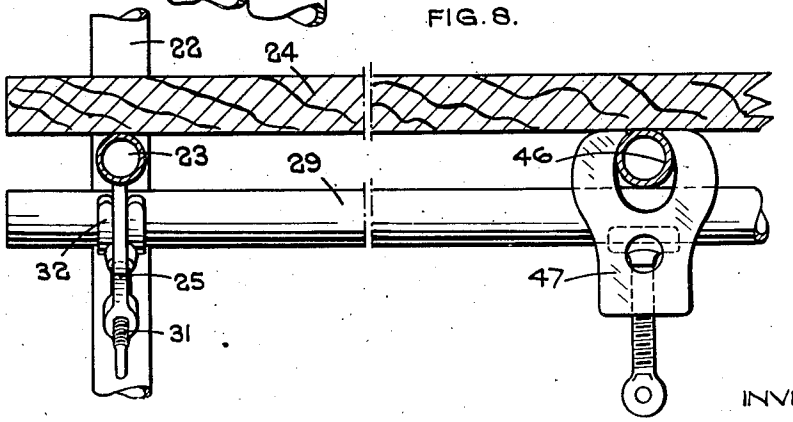


FIG. 8.

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Patented June 7, 1949 2,472,423

UNITED STATES PATENT OFFICE

2,472,423

SCAFFOLDING

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Application September 11, 1946, Serial No. 696,081
In Great Britain October 2, 1945

7 Claims. (Cl. 304—2)

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This invention relates to scaffolding of the kind which incorporates metal tubular elements and which is used in the assembly of a scaffolding structure for supporting a substantially horizontal platform or staging for workmen.

In assembling such a structure from scaffolding of the above kind it is at present usual to erect at suitable intervals two rows of vertical columns, adjacent columns in the two rows being connected together by transverse putlogs secured to the columns by separate clamps, each pair of columns so formed being also connected to the next pair or pairs by horizontal ledgers which again are held in place by separate clamping devices. A staging or working platform consisting of a plurality of parallel wooden battens is then laid upon the putlogs to form the platform or staging.

The connected pairs of columns require to be placed at a prescribed distance apart, depending on the thickness of the battens, and the consequent relatively close spacing of the pairs of columns results in a structure incorporating a very large number of separate elements, whose strength is out of all proportion to the load to be carried.

Furthermore, unless the transverse putlogs are very carefully located during assembly of the scaffolding, the battens laid thereon will not provide a level platform and it may be necessary to overlap the ends of adjacent battens, or adjacent sections of the staging with the result that dangerous steps liable to trip a workman are produced.

The present invention has for its object the provision of an improved construction of scaffolding of the above kind for supporting a substantially horizontal platform or staging, which construction whilst being fully as strong as those hitherto employed nevertheless comprises a very much smaller number of elements and can be erected much more rapidly and cheaply, thus facilitating the provision of a substantially horizontal platform or staging as is required, which platform or staging is level so that dangerous steps liable to trip a workman are avoided.

The invention is illustrated in the accompanying drawings, wherein:

Figure 1 is a perspective view of one form of scaffolding structure in accordance with this invention and incorporating scaffold frame units as aforesaid, which structure is intended for use in the construction of walls.

Figure 2 is a detailed perspective view of part of a scaffold frame unit of this construction.

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Figure 3 is a cross sectional view of part of the construction shown in Figure 1.

Figure 4 is a view similar to Figure 3 showing a slightly modified construction.

Figures 5 and 6 are perspective views showing two further modified constructions.

Figure 7 is a cross sectional view showing the application of the invention to the supporting of shuttering for use in the construction of walls or the like from concrete or similar material.

Figure 8 is an enlarged cross sectional view of the upper part of the structure shown in Figure 1.

Figure 9 is a detailed perspective view illustrating a further modification of the invention.

Figure 10 is an enlarged side elevation of part of the construction shown in Figure 9.

Referring firstly to the construction shown in Figures 1 to 3 and 8 of the drawings, each of the scaffold frame units there depicted and which are indicated generally at **20** comprises two vertical tubular members **21**, **22** rigidly and permanently connected together by a horizontal member **23**, which in the construction illustrated is also formed as a tube, which horizontal member is adapted to engage and support a substantially horizontal staging or platform which extends transversely of the frame unit, which platform or staging in the arrangement illustrated is constituted by a plurality of wooden battens **24**.

Each frame unit further comprises a pair of clamping devices **25** disposed adjacent to the junction of the horizontal member **23** with each of the two vertical members **21**, **22** the clamping devices in the arrangement illustrated being provided on the inner side of each of the vertical members and below the adjacent horizontal member and each clamping device comprises a bracket **26** in the form of a gusset piece shown most clearly in Figures 2 and 3 and disposed in the angle between the horizontal and vertical members, the bracket extending between the two members and having its ends **27** secured permanently to both of these members so that it provides a reinforcement to the junction between the horizontal member **23** and each vertical member **21**, **22**.

Intermediate its ends the bracket is formed with a transverse opening **28** adapted to receive a transversely extending tubular ledger element **29** which is inserted in position by sliding it endwise and horizontally through the opening **28**.

Adjacent to the opening and intermediate the ends thereof the bracket **26** is formed with an integral threaded socket **30** in which works a

clamping screw 31 and the inner end of the clamping screw is rotatably connected to a pressure plate 32 curved to engage with the tubular ledger element 29, the pressure plate being provided along opposite edges with spaced ears 33 which engage one on each side of the bracket so as to prevent the plate from rotating when the screw is turned, turning being effected by means of a tommy bar which is inserted within the eye 34 of the screw so as to clamp the ledger element tightly to the frame unit.

The bracket 26 by its connection to both the horizontal and vertical members of the frame unit serves to retain the ledger element in position on the frame unit while the clamping screw 31 is being tightened.

Each frame unit is further provided with a pair of diagonal bracing members 35 which extend from the lower part of the vertical members to the medial part of the horizontal member 23.

In utilizing such frame units for the supporting of a substantially horizontal platform or staging for use, for example, in the construction of a wall a number of similar units would be taken and disposed in transversely and horizontally spaced relationship as shown in the lower part of Figure 1, the units being connected rigidly together by placing the horizontal transversely extending ledger elements 29 in position and then tightening the clamping screws of the built in clamping device 25.

The horizontal platform or staging formed of the battens 24 would then be laid upon horizontal members 23 of the lower units shown in Figure 1 with the battens extending transversely of the said horizontal members.

In order to enable the height of the staging to be increased as the height of the wall increases, each frame unit is provided with an adjustable support comprising a pair of vertical metal bars 36 of polygonal section twisted about its axis to form in effect a multiple start screw thread having a very large pitch in relation to its diameter, the lower end of each bar being connected to a horizontal plate 37, which plates form feet for engaging with the ground and the upper part of each bar extends within one of the vertical tubular members of each frame.

Each bar is further provided with a pair of socket members 38 having an external formation of shape corresponding to that of the twisted bar and provided each with a locking screw 39, the inner end of which is adapted to act upon one face of the bar.

The upper of each of these two sockets 38 is provided on each side with a pair of upstanding part-circular flanges 40 to locate it in relation to the lower end of the adjacent tubular member and each of the upper sockets 38 is adapted to engage with the lower end of said member so that by loosening the screws 39 and raising both sockets along their respective bars the structure formed by the so assembled frame units can be secured at varying heights in relation to the ground and raised as the height of the wall increases.

In order to enable the height of the staging or platform formed by the battens 24 to be increased still further, for example, as the height of the wall increases a provision is made to enable further sets of frame units to be mounted in vertical superposed relationship upon the lower set of units indicated in Figure 1 and for this purpose the upper end of each of the vertical tubular members 21, 22 is made of reduced section to provide at this end a spigot 41 adapted to engage within the socket 42 provided by the lower end of the vertical members of the unit immediately thereabove as will be apparent from Figures 1 and 3 of the drawings so that the unit frames can be assembled detachably one above the other in the manner illustrated.

In the modified construction shown in Figure 4 of the bracket 26 forming part of the clamping devices 25 is secured permanently to the vertical member only of the frame unit adjacent to its junction with the horizontal member 23, the free end 43 of the bracket carrying the clamping screw 31 and its associated pressure plate 32 with the end 43 spaced sufficiently from the horizontal member 23 to enable the ledger element 29 to be inserted therebetween by a horizontal movement transverse to its length instead of only by an axial movement as in the preceding construction. In this arrangement the ears 33 are provided on one side only of the pressure plate 32.

In each of the above described constructions the diameter of the horizontal member 23 is made somewhat less than the diameter of the vertical members 21, 22 of the frame unit, which latter diameter is the same as the diameter of the other scaffolding elements used in building up the structure and in the arrangement shown in Figures 1 to 3 the configuration of the opening 28 in relation to the adjacent vertical member of the frame unit, is such that with the ledger element 29 tightly clamped the distance between the upper surface of the latter and the upper surface of the horizontal member 23 corresponds to the diameter of such scaffolding element, there being a small clearance indicated at 44 between the upper surface of the element 29 and the lower surface of the member 23.

In the modified arrangement shown in Figure 4 it is consequently necessary to provide on the under surface of the member 23 a distance piece 45 of a thickness corresponding to such clearance, which distance piece may be welded in position.

With either form the arrangement is such that the ledger elements 29 are supported by the clamping devices 25 in such a position that when another scaffolding element known as a putlog element is laid transversely across the ledger elements 29 and of a diameter corresponding to the diameter of the ledger elements, its upper surface will be level with the upper surface of the members 23 to provide a level support for the battens 24.

This will be understood from a consideration of Figures 1 and 8 of the drawings in which the putlog elements in the form of short metal tubes of the same diameter as the ledger elements are indicated at 46 extending parallel to and intermediate the horizontal members 23 with their upper surfaces level with the upper surfaces of the members 23 as shown in Figure 8. The putlog elements are secured to the ledger elements by putlog clamps 47, the construction of which clamps forms the subject of patent application No. 712,482, filed November 27, 1946, and the length of the putlogs is the same as or slightly greater than the length of the horizontal members 23.

In Figure 5 is shown a slightly modified form of unit frame in which the diagonal bracing members 35 are omitted and replaced by a pair of vertically spaced horizontal bracing members 48.

This construction is particularly suitable for

supporting substantially horizontal a trestle platform for use, for example, in the plastering, distempering or painting of walls or ceilings of buildings wherein considerable variation in the height of the platform is frequently required, although the arrangement may be used for supporting any other platform or staging wherein vertical adjustment is necessary.

In this construction vertical adjustment is obtained by the use of helically twisted bars **36** as in the preceding arrangement but the bars are supported on a more robust base than in the construction shown in Figure 1, the base comprising a pair of vertical tubular members **49** within which the lower ends of the bars are secured or alternatively placed so that they extend for the full length of the said members, the latter being provided with feet **37** and connected by a pair of horizontal bracing members **50**.

In this arrangement the upper end of each of the vertical members, **21**, **22** of the frame unit are spigoted as in the previous construction and the internal diameter of the spigot **41** is less than the diameter of the twisted bar **36** so that the maximum vertical adjustment cannot be greater than the length of the vertical member of the frame unit.

A much greater vertical adjustment is obtained with the alternative construction shown in Figure 6 in which the spigots are omitted and twisted bars **36** of a considerably greater length than in the preceding constructions are used, the bar projecting through and beyond the upper end of each of the vertical tubular members **21**, **22** along the length of which bars the frame unit can be adjusted in the manner already described.

In this construction the frame unit is provided with a second horizontal member **23** which joins the two vertical members near their lower ends, a second pair of clamping devices **25** being provided adjacent the junction of the two members so as to provide for a second set of ledger elements **29** for connecting a number of these frame units together in horizontally spaced transverse relationship. The twisted bars are again provided with feet **37** for engaging with the ground.

The construction shown in Figure 6 is particularly suitable for supporting shuttering for use in the construction of walls or the like from concrete or similar material which is confined during setting by removable shuttering plates, the concrete or similar material being poured in stages and the shuttering plates being raised bodily periodically so that their upper edge maintains a substantially constant relationship to the upper surface of the cast material, the shuttering used being of such a height that the cast material progressively uncovered by the lower edge of the shuttering plates has had time to solidify, this progressive elevation of the shuttering plates permitting the use of a shuttering assembly whose height is only a fraction of that of the wall or the like to be built.

The application of the construction shown in Figure 6 to the construction of such walls is depicted in Figure 7 wherein the wall in process of construction is shown at **51** and the twisted bars **36** are arranged in two rows namely, an inner row close to the wall and an outer row spaced therefrom with the vertical members **21**, **22** of each frame unit mounted on the inner and outer rows respectively.

To the inner tubular members **21** are attached shuttering plates **52** which may be constructed and arranged as described in prior U. S. A. patent

specification No. 2,396,174 and these shuttering plates are secured to the adjacent vertical member **21** by means of clamps **53**, distance pieces **54** being provided between the outer face of the plates and the adjacent vertical member.

The upper horizontal member, or if desired, the lower horizontal member **23** of the frame unit carries transverse battens **24** which extend for the full length of the wall to provide a platform for the workmen during the operation of pouring the concrete or the like and the frame units disposed at spaced intervals along the length of the wall are raised progressively carrying the shuttering plates with them as the casting operation proceeds, raising being effected by adjusting the socket members **38** along the length of the bars **36**, only one set of socket members being provided in the arrangement shown.

In Figure 9 there is shown a more rigid form of scaffolding structure embodying the frame units **20** than is the case with any of the constructions so far described, which structure is used for the purpose of supporting a vertically adjustable platform or staging and in this arrangement the spaced frame units **20** in addition to being joined by transverse ledger elements **29** are joined also by transversely disposed connecting frames **55** of a form similar to the frame units **20**, with the exception that the clamping devices **25** are omitted, although in place of the connecting frames **55** frame units **20** including clamping devices can be utilised if so desired.

These connecting units include vertical tubular members **56** connected rigidly by horizontal tubular members **57** and provided also with diagonal bracing members **58** as in the construction shown in Figure 1 and the vertical members **56** are secured to the vertical members **21**, **22** of the frame units by means of a special form of scaffolding clamp indicated generally at **59** in the drawings, which clamp serves to secure the members **56** and **21** or **22** in abutting parallel relationship. The clamp **59** forms the subject of patent application Ser. No. 691,932 filed August 21, 1946.

This abutment between the members **25** and **21** or **22** is permitted by reason of the fact that the overall width of both forms of the clamping devices **25** in a direction along the length of the ledger elements **29** is less than the diameter of the vertical members **21**, **22** so that the clamping devices do not project transversely of the units beyond said vertical members as will be apparent from Figure 8.

The upper ends of the members **56** of the connecting units are spigoted in a manner similar to the upper ends of the members **21**, **22** and are made of the same length as these members and the clamps **59** further serve to secure the spigots **41** of the members **21**, **22** and **56** to the tubular lower ends **42** of the corresponding members immediately thereabove as shown more particularly in Figure 10.

What I claim then is:

1. A scaffold frame unit comprising two vertical tubular members, a horizontal member connecting said vertical members rigidly and permanently together, said horizontal member being adapted to engage and support a substantially horizontal platform or staging extending transversely of said frame unit, a pair of clamping devices secured permanently to the frame unit and adapted for clamping engagement with tubular scaffolding elements extending transversely and horizontally of the frame unit to secure the

latter to a second similar unit or other structure; said clamping devices being disposed one adjacent to each junction between the said horizontal and vertical members of the frame unit, each clamping device comprising a bracket disposed in the angle between the said horizontal and vertical members and extending between said members to each of which it is permanently secured to provide a reinforcement for said junction, the bracket having a transverse opening to receive the transverse scaffolding element by a movement along its length, said bracket having also adjacent to said opening a threaded socket, a clamping screw working in said threaded socket, a pressure plate on said clamping screw, the latter being rotatable relative to said plate, said plate being adapted for clamping engagement with said transverse scaffolding element, and said plate having a pair of spaced ears adapted to engage one on each side of said bracket.

2. A scaffold frame unit comprising two vertical tubular members, a horizontal member connecting said vertical members rigidly and permanently together, said horizontal member being adapted to engage and support a substantially horizontal platform or staging extending transversely of said frame unit, a pair of clamping devices secured permanently to the frame unit and adapted for clamping engagement with tubular scaffolding elements extending transversely and horizontally of the frame unit to secure the latter to a second similar unit or other structure, said clamping devices being disposed one adjacent to each junction between the said horizontal and vertical members of the frame unit, each clamping device comprising a bracket disposed in the angle between the said horizontal and vertical members, said bracket being secured permanently at one end to one of the said two members and having its other end spaced sufficiently from the other member to permit of the tubular scaffolding element being disposed in said clamping device by a movement transverse of the length of said member, said bracket having at its said other end a threaded socket, a clamping screw working in said threaded socket, a pressure plate on said clamping screw, the latter being rotatable relative to said plate, said plate being adapted for clamping engagement with said transverse scaffolding element, and said plate having a pair of spaced ears adapted to engage one on each side of said bracket.

3. A scaffold frame unit comprising two vertical tubular members, a horizontal member connecting said vertical members rigidly and permanently together, said horizontal member being adapted to engage and support a substantially horizontal platform or staging extending transversely of said frame unit, a pair of clamping devices secured permanently to the frame unit and adapted for clamping engagement with tubular scaffolding elements extending transversely and horizontally of the frame unit to secure the latter to a second similar unit or other structure, said clamping devices being disposed one adjacent to each junction between the said horizontal and vertical members of the frame unit, each clamping device comprising a bracket disposed in the angle between the said horizontal and vertical members and extending between said members to each of which it is permanently secured to provide a reinforcement for said junction, the bracket having a transverse opening to receive the transverse scaffolding element by a movement along its length; said bracket having also adjacent to said opening a threaded socket, a clamping screw working in said threaded socket, said clamping screw being adapted for clamping engagement with the said transverse scaffolding element, a support upon which the frame is mounted for adjustable vertical movement, said support comprising a pair of vertical metal bars extending into each vertical tubular member of the frame unit, means for supporting said bars in a vertical position on the ground or other external support, each of said bars being of polygonal section and being twisted about its axis to form in effect a multi-start screw thread having a very large pitch in relation to its diameter, a socket member on each of said bars of corresponding shape engaging the lower end of each vertical tubular member, and each socket member carrying a clamping screw adapted to act on one face of the twisted bar so as to secure the frame unit in its adjusted position.

4. A scaffold frame unit comprising two vertical tubular members, a horizontal member connecting said vertical members rigidly and permanently together, said horizontal member being adapted to engage and support a substantially horizontal platform or staging extending transversely of said frame unit, a pair of clamping devices secured permanently to the frame unit and adapted for clamping engagement with tubular scaffolding elements extending transversely and horizontally of the frame unit to secure the latter to a second similar unit or other structure, said clamping devices being disposed one adjacent to each junction between the said horizontal and vertical members of the frame unit, each clamping device comprising a bracket disposed in the angle between the said horizontal and vertical members, said brackets being secured permanently at one end to one of the said two members, and having its other end spaced sufficiently from the other member to permit of the tubular scaffolding element being disposed in said clamping device by a movement transverse of the length of said member, said bracket having at its said other end a threaded socket, a clamping screw working in said threaded socket, said clamping screw being adapted for clamping engagement with the said transverse scaffolding element, wherein said plurality of horizontally and transversely spaced scaffold frame units are connected together by horizontal tubular ledger elements extending between the frame units and secured thereto by the said clamping devices, and the said horizontal members of the spaced frame units being adapted to support a substantially horizontal platform or staging extending transversely of the spaced frame units.

5. A scaffold frame unit comprising two vertical tubular members, a horizontal member connecting said vertical members rigidly and permanently together, said horizontal member being adapted to engage and support a substantially horizontal platform or staging extending transversely of said frame unit, a pair of U-shaped brackets disposed each in the angle between the said horizontal and vertical members, the limbs of each bracket having their free ends secured permanently and rigidly one to the horizontal member and the other to the adjacent vertical member, the limbs of each bracket being spaced apart relatively to receive therebetween a tubular scaffolding element extending transversely and horizontally of the frame unit;

said bracket member being joined by a connecting part, a nut associated with said connecting part, a clamping screw working in said nut and adapted to apply clamping pressure to the transverse tubular scaffolding element and secure the same in the said angle between the horizontal and adjacent vertical members of the frame unit.

6. A scaffold frame unit comprising two vertical tubular members, a horizontal member connecting said vertical members rigidly and permanently together, said horizontal member being adapted to engage and support a substantially horizontal platform or staging extending transversely of said frame unit, a pair of clamping devices secured permanently to the frame unit and adapted for clamping engagement with tubular scaffolding elements extending transversely and horizontally of the frame unit to secure the latter to a second similar unit, said clamping devices being disposed one adjacent to each junction between the said horizontal and vertical members of the frame unit, each clamping device comprising a bracket disposed in the angle between the said horizontal and vertical members, each bracket being secured permanently and rigidly to one of said frame unit members, each of said brackets co-operating with the respective vertical and horizontal member adjacent said angle in providing an opening to receive one of said transverse scaffolding elements, a nut rigid with each of said brackets, a clamping screw working in said nut, a pressure plate on said clamping screw, the latter being rotatable relative to said plate, said plate being adapted for clamping engagement with said transverse scaffolding element, and means on said plate adapted to engage with said bracket to prevent rotation of said plate.

7. A scaffold frame unit comprising two vertical tubular members, a horizontal member connecting said vertical members rigidly and permanently together, said horizontal member being adapted to engage and support a substantially horizontal platform or staging extending transversely of said frame unit, a pair of clamping devices secured permanently to the frame unit and adapted for clamping engagement with

tubular scaffolding elements extending transversely and horizontally of the frame unit to secure the latter to a second similar unit, said clamping devices being disposed one adjacent to each junction between the said horizontal and vertical members of the frame unit, each clamping device comprising a bracket disposed in the angle between the said horizontal and vertical members, each of said brackets co-operating with the respective vertical and horizontal member adjacent said angle in providing an opening to receive one of said transverse scaffolding elements, each of said brackets comprising a substantially flat plate disposed with its plane vertical and parallel to the axes of each of said frame unit members, a nut rigid with each of said bracket plates, a clamping screw working in said nut, a pressure plate on said clamping screw, the latter being rotatable relative to said plate, said plate being adapted for clamping engagement with said transverse scaffolding element, means on said plate adapted to engage with said bracket to prevent rotation of said plate, and said clamping devices having an overall width such that they do not project transversely beyond the vertical members of the frame unit, for the purpose specified.

ALBERT HENRY HAWES.

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