

Jan. 21, 1947.

C. K. LAMB

2,414,538

SAFETY SCAFFOLD

Filed June 11, 1945

6 Sheets-Sheet 1

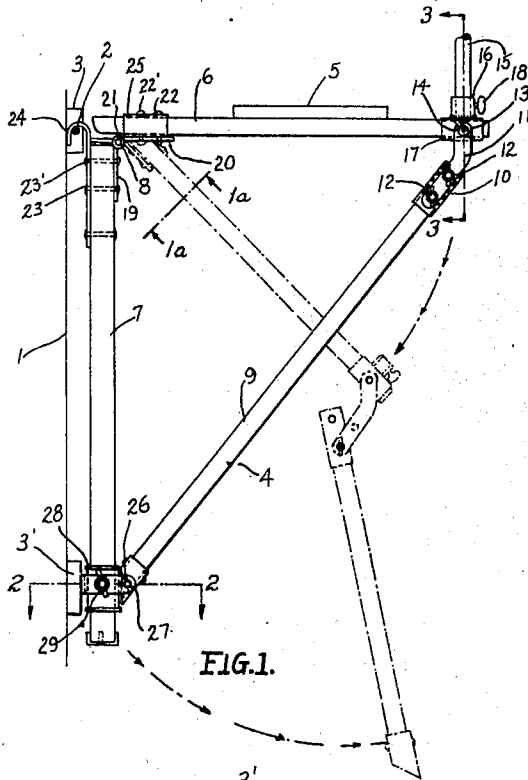


FIG. 1.

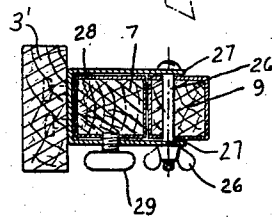


FIG. 2.

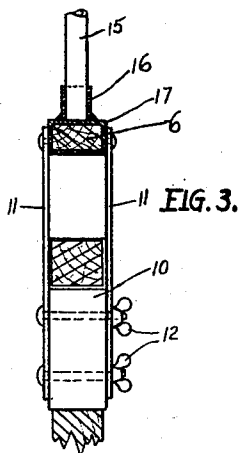


FIG. 3.

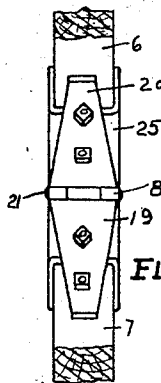


FIG. 1A.

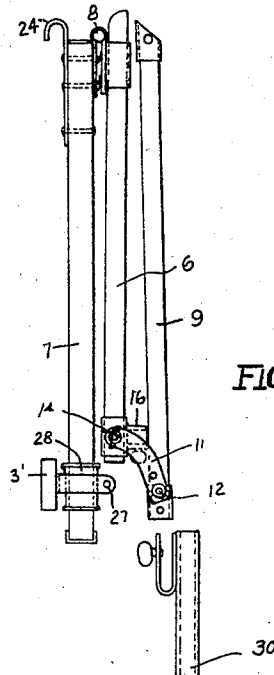


FIG. 4.

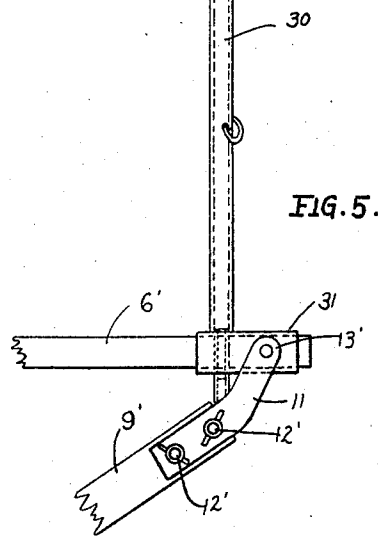


FIG. 5.

INVENTOR.
Clyde K. Lamb
BY Frank M. Slough
His ATTORNEY.

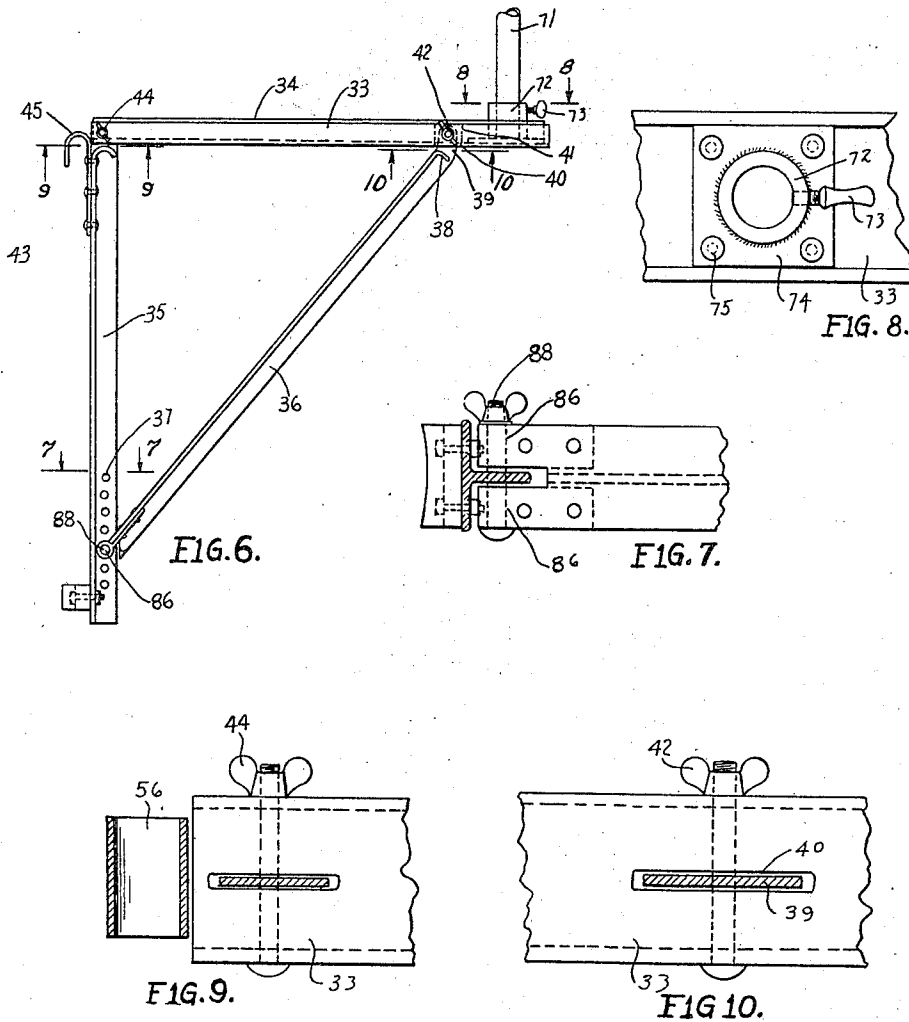
Jan. 21, 1947.

C. K. LAMB
SAFETY SCAFFOLD

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6 Sheets-Sheet 2



Clyde K. Lamb. INVENTOR.
BY Frank T. Slough.
HIS ATTORNEY.

Jan. 21, 1947.

C. K. LAMB

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SAFETY SCAFFOLD

Filed June 11, 1945

6 Sheets-Sheet 3

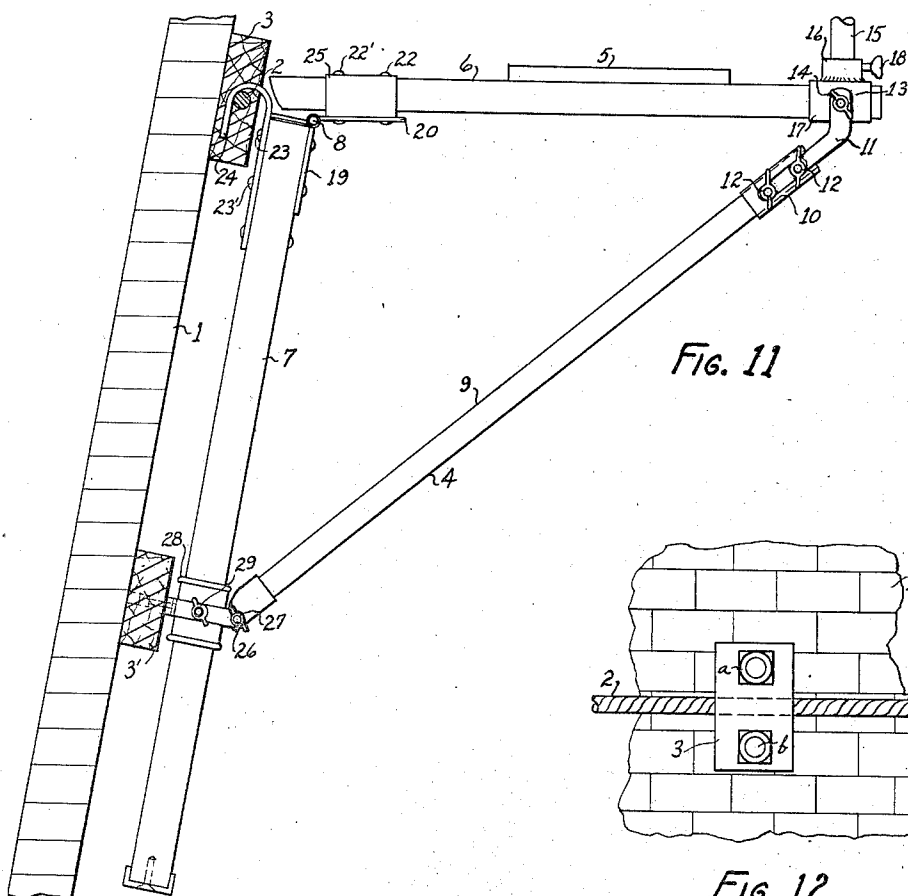


Fig. 11

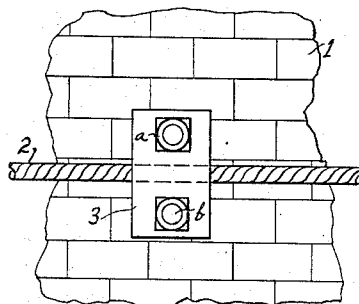


Fig. 12

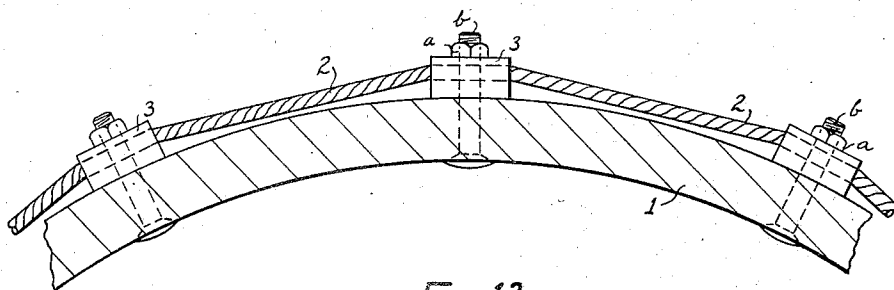


Fig. 13

INVENTOR.

CLYDE K. LAMB

BY

W. Frank T. Slough
att'y.

Jan. 21, 1947.

C. K. LAMB
SAFETY SCAFFOLD

2,414,538

Filed June 11, 1945

6 Sheets-Sheet 4

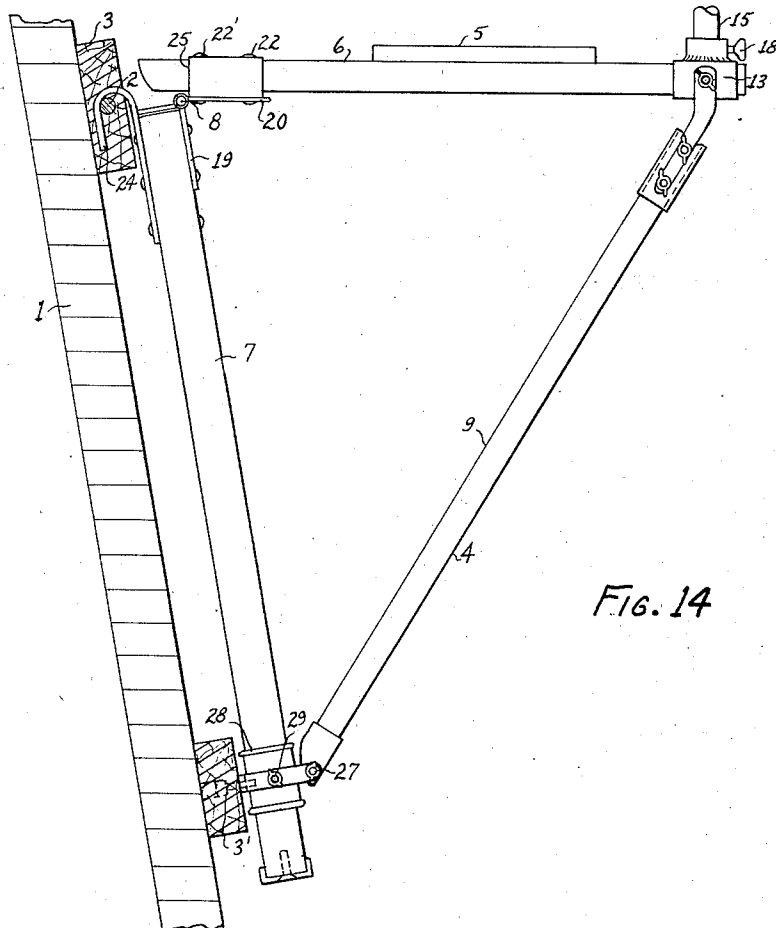


FIG. 14

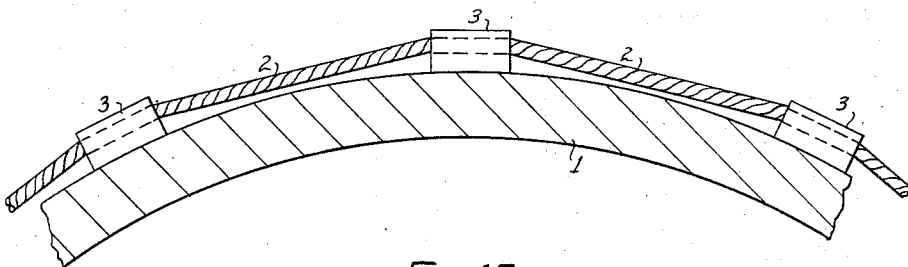


FIG. 15

INVENTOR.
CLYDE K. LAMB
BY Frank T. Slough.

Jan. 21, 1947.

C. K. LAMB

2,414,538

SAFETY SCAFFOLD

Filed June 11, 1945

6 Sheets-Sheet 5

FIG. 16

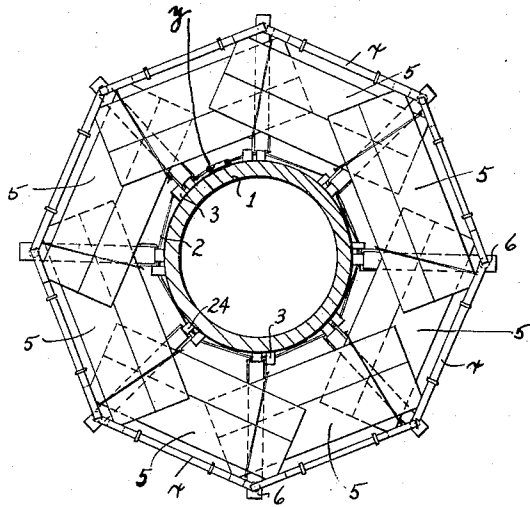


FIG. 17

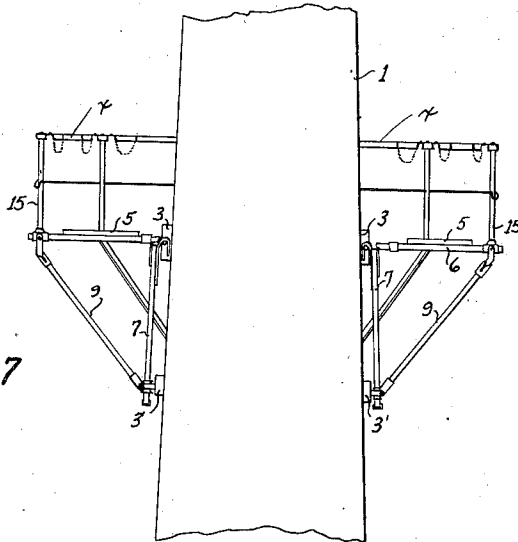
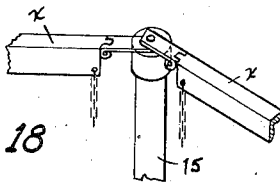


FIG. 18



INVENTOR.
CLYDE K. LAMB
BY Frank M. Slough
att.

Jan. 21, 1947.

C. K. LAMB

2,414,538

SAFETY SCAFFOLD

Filed June 11, 1945

6 Sheets-Sheet 6

FIG. 19

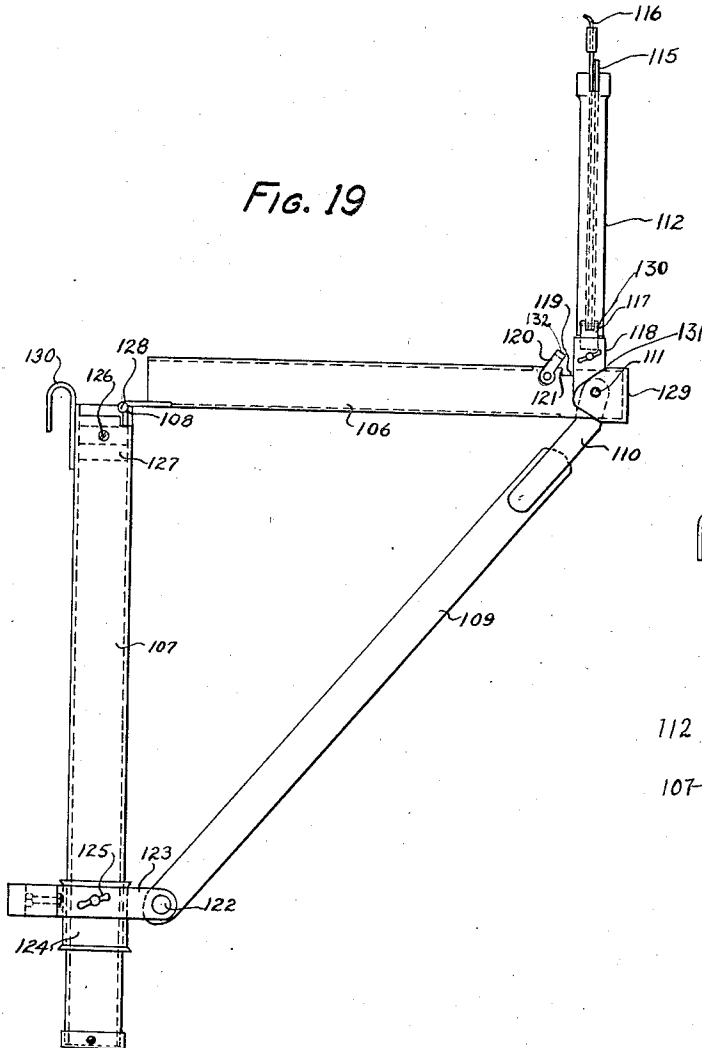
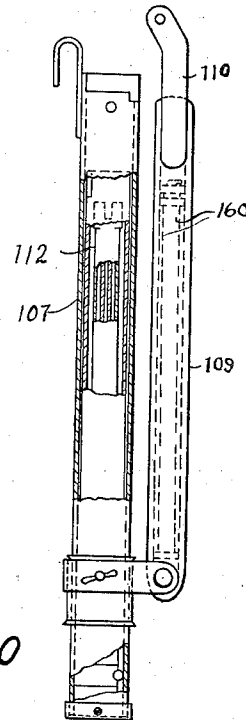


FIG. 20



Clyde K. Lamb INVENTOR.

BY Frank T. Slough.

UNITED STATES PATENT OFFICE

2,414,538

SAFETY SCAFFOLD

Clyde K. Lamb, Cleveland, Ohio, assignor to The Safety Scaffold Corporation, Cleveland, Ohio, a corporation of Ohio

Application June 11, 1945, Serial No. 598,682

6 Claims. (Cl. 304—13)

1

My invention relates to safety scaffolds for construction, repair and maintenance work, and relates more particularly to the provision of scaffolds particularly adapted for use on stacks, chimneys, tanks, and the like.

It is an object of my invention to provide a scaffold adapted for such use, which is efficient and which is adjustable to accommodate various size stacks, chimneys, etc., and regardless of the degree of inclination of such structure.

Another object of my invention is to provide an adjustable scaffold of the type described, which is adapted to be carried or transported from one structure to another or to different positions on the same structure in a compact unit, or to be passed through small openings in structure just completed.

Another object of my invention is to provide a folding scaffold of the type described.

Another object of my invention is to provide a scaffold both adjustable and folding, and which is adapted for use where it is desired to assemble or disassemble at the place of use. Certain difficulties are sometimes encountered in both moving scaffolds of the type described, inside of tanks for interior work, and removing such scaffolds after the work is completed.

Another object of my invention is to provide a scaffold bracket adapted for use of supporting scaffolding, which scaffold is of simple form and adapted to be readily assembled and folded into compact form when not in use, and wherein the connections for such bracket can be transported with the bracket.

Other objects of the invention, and the invention itself, will become more apparent after consideration of the following description and drawings, wherein:

Fig. 1 is a fragmentary elevational view of a bracket of my invention in which figure dotted lines are used to illustrate a position which the bracket will assume either in folding or assembly;

Fig. 1a is a view taken from the plane 1a—1a of Fig. 1;

Fig. 2 is a view taken from the plane 2—2 of Fig. 1;

Fig. 3 is a view taken from the plane 3—3 of Fig. 1;

Fig. 4 is an elevational view of the bracket of Fig. 1, in its completely folded position;

Fig. 5 is a view of Fig. 1 but showing a modification thereof consisting in a different type of post being mounted therewith;

Fig. 6 is an elevational view of another embodiment of my invention, wherein the upright

2

and connecting brace members of the bracket are adapted to have adjustable relation to each other, and shows novel means employed therefor;

Fig. 7 is a view taken on the plane 7—7 of Fig. 6;

Fig. 8 is a view taken on the plane 8—8 of Fig. 6;

Fig. 9 is a view taken on the plane 9—9 of Fig. 6;

Fig. 10 is a view taken on the plane 10—10 of Fig. 6;

Figs. 11 and 14 are views of the bracket of Figs. 1 to 4 inclusive applied in oppositely inclined relation to the oppositely inclined outer surfaces of a tapered stack or chimney, in both of which cases the platform-supporting part is maintained in horizontal position;

Fig. 12 is a side elevational view of the stack or chimney of Figs. 11 and 13;

Figs. 13 and 15 show transverse cross sectional views of a segment of the stack or chimney wall, and the bracket supporting cables in place thereon, Fig. 13 being applicable to Fig. 11, and Fig. 15 being applicable to Fig. 14;

Fig. 16 illustrates all guard rail posts and brackets applied to a stack section such as shown in Figs. 14, 15 and 17;

Fig. 17 is a side elevational view of a stack or chimney having an upwardly tapered outer surface, as indicated in Fig. 1, with a plurality of brackets, with guard rail posts and guard rails in position, one-half of the bracket and guard rail structure being omitted to better show the illustrated brackets and guard rail structures; and

Fig. 18 is an isometric view at the junction of two guard rail sections at the top of a post illustrated in Fig. 17.

Fig. 19 is an elevational view of a further embodiment of my invention, in operative position, wherein the parts thereof are adapted to have adjustable relation to each other in accordance with the inventions of the forms of Figs. 1, 5 and 6, and also a telescoping action when in inoperative position;

Fig. 20 is an elevational view, partly in section, of the bracket of Fig. 19 in its inoperative position.

This application is a continuation in part of applicant's previous application for Letters Patent, Serial No. 339,877 filed June 11, 1940, now abandoned.

With reference to the drawings, in all of which like parts are designated by like reference characters, in Figs. 1 to 4 inclusive, I show a preferred embodiment of my invention. At 1, I illustrate generally the outline of a structure upon

which brackets of my invention are adapted to be mounted. A supporting cable 2 having a plurality of spaced blocks 3 secured thereto encircles the work but is maintained slightly spaced therefrom by the blocks 3 and is drawn taut by the use of a turnbuckle or the like.

Supported by the cable 2 are a plurality of brackets 4, generally triangular in form, the number of brackets being optional and largely dependent upon the cross sectional contour and size of the work. The brackets 4 form supports for a preferably continuous platform 5 surrounding the work formed by laying boards over the horizontally extending arms 6 of the brackets. The brackets illustrated are preferably formed of wood although metal may be employed, if desired, and metal connections are preferably employed to connect the adjacent portions comprising the said triangular brackets. Each bracket consists of the horizontally disposed outwardly extending arm 6 described, an upright portion 7 hingedly secured thereto as at 8 and a brace 9 interconnecting the said upright portion 7 and the horizontally extending portion 6, the connection between said brace and said horizontally extending portion being pivotal in type and consisting of a socket 10 adapted to be telescoped over the upper terminus of said brace and a pair of arms 11 adapted to be secured to said socket and to said upright by nut and screw means 12, said arms extending upwardly of said socket and brace connection and curved inwardly adjacent their free ends 13. Said arms are, further, adapted to have pivotal connection at such free ends with the horizontally extending portion 6 by means of screw and nut means 14 adapted to be projected through said horizontally extending portion and to hold said spaced arms and said horizontally extending portion rigidly together when said bracket is in its operative assembled position and to permit the brace to pivot about said horizontally extending portion when the brace is in its disassembled collapsible position, as will later be more fully described.

Socket means are disposed upon said horizontally extending means which are adapted to receive an upwardly extending post, as shown at 15, and consist in a socket 16 disposed at right angles to a socket 17 adapted to receive the outwardly extending end of said horizontally disposed portion 6, said horizontally extending portion and socket 17 reinforcing the seat of said first described post receiving socket 16.

A thumb screw 18 is adapted to be projected through a lateral wall of said socket 16 whereby the post may be rigidly secured within said socket and suitable cable or guard rail means may be employed in connection with the post of the scaffold described.

The hinge connection, previously referred to as shown at 8, connecting the opposite end of the horizontally extending portion and the upright is formed, as shown in Figs. 1, 1a and 4 particularly, by a pair of metal members 19 and 20 having curved trunnion receiving end portions through which the bearing 21 is projected; each of said arms 19 and 20 is secured by screw or bolt means 22 and 22', 23 and 23' to the horizontally extending portions and the upright portion respectively.

The hook 24 engageable with the cable 2 and which is adapted to secure the bracket to the work is secured to the upright 7 by means of the securing means 23 and 23'. A socket 25 is further connected to the strap 20 and the horizontally extending portion 6 by means of the secur-

ing means 22—22' securing the said strap to the upright.

The brace, in turn, is secured to the upright by securing means 26 projected through the end of said brace, which end is sheared at an angle to enable it to take a plurality of adjusted positions, and through arms 27 of an adjustable metal band 28 which is telescoped over the upright 7 and is adapted by means of loosening or tightening the thumb screw 29 to be adjustable vertically of said upright thereby accommodating the bracket to different inclinations of varying diameters of the work structure.

It is to be noted that blocks 3' are secured to said element 28 whereby the upright at this point is also maintained slightly spaced from the work. In operation, when it is desired to take down the scaffold, the securing pin 28 and associated wing nut are removed from the arms 27 of the adjustable metal band 28 and are removed from the brace. When the brace is thereafter removed from its contact with the upright portion, the screw and nut may then be placed in the perforations in said arms 27 for safekeeping and the thumb screw and nut 13 is then loosened and the brace pivoted about the end of the horizontal portion, after first removal of one of the pair of screws and wing nut connections 12, which, for safekeeping, are preferably secured in the perforation provided through the lower end of the brace. Thereupon, the brace assumes the folded position shown in Fig. 4 by means of the hinged connection between the horizontal and the upright, and the upright, and the rotative movement of the brace about the outer end of the horizontally extending portion.

It is to be noted that the post end of the brace in the folded position protects the post socket and the unit is a compact assembly of the several portions of the bracket.

In Fig. 5, a different type of post is shown, which post may be associated with the bracket of Fig. 1, this post 30 being adapted to be projected through a socket 31 telescoped over the outer end of the horizontal member 6' and adapted to be further projected through the horizontal member and to be secured to the end of the brace 9'. The arms 11 of Fig. 1 are, in the form shown in Fig. 5, secured at their upper free ends 13' to the socket rearwardly of the point of projection of the post through said socket and a pair of screw and wing nut connections 12' are employed in the manner of the securing means 12—12 of Fig. 1.

The form of my invention illustrated in Figs. 5, 6, 7, 8, 9 and 10 is generally similar to that form shown in Fig. 1 but in this embodiment, I preferably employ a metal channel portion 33 adapted to seat a horizontally disposed member 34 preferably of wood and which is disposed lengthwise thereof, and utilize a pair of metal T-shaped members to form the upright 35 and the brace 36.

The connection between the upright and the brace adjacent the lower ends is a hinging one and adjustable, somewhat in the manner of that of the form shown in Fig. 1 but in this embodiment is accomplished by providing an eye 36 at the lower end of the brace adapted to be aligned with any of the perforations 37 disposed lengthwise of the upright and to be secured by a bearing 38 or pin or screw means 38 adapted to be projected through the eye of the brace within the aligned perforation in said upright.

The brace, at its upper end, preferably has the arms of the T bent back, as shown at 33, and the 75 center reinforcing portion of the T curved, as

5

shown at 39, and adapted to be projected through aligned slots 40 and 41 disposed in the post ends of the metal channel and wooden horizontal member. Said curved portion of the brace is further provided with an aperture which is aligned with apertures in the channel and horizontal member through which screw means are adapted to be projected to secure the said members and the brace together, which screw means are adapted to act as a hinge about which the brace is adapted to move whereby, upon adjusting the brace to assume different positions with relation to the upright by means of the selection of different of the apertures 37 disposed vertically of said upright, the brace 36 may accommodate itself to the preferred adjustment without effecting the horizontal position of the platform mounted upon the horizontally extending member.

In connection therewith, it is to be noted that the slots provided in said channel and horizontally extending portions are of substantially greater extent than the end members of the curved upper portion of the brace inserted there-through whereby the said portions are adapted to have rotating movement in said slot about the screw means, the curved ends 38 cooperating therewith, this, as stated, being highly advantageous in view of the adjusted positions permitted by the hinging adjustable connections between the brace and the upright and said rotation is in a certain sense, as described, also a hinging connection between the horizontally extending portions and the brace and said bracket is thus adapted to various degrees of inclination which may be encountered on the structure which is adapted to be worked upon.

A similar rotative connection is provided at the inner or hook end of the horizontally extending portions wherein the said upright is adapted to pivot about curved portions 43 of the T comprising the upright and which are provided adjacent the upper ends of the upright by bending back the arms of the said T. Said upright is further adapted to have rotating or hinging movement within said slots about screw means 44 projected through apertures provided within said channel, horizontally extending portion and hook end of the upright.

In a similar manner to that provided at the post end of the bracket in the brace and the said channel horizontally extending portion, the said slots in the channel and horizontally extending member are provided at the hook end of greater extent than the width of the upper end of the T-shaped member composing the upright and the said end of the T is also curved to provide rotating as well as hinging movement therein.

To take down the structure of Figs. 6 to 10 inclusive, the channel and its associated horizontally extending portion is removed from the upright and the brace means secured thereto by removing the screw means 42 and 44 and then removing the brace 36 from its connection with the upright by removal of the pin means or bearing 88. Thus, the bracket of Fig. 6 is not a folding bracket as the bracket illustrated in Fig. 1, but is an adjustable bracket as the bracket of Fig. 1 is adjustable.

In Figs. 11 to 13 inclusive, the stack section 1 is tapered downwardly; in other words, the walls extend upwardly divergently. The bracket of Figs. 1 to 4 inclusive is shown as applied to the outer walls of such a stack and, in such a case, the cable 2 is preferably permanently attached to the stack at equally spaced intervals proceed-

6

ing vertically, the supporting blocks 3 being secured by bolts *a* and *b* which extend through the stack wall 1, as best shown in Figs. 12 and 13.

It is to be noted that the angle between the bracket arms 6 and 7 defines an obtuse angle in the case of Fig. 11, the sleeve 28 being disposed relatively more upwardly on the arm 7 than in the case of Fig. 14.

From the above, it will be understood that the angle included between the arms 6 and 7 is a right angle when the brackets are applied to a vertical wall. In this case, the inclination of the chimney is compensated for so that the bracket arms 6 with the load supported thereby which includes the posts 15, guard rails *x* platform planking 5 and any load supported by said platform planking, is maintained in a horizontal position. The angle defined by the bracket arms 6 and 7 is an acute angle, the adjustable sleeve 28 extending to a relatively downward position on the arm 7.

In Figs. 14 to 18 inclusive, I have illustrated the elements involved in the mounting onto an upwardly tapered stack or chimney wall, the wall being illustrated in the different figures at 1, wherein equally spaced blocks 3 are first secured against the stack which, by means of the cable 2 passing through the blocks, are tightened by means of a turnbuckle *y*.

In the form of my invention illustrated in Figs. 19 and 20, I show a triangular bracket related to the forms of Figs. 1 and 5 in that it comprises a horizontally disposed outwardly extending arm 106, an upright portion 107 hingedly secured thereto as at 108 and a brace 109 interconnecting the said upright and horizontal members. The connection between the horizontal arm 106 and the brace 109 is pivotal in character and consisting of an extension 110 adapted to be bolted with-in the brace at its upper terminus and pivoted to the horizontal arm at its outer end by means of a bolt 111 projected therethrough. The horizontal upright and brace members are all preferably rectangularly tubular in form and, for purposes later disclosed herein, the horizontal arm 110 is of such relative dimensions to the tubular upright as to permit the same to be telescoped therein and likewise of such size relative to the post as to permit the same to be telescoped within the horizontal arm.

The tubular post construction, as shown at 112, is similar to that illustrated and claimed in my Patent No. 2,289,844 having a flanged head shown at 113 slotted as at 114 to permit movement therein and therethrough of guard rail members 115 and 116 pivoted together and anchored to a plunger 117 when telescoped within the said post 112.

As more fully described in my said patent, the guard rails are susceptible of being withdrawn from the tubular post 112, the lowermost plunger 117 to which they are relatively hinged attached by the pin 130 will rise interiorly to the top of the post 112, whereupon the guard rails may be rocked on the hinge pin 130 to their operative horizontal position for connection at their free ends, indicated uppermost in Fig. 19 for connection to the guard rails of other posts, as described in said patent.

The post 112 is preferably seated in a socket 118 mounted within an opening 119 provided in the upper part of the outer end portion of the horizontal member 106 and secured to said horizontal member by the bolt 111 projected through said member 106.

7
An additional box or end socket 120 is further telescoped over the end of the member 106 through which the bolt 111 is projected, wherefor the brace, by means of its extension 110 and the horizontal member 106, and post 112 are anchored. A latch 121 is further provided adapted to be rocked on the shoulder 121 disposed adjacent the opening 119 to rigidly retain the post in vertical position while in use, the end 132 of said latch abutting closely against the adjacent side of the socket element 118 whose opposite side is then firmly engaged with the edge 131 of the opening 119 of said horizontal frame element 106.

The brace 109 is pivotally secured, as at 122, to a clamp 123 telescoped over the adjustable metal band 124 and secured by thumb screw 125 thereto.

In collapsing the bracket for transportation or storage, toe boards 160, such as those shown in the patent above referred to, may be placed within the tubular brace which is detached from the horizontal member 106 by removing the bolt 111.

The post 112 is then telescoped within the member 106, the pin 126 then withdrawn from its connection with the upright 107 and plunger 127, which plunger carries a hinge 128 secured to the arm 106 at its inner end wherefor a hinging connection between the arm 106 and upright 107 in the manner of that of the form of Fig. 1 is achieved, and the entire assembly of post, guard rails and horizontal arm, telescoped within the upright 107.

Fig. 20 illustrates the complete folded telescoped relation of the several parts of the bracket and the guard rail structure with ancillary toe boards.

A cable hook 130 similar to hook 24, in the form of Fig. 1, achieves the improved operating results thereof in connection with the bracket of the forms shown in Figs. 19 and 20.

The stack, cable, blocks, scaffold flooring, as well as the guard rails and rail posts, shown in Figs. 11 to 18 inclusive, are all well known to the art, being herein shown more particularly for the purpose of illustrating the cable and hook connection between my improved bracket, and the attitude of the bracket flooring and posts, under varying conditions of common use, and whereby the folding scaffold bracket of my invention is peculiarly capable of achieving the claimed benefits when applied to stack, chimney and like structures which are not to be realized by any prior structures with which I am familiar.

My present invention therefore provides scaffolding comprising a plurality of triangular brackets circumferentially spaced around a stack or chimney section which may be outwardly inclined proceeding downwardly or upwardly and in all attitudes the upright is maintained parallel to the outer wall of the stack and the floor supporting arm is maintained level, to wit: at right angles to a vertical direction in which the force of gravity is most operative and this is achieved by an adjustable connection between the brace and one of the other arms, such as the preferred upright, thus, also, maintaining the guard rails vertical with the flooring horizontal.

The hinge connections are illustrated of the non-universal type whereby movement of any of the arms with respect to any other arms or the chimney or stack is always in a plane laterally radial to the stack.

Applicant has achieved another advantage in making the bracket of the folding type and by making the cable embracing hook of proper size

and form and its being secured to the upright arm of the triangular scaffold bracket has ensured that under no conditions of use is the outward pull effected by weight of the bracket or all load supported thereby of such nature as to cause or tend to cause disengagement between the bracket and the supporting cable.

In the appended claims, where reference is made to the angular relations between the load supporting bracket arm and the upright arm, it will be understood that such angularity is to be taken with respect to a straight line interconnecting the ends of said arms since, for example, the intermediate portions of the upright arm might depart from a straight line while still maintaining the end portions in their proper proportions to define such angularity, as set forth in the claims.

I am aware that numerous and extensive departures may be made from the form of my invention herein illustrated and described without however departing from the spirit of my invention and the scope of the appended claims.

I claim:

1. In a scaffolding structure particularly adapted for upstanding structures of the class comprising stacks and chimneys, having upwardly extending wall sections which are inclined to the vertical, the combination with a cable circumferentially encircling said structure, spacing and mounting means to secure the cable, in laterally spaced relation to said stack or chimney, a plurality of brackets adapted to be suspended from said cable in relatively spaced relation circumferentially of the stack, each of said brackets comprising three arms, said arms being a first or floor supporting arm, the second being an upright arm, and the third being a brace arm, said floor supporting arm extending horizontally radially outwardly from adjacent the outer wall of said structure, hinge means respectively secured to said first arm at its two end portions for hingedly interconnecting its respective end portion to the upper end portions of said upright and brace arm, and a third hinge means interconnecting the lower end of the brace arm to a lower portion of the upright arm, said third hinge means comprising securing means for adjustably securing it to the lower portion of said upright arm at any of a plurality of differently longitudinally located points on said lower portion of the upright arm, engagement means secured to a lower portion of said upright arm adapted to laterally bear against the outer wall surface of said structure, cable and bracket interconnecting means affixed to the upper end of the upright arm and comprising a hook element adapted to be hooked over said stack or chimney cable and comprising a free end disposed nearest said wall surface and extending downwardly between said wall surface and said cable by a sufficient length and at such an angle relative to the general direction of extent of said upright arm as to effectively prevent dislodgement of said hook from said cable when said first arm is weighted and resultingly in tensile stress and said brace arm is resultingly in compressive stress, said scaffolding also comprising a rail supporting post secured by a lower end to and extending substantially normal and upwardly from the region of each said bracket which is most remote from said structure, and guard rail means interconnecting the upper ends of said posts, said adjustable securing means for said third hinge and upright arm adapted to be adjusted to a proper point to the length of said upright arm

lower portion as to maintain said first arm level and said posts substantially vertical, and means to lock said securing means and upright arm in the desired adjusted position.

2. The scaffolding structure as set forth in claim 1 characterised by the provision of interconnecting hinge means between each of the adjacent interconnecting ends of each adjacent pair of arm ends being of the non-universal type whereby relative transverse movements of any arm with respect to any other arm is avoided.

3. The scaffolding structure as set forth in claim 1 characterised by said hook element comprising a pair of spaced hook arms interconnected by a yoke portion adapted to overlie the cable and said yoke portion being so formed that one of said arms may be rigidly secured to the upper end portion of the upright arm of the bracket and the other arm extending substantially parallel to said first arm and to such an extent as to protrude below said cable.

4. The scaffolding structure as set forth in claim 1 characterised by the guard post secured to each said bracket being removably rigidly affixed to an end portion of the first arm and extending at right angles thereto, the angular relation between the said first arm and said upright arm adapted to be made an acute angle when said bracket is applied to an upwardly tapering stack or chimney section and an obtuse angle when applied to a downwardly tapering stack or chimney section, said post being independent of the adjusted relative angularity of said first arm, and said upright arm being maintainable in a vertical attitude.

5. The scaffolding structure as set forth in claim 1 characterized by the three arms being tubular in form, the post structure being tele-

scoped within one of said arms and said arm being adapted to be telescoped into another of said arms when in non-operative position.

6. In a scaffolding structure particularly adapted for upstanding structures of the type comprising stacks and chimneys, a plurality of brackets circumferentially encircling said structure in relative spaced relation circumferentially of the stack, each of said brackets comprising three arms at least, a pair of said arms being tubular in form, one of said arms being a floor supporting arm, a second being an upright arm and a third being a brace arm, said floor supporting arm extending horizontally radially outwardly from adjacent the outer wall of said structure, hinge means secured to said floor supporting arm and to said upright arm for hingedly interconnecting said arms, adjustment means telescoped over said upright arm and movable longitudinally thereof to any of a plurality of adjusted positions, said brace arm being secured to said movable means, said brace means being pivotally secured to the outer end of said floor supporting arm, a post extending upwardly from said floor supporting arm adjacent the outer end thereof, said post having associated therewith and telescopicable therein guard rail means adapted to unite with guard rail means carried by posts mounted on said other brackets to form a complete guard rail assembly about said structure, said post and guard rail means being adapted to be telescoped within one of the said tubular arms and said arm being of such dimensions relative to said other arm as to be telescoped therein when the bracket is in folding non-operative position.

CLYDE K. LAMB.