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(54) IMPROVEMENTS RELATING TO BUILDERS SCAFFOLDING/

(71) We, KWIKFORM LIMITED, a British Company of Waterloo Road, Birmingham B25 8LE do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates to builders scaffolding structure of the kind comprising upright members connected together by cross members and including additional members inclined to the upright ends and/or cross members at other than 90°, which serve as braces to add rigidity to the whole structure, such scaffolding being hereinafter referred to as of the kind specified.

This invention is particularly concerned with an improved manner of securing such braces in scaffolding structures.

The invention has been developed particularly, but not exclusively, in relation to scaffolding of the kind specified in which the upright members are provided with socket members arranged in groups at spaced intervals along the lengths thereof, the cross members affording at opposed ends thereof connecting members adapted for releasably engaging with said socket members. Examples of such scaffolding structures, in which the cross members are wedgingly engaged with the socket members, are disclosed in our British Patent Specifications Nos 985,912/3; 1,163,532/3; 1,180,562 and 1,278,596. In other known systems bolts are employed instead of wedging arrangements, and it is to be understood that the present invention is applicable to all such prior systems, and indeed with other types of scaffolding of the kind specified wherein the cross members are secured to the uprights by means other than interfitting socket members and connecting members.

In accordance with one aspect of the

present invention we provide a scaffolding structure of the kind specified including at least one brace secured to one of said members of the scaffolding, the brace having rigidly secured thereto so as to project transversely therefrom an elongate transverse pin having a longitudinal axis, said one of said members being provided with an aperture in which the pin is releasably received, a displaceable locking member mounted on the brace and having an abutment portion extending generally transversely of the longitudinal axis of the pin and which portion, in an operative position, is adapted to engage the member to releasably restrain the brace from movement relative to the member in a direction parallel to said longitudinal axis of the pin.

The pin may be provided at one end of the brace.

The brace, at its other end, may be provided with a transverse pin and means capactively associated therewith for releasably restraining the brace from movement in a direction longitudinally of the pin.

Preferably, the locking member is formed as a spring loaded catch having an arm which in the operative position extends substantially parallel to the brace whilst being spaced apart therefrom by a distance sufficient to accommodate the member between the arm and the brace. The outer edge of the arm (i.e. that which is furthest from the brace) is conveniently angled to define a lead-in edge which facilitates displacement of the catch to an inoperative position as the pin is offered up to the aperture in the member, the catch thereafter returning to its operative position under its spring loading. To facilitate release of the brace, the catch may be formed or provided with a finger piece to enable it to be manually displaced to its inoperative position.

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It will be understood that the brace may extend in either a vertical or horizontal plane. In the former arrangement the limbs of the connecting member may extend parallel to the length of the brace to enable the brace to extend in a vertical plane, or they may extend transversely of the length of the brace to enable it to extend in a horizontal plane. In the latter arrangement the portion of the brace which carries the pin may extend in alignment with the remainder of the brace to enable it to be used in a vertical plane, or such portion may be arranged transversely of the remainder to enable the brace to be used in a horizontal plane.

According to a second aspect of the invention we provide for use in a scaffolding structure according to the first aspect of the invention a brace having closely adjacent one end thereof a transverse pin rigidly secured thereto so as to project transversely therefrom, a displaceable locking member mounted on the brace, having an abutment portion extending generally transversely of the longitudinal axis of the pin and being of a configuration to define in combination with the brace and pin an opening in which, in use, is received part of a member having an aperture in which the pin is engaged.

The invention will now be described by way of example with reference to the accompanying drawings wherein:

FIGURE 1 is a view in side elevation showing a connection between an upright member and a cross member and incorporating a brace such brace extending in a vertical plane, but not embodying the present invention.

FIGURE 2 is a view in end elevation of the cross member and brace of Figure 1 as connected together.

FIGURE 3 is a plan view corresponding to Figure 1.

FIGURES 4 to 6 illustrate a brace in accordance with the invention in views respectively corresponding to those of Figures 1 to 3, and

FIGURE 7 is a longitudinal section through the end portion of the brace illustrated in Figures 4 to 6.

In the accompanying drawings there is shown a single connection between a scaffolding upright 10 and a horizontally extending cross member 12. The upright 10 is provided, in known manner, with sockets 11 at spaced intervals along its length, only one such socket being shown in the accompanying drawings. Each socket consists of a generally U-shaped strip of metal which is welded or otherwise secured to the exterior surface of the upright 10 so as to define a socket which is open at both ends.

Each such socket forms part of a connect-

ing means which additionally comprises connector means indicated generally at 13, at the end of a cross member such as 12, and a wedge clamping member 14 which is captively associated with such connector means.

In the illustrated embodiment, the cross member 12 is of round tubular form and includes a flattened end portion 15. The upper and lower marginal edges of the flattened portion 15 are received within the interior of respective U-section limbs 16 and 17 and secured therein, for example by welding.

The wedge clamping member 14 extends through a narrow slot 18 in the upper limb 16 and through a somewhat wider slot 19 in the lower limb 17. The lowermost end portion of the wedge clamping member 14 is formed with a lateral protrusion 20 which can pass through the slot 19 but not through the slot 18. In use, the wedge clamping member 14 extends through the socket 11, but can be retracted to an inoperative position in which the lowermost end portion thereof is disposed within the cavity afforded by the inverted U-section upper limb 16.

This arrangement is described in more detail and claimed in our co-pending application No. 46977/75. (Serial No. 1570383).

In accordance with the present invention, the flattened end portion 15 of the cross member 12 is formed with a pair of holes 21 or 21a adjacent to the upper and lower edges thereof. These holes are formed in the marginal portions which are received within the U-shape limbs 16 and 17, and the latter are formed with respective open ended slots 22 in alignment with the holes to define in combination therewith a through-aperture of dimensions adapted to receive a pin 23 or 43 as hereinafter described as a close fit for the purpose of securing to the cross member 12 a diagonal brace 24 or 44.

The brace 24 as illustrated in Figures 1 to 3, is, like the cross member 12, in the form of a tube with a flattened end portion 25. A connecting member 26 is secured, as by welding, to the end portion 25 of the brace 24, and consists of a generally U-shaped strip affording spaced parallel limbs 27 and 28 connected at one end by a web 29. As can be seen, the limbs 27 and 28 extend longitudinally outwardly in a direction parallel to the axis of the brace 24, the limb 27 being secured directly to the flattened end portion 25. The opposite limb 28 carries at the end thereof nearest the web 29 a laterally projecting lug 29a having an aperture at its outer end to serve as a pivotal mounting for the generally U-shaped resilient link 30. The link 30

includes a pair of interconnected at portion 32 which e ture in the lug 29 the arms 31 are t cated at 33 and formed near to one 23 previously ment

When the connec ranged with its lim the upper limb 16 13, apertures form 28 can be aligned hole 21 in the flatt the cross member 1 be driven through into the locking po accompanying draw particularly from 23 is driven into i arms 31 of the link towards the adjae connecting member 26 the arms 31 of greater than the s tween the points a tached to the lug 29 the pin 23 is in its link 30 thus exerts one end of the loc generally longitudi thereby urging the and also applying further assists fric pin 23 in its lockin

As can be seen, tapering nose porti from the aperture 27 and to remove to strike this end to overcome both to movement of the apertures and the by the link 30. The be withdrawn to a as illustrated in ch 2, with the tapering of resting within t limb 28.

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includes a pair of spaced parallel arms 31 interconnected at one end by a transverse portion 32 which extends through the aperture in the lug 29. The opposite ends of the arms 31 are turned inwardly as indicated at 33 and enter a throughbore 34 formed near to one end of the locking pin 23 previously mentioned.

When the connecting member 26 is arranged with its limbs 27 and 28 embracing the upper limb 16 of the connector means 13, apertures formed in the limbs 27 and 28 can be aligned with the corresponding hole 21 in the flattened end portion 15 of the cross member 12 so that the pin 23 can be driven through the aligned apertures into the locking position illustrated in the accompanying drawings. As can be seen, particularly from Figure 3, when the pin 23 is driven into its locking position, the arms 31 of the link 30 are bowed inwardly towards the adjacent limb 28 of the connecting member 26, the natural length of the arms 31 of the link being slightly greater than the straight-line distance between the points at which the link is attached to the lug 29a and the pin 23, when the pin 23 is in its locking position. The link 30 thus exerts a resilient pressure on one end of the locking pin in a direction generally longitudinally of the arms 31, thereby urging the locking pin inwardly and also applying a lateral force which further assists frictional retention of the pin 23 in its locking position.

As can be seen, the pin 23 includes a tapering nose portion 23a which projects from the aperture 35 in the opposite limb 27 and to remove the pin it is necessary to strike this end with a force sufficient to overcome both the frictional resistance to movement of the pin within the aligned apertures and the resilient force exerted by the link 30. Thereafter, the pin 23 can be withdrawn to an inoperative position as illustrated in chain dot lines in Figure 2, with the tapering nose portion 23a thereof resting within the aperture 35 of the limb 28.

Clearly, a similar diagonal brace may be connected at the lower edge of the flattened portion 15 of the cross member 12.

In order to adapt the brace 24 for use in a horizontal plane, it would be appropriate to secure the web 29 of the connecting member 26 to the flattened portion 25 of the brace 24, with the limbs 27 and 28 extending oblique to the length of the latter.

In the case of the alternative embodiment of brace 44, as illustrated in Figures 4 to 7, the end portions 45 thereof are not flattened, but remain of tubular form. The pin 43 is of relatively greater diameter than the pin 23, since in this embodiment

it is arranged to extend releasably through only a single aperture, namely the aperture 21a formed in the flattened end portion 15 of the cross member 12, the aperture 21a being of correspondingly increased 70 diameter as compared with the aperture 21 in the previously described embodiment.

The pin 43 extends through a pair of aligned holes formed at diametrically opposed positions at or adjacent to the end 75 of the tubular brace 44 and is secured in position rigidly as by welding. The pin 43 projects substantially to one side of the brace and is formed with a tapered nose portion 43a to facilitate its passage through 80 the aperture 21a.

In use, the brace 44 is secured in position simply by offering up the pins 43 to the respective apertures 21a and moving the brace sideways in the direction of the 85 length of pins so as to insert them through the apertures. It will be appreciated that once the pins are inserted in the respective apertures, the brace is held against movement in directions transverse to the length 90 of the pins. To prevent substantial movement of the brace longitudinally of the pins, and thereby to prevent inadvertent disengagement of the brace, respective displaceable catches 46 are provided in asso- 95 ciation with each pin 43. As most clearly seen in Figure 7, each catch 46 comprises a plate-like member which is pivotally mounted on a pin 47a which extends intern- 100 ally across the tubular brace 44 at a position adjacent to the pin 43 and perpendicular thereto. Conveniently, the pivot pin is formed as a rolled pin of spring steel so that it can be transversely inserted through 105 aligned holes formed in the tube for this purpose, and be self-retaining.

The catch 46 includes an arm 47 of which the inner face 48 is normally arranged to extend generally parallel to the 110 length of the brace, whilst being spaced outwardly from the surface thereof by a distance sufficient to enable the U-shaped limb 16 or 17 at the end of the cross member 12 to be received between the arm 47 and the brace 44, as shown in Figures 5 115 and 6. The catch 46 is biased into this operative position by means of a torsion spring 49 which is coiled around the pivot pin 47a with one end 49a thereof engaging the catch 46 and the other end 49b thereof 120 engaging the internal face of the tubular brace 44. The arrangement is such that the catch 47 is biased by the spring 49 so that the free end of the arm 47 is urged towards the adjacent pin 43. 125

The outer face 50 of the arm 47 is tapered inwardly towards the pin and serves as a lead-in face so that when the tapered end portion 43 of the pin is offered up to the aperture 21a in the end portion 15 of 130

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the cross member 12, the outer edge 50 of the arm 47 engages the outer face of the U-shaped limb 16 or 17 and, in riding over this face, the catch 46 is displaced away from the pin 43. This allows the pin to be fully inserted through the aperture 21a, and when the pin is fully inserted the catch 46 returns to its operative position so as to trap the limb 16 or 17 between the end portion 45 of the brace 44 and the arm 47 of the catch 46, as seen in Figures 4 to 6.

In order to release the brace 44, the catch 46 can be manually displaced to its releasing position, and for this purpose the finger piece 51 is formed on the catch.

The catch 46 and pivot pin 47 can be assembled with the brace 44 by two alternative methods. In the first alternative, the assembly of catch 46 and spring 49 can be inserted into the open end of the tube and then the pivot pin 47 can be passed through the appropriate apertures in the tube, this being done before the pin 43 is positioned. In this case, the slot 52 through which the catch 46 extends can be of simple straight sided form. In the alternative method, the slot 52 needs to be widened at the end nearest the pin 43 so that the assembly of catch 46 and spring 47 can be passed transversely through the slot and then retained by insertion of the pivot pin 47. In this case, the operation can be carried out after the pin 43 is positioned and this method of assembly has the advantage that the catch 46 and spring 47 can readily be replaced if damaged in use.

The brace as described and illustrated is intended for use in a vertical plane. In order to adapt the brace 44 for use in a horizontal plane, it would be appropriate to bend the end portions 45 of the brace 44 so as to extend transversely thereto at the appropriate angle.

Whilst the invention has been specifically described in relation to an embodiment incorporating connector means of the type which are the subject of our co-pending application previously referred to, it will be apparent that the connecting member 26 can alternatively be shaped and dimensioned so as to be adapted to co-operate with any other type of connector means, or with any other type of cross member, i.e. of a type not provided with connector means for coupling to a socket member.

Although the ends of the braces have been described as being connected to cross members adjacent the ends thereof, the braces may be connected to cross-members intermediate their ends, or to upright members or to other braces by providing apertures in suitable locations on the members for example by attaching

apertured brackets to the members at desired locations.

WHAT WE CLAIM IS:—

1. A scaffolding structure of the kind specified including at least one brace secured to one of said members of the scaffolding, the brace having rigidly secured thereto so as to project transversely therefrom an elongate transverse pin having a longitudinal axis, said one of said members being provided with an aperture in which the pin is releasably received, a displaceable locking member mounted on the brace and having an abutment portion extending generally transversely of the longitudinal axis of the pin and which portion, in an operative position, is adapted to engage the member to releasably restrain the brace from movement relative to the member in a direction parallel to said longitudinal axis of the pin.

2. A scaffolding structure according to Claim 1 wherein said pin is provided at one end of the brace.

3. A scaffolding structure according to Claim 2 wherein the brace, at its other end has a further transverse pin rigidly secured thereto so as to project transversely therefrom and being releasably received in an aperture in a further member, a further displaceable locking member mounted on the brace which in an operative position engages the further member to releasably restrain the brace from movement relative to the further member in a direction longitudinally of the further pin.

4. A scaffolding structure according to any one of the preceding claims wherein the or each locking member embraces the member or further member adjacent to the aperture therein.

5. A scaffolding structure according to any one of the preceding claims wherein the or each locking member is formed as a spring loaded catch having an arm which in the operative position extends substantially parallel to the brace whilst being spaced apart therefrom by a distance sufficient to accommodate a part of the member or further member between the arm and the brace.

6. A scaffolding structure according to Claim 5 wherein the outer edge of the arm (i.e. that which is furthest from the brace) is angled to define a lead-in edge which facilitates displacement of the catch to an inoperative position at the pin is offered up to the aperture in the member, the catch thereafter returning to its operative position under its spring loading.

7. A scaffolding structure according to Claim 5 or Claim 6 wherein to facilitate release of the brace, the catch is provided with a finger piece to enable it to be manually displaced to its inoperative position.

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the cross member 12, the outer edge 50 of the arm 47 engages the outer face of the U-shaped limb 16 or 17 and, in riding over this face, the catch 46 is displaced 5 away from the pin 43. This allows the pin to be fully inserted through the aperture 21a, and when the pin is fully inserted the catch 46 returns to its operative position so as to trap the limb 16 or 17 between 10 the end portion 45 of the brace 44 and the arm 47 of the catch 46, as seen in Figures 4 to 6.

In order to release the brace 44, the catch 46 can be manually displaced to its releasing position, and for this purpose the finger piece 51 is formed on the catch.

The catch 46 and pivot pin 47 can be assembled with the brace 44 by two alternative methods. In the first alternative, the assembly of catch 46 and spring 49 can be inserted into the open end of the tube and then the pivot pin 47 can be passed through the appropriate apertures in the tube, this being done before the pin 43 is positioned. 25 In this case, the slot 52 through which the catch 46 extends can be of simple straight sided form. In the alternative method, the slot 52 needs to be widened at the end nearest the pin 43 so that the assembly of catch 46 and spring 47 can be passed transversely through the slot and then retained by insertion of the pivot pin 47. In this case, the operation can be carried out after the pin 43 is positioned and this 35 method of assembly has the advantage that the catch 46 and spring 47 can readily be replaced if damaged in use.

The brace as described and illustrated is intended for use in a vertical plane. In order to adapt the brace 44 for use in a horizontal plane, it would be appropriate to bend the end portions 45 of the brace 44 so as to extend transversely thereto at the appropriate angle.

Whilst the invention has been specifically described in relation to an embodiment incorporating connector means of the type which are the subject of our co-pending application previously referred to, it will be apparent that the connecting member 26 can alternatively be shaped and dimensioned so as to be adapted to co-operate with any other type of connector means, or with any other type of cross member, 55 i.e. of a type not provided with connector means for coupling to a socket member.

Although the ends of the braces have been described as being connected to cross members adjacent the ends thereof, the braces may be connected to cross-members intermediate their ends, or to upright members or to other braces by providing apertures in suitable locations 65 on the members for example by attaching

apertured brackets to the members at desired locations.

WHAT WE CLAIM IS:—

1. A scaffolding structure of the kind specified including at least one brace secured to one of said members of the scaffolding, the brace having rigidly secured thereto so as to project transversely therefrom an elongate transverse pin having a longitudinal axis, said one of said members being provided with an aperture in which the pin is releasably received, a displaceable locking member mounted on the brace and having an abutment portion extending generally transversely of the longitudinal axis of the pin and which portion, in an operative position, is adapted to engage the member to releasably restrain the brace from movement relative to the member in a direction parallel to said longitudinal axis of the pin.

2. A scaffolding structure according to Claim 1 wherein said pin is provided at one end of the brace.

3. A scaffolding structure according to Claim 2 wherein the brace, at its other end has a further transverse pin rigidly secured thereto so as to project transversely therefrom and being releasably received in an aperture in a further member, a further displaceable locking member mounted on the brace which in an operative position engages the further member to releasably restrain the brace from movement relative to the further member in a direction longitudinally of the further pin.

4. A scaffolding structure according to any one of the preceding claims wherein the or each locking member embraces the member or further member adjacent to the aperture therein.

5. A scaffolding structure according to any one of the preceding claims wherein the or each locking member is formed as a spring loaded catch having an arm which in the operative position extends substantially parallel to the brace whilst being spaced apart therefrom by a distance sufficient to accommodate a part of the member or further member between the arm and the brace.

6. A scaffolding structure according to Claim 5 wherein the outer edge of the arm (i.e. that which is furthest from the brace) is angled to define a lead-in edge which facilitates displacement of the catch to an inoperative position at the pin is offered up to the aperture in the member, the catch thereafter returning to its operative position under its spring loading.

7. A scaffolding structure according to Claim 5 or Claim 6 wherein to facilitate release of the brace, the catch is provided with a finger piece to enable it to be manually displaced to its inoperative position.

8. A scaffolding structure according to any one of the preceding claims wherein the brace extends horizontally in the brace extension.

9. A scaffolding structure according to Claim 8 wherein the brace is rigidly secured to each pin extending transversely of the brace.

10. A scaffolding structure according to Claim 8 wherein the brace is rigidly secured to each pin extending transversely of the brace.

11. A scaffolding structure according to any one of the preceding claims wherein the brace is rigidly secured to each pin extending transversely of the brace.

12. A scaffolding structure according to any one of the preceding claims wherein the brace is rigidly secured to each pin extending transversely of the brace.

13. For use in a scaffolding structure of the kind specified, a brace having rigidly secured thereto a transverse pin extending transversely of the brace.

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8. A scaffolding structure according to any one of the preceding claims wherein the brace extends in a vertical plane or a horizontal plane.

5 9. A scaffolding structure according to Claim 8 wherein the end portion or portions of the brace which carries the or each pin extends in alignment with the remainder of the brace to enable it to be 10 used in a vertical plane.

10. A scaffolding structure according to Claim 8 wherein the end portion or portions of the brace which carries the or each pin extends transversely of the remainder to enable the brace to be used in 15 a horizontal plane.

11. A scaffolding structure according to any one of the preceding claims wherein the brace is secured to a cross member at a position immediately adjacent the end thereof. 20

12. A scaffolding structure substantially as hereinbefore described with reference to and as shown in Figures 4 to 7 25 of the accompanying drawings.

13. For use in a scaffolding structure of the kind specified a brace having closely adjacent one end thereof a transverse pin rigidly secured thereto so as to project 30 transversely therefrom, a displaceable lock-

ing member mounted on the brace, having an abutment portion extending generally transversely of the longitudinal axis of the pin and being of a configuration to define in combination with the brace and pin 35 an opening in which, in use, is received part of a member having an aperture in which the pin is engaged.

14. A brace according to Claim 13 wherein the locking member is formed as a 40 spring loaded catch having an arm which in the operative position extends substantially parallel to the brace whilst being spaced apart therefrom.

15. A brace substantially as hereinbefore 45 described with reference to and as shown in Figures 4 to 7 of the accompanying drawings.

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