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(54) IMPROVEMENTS RELATING TO 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 scaffolding of a kind comprising upright members connected together by cross members and including additional members which serve as braces to add rigidity to the structure, said scaffolding being hereinafter referred to as of the kind specified. The invention is particularly concerned with scaffolding of the kind specified which is intended for use as shoring to support shuttering for use in forming concrete floors and the like. In such application adjustable jacks are provided at the upper ends of the uprights, the jacks carry support heads which engage the elements to be supported and thus permit the elements to be supported in a predetermined orientation, for example, a horizontal plane, irrespective of variation in the level of the surface upon which the scaffolding is erected.

It is accordingly an object of the invention to provide a new and improved scaffolding of the kind specified.

According to the invention we provide a scaffolding of the kind specified wherein at least some of the uprights include an adjustable length jack provided at the upper end thereof, a support head provided at the upper end of each jack and a telescopic brace extending from the jack adjacent the support head to an adjacent upright.

Since the jacks may need to project from the uprights by a relatively great amount it is necessary to brace the jacks by braces which extend from adjacent the upper end of a jack to an adjacent upright. The braces may be diagonal braces.

The support head may be pivotally mounted for rotation about a vertical axis, relative to the upright upon which it is carried.

It is also desirable that the support head can rotate relative to the bracing connections to permit wedging of the head relative to the

elements to be supported.

The support head may be fixed relative to the jack and the jack permitted to rotate relative to the upright about said axis.

Alternatively, the support head may be rotatable relative to the jack about said axis.

The jack may be provided with a collar mounted on the jack adjacent to the underside of the support head, means being provided to permit of relative rotation, about the longitudinal axis of the jack, between the support head and the collar, the collar having attachment means whereby one end of the telescopic brace may be engaged therewith.

The collar may be interposed between the head and a fixed abutment provided on the rod.

When the support head is fixed relative to the jack the collar is rotatable relative to the jack.

When the support head is rotatable relative to the jack the collar may be fixed relative to the jack.

The jack may be provided with a collar mounted on the jack adjacent to the underside of the support head, means being provided to prevent at least substantial relative rotation, about the longitudinal axis of the jack, between the support head and the collar means being provided to permit of relative rotation, about longitudinal axis of the jack, between the collar and the jack, and the collar having attachment means whereby one end of the telescopic brace may be engaged therewith.

Preferably the collar has four lugs extending radially outwardly thereof at equally angularly spaced positions, the lugs being provided with an aperture in which an element of the brace can be engaged.

Alternatively, when the support head is rotatable relative to the jack, an attachment means for one end of the telescopic brace, such as a plurality of lugs, for example four, could be fixed directly to the jack.

The lugs may be adapted to be engaged by the underside of the support head to provide additional support therefor.

The jack may comprise a threaded rod having a generally channel section support

head mounted at one end thereof.

Instead of providing a lug with relative rotation between the lug and the support head a clamp may be engaged with the jack beneath the support head the clamp having an attachment means whereby one end of the telescopic brace may be engaged therewith.

The brace may be provided with at least one transverse pin and means captively associated with the brace for releasably restraining the brace from movement in a direction longitudinally of the pin relative to an attachment means associated with the jack.

The pin may be rigidly secured to the brace so as to project transversely therefrom and the means for restraining the brace from movement may comprise a displaceable locking member which in an operative position engages the attachment means.

The locking member may embrace the attachment means adjacent to the aperture found therein in which the pin is received.

The locking member may be 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 attachment means between the arm and brace.

At the lower end of at least some of the uprights a telescopic jack may be provided having at its lower end a ground engaging element and a telescopic brace may extend from the jack adjacent the ground engaging element to an adjacent upright.

The jack may be provided with a clamp adjacent the upper side of the ground engaging element and having an attachment means for engagement by the telescopic brace.

The invention will now be described in more detail by way of example with reference to the accompanying drawings:—

FIGURE 1 is a diagrammatic perspective view of a scaffolding embodying the invention.

FIGURE 2 is a side elevation of part of an adjustable length jack used in the scaffolding of Figure 1.

FIGURE 3 is a section on the line 3—3 of Figure 2.

FIGURE 4 is a side elevation of a telescopic brace for use in the scaffolding Figure 1.

FIGURE 5 is a section on the line 5—5 of Figure 4.

FIGURE 6 is a sectional view through part of the adjustable brace of Figures 4 and 5.

FIGURE 7 is a side elevation of a clamp for use in the scaffolding of Figure 1.

FIGURE 8 is an end elevation of the clamp of Figure 7.

FIGURE 9 is a side elevation of part of an

adjustable lengthened jack of another embodiment of the invention.

FIGURE 10 is an end elevation of the part shown in Figure 9, and

FIGURE 11 is a fragmentary side elevation of another embodiment of the invention.

Referring to Figure 1, a scaffolding structure for use as shoring to support longitudinally extending timbers 10 is shown and comprises a plurality of upright supports 11, each upright 11 comprises a plurality of tubes 11a with conventional spigot and socket connections therebetween and is provided in known manner, with sockets 12 at spaced intervals along its length. Each socket 12 consists of a generally U-shaped strip of metal which is welded or otherwise secured to the exterior surface of the upright 11 so as to define a socket which is open at both its upper and lower ends. Each socket 12 forms part of a connecting means which additionally comprises a connector means indicated generally at 14 at the end of a cross member 15 and a wedge clamping member 16 which is captively associated with such connector means. This is described in more detail in our co-pending application No. 46977/75 (serial number 1570383). Four sockets 12 are provided at each of said spaced positions along the length of each upright, the sockets at each of said positions being equally angularly spaced apart around the circumference of the upright. If desired other forms of connecting means may be used.

Fixed length diagonal braces 17 extend between the ends of adjacent cross members 15, as illustrated, and the braces 17 are provided with a transversely extending pin, not shown, which is received in an aperture formed in a flattened end portion 18 of the cross members 15 and retained therein by appropriate means. Preferably, the diagonal braces 17 are as described in our co-pending Application No. 20181/76. (Serial No. 1579825) but again other forms of diagonal brace may be provided if desired.

At the upper end each upright 11 includes an adjustable length jack 20 engaged with the uppermost tube 11a. In certain applications a jack may not be needed on each upright. Each jack 20 comprises a threaded rod 21, which is threadedly engaged with a nut 21a engaged with the top of the associated upright tube 11a.

Referring now particularly to Figures 2 and 3, at its upper end the threaded rod 21 carries a channel shaped support head 22 welded, as shown at 23, to the upper end of the rod 21. A cylindrical collar 24 is rotatably mounted on the rod 21 between the underside of the head 22 and a fixed abutment 24a. The collar 24 has welded thereto four lugs 25 made by bending steel plate to generally U-shape to provide two parallel limbs 26 and a relatively short base portion 27. An aperture

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28 is formed in each limb 26 to provide an attachment means for an adjustable diagonal brace hereinafter to be described. The upper edge 29 of the lugs 25 is adapted to engage the under surface 30 of the head 22 to provide additional support thereto.

5 A diagonal adjustable brace 31 is engaged between a lug 25 and adjacent upright 11 by virtue of being engaged with the flattened end portion 18 of an appropriate cross member 15 as indicated at 32 in Figure 1.

10 Each adjustable diagonal brace comprises, referring particularly to Figures 4 and 5, an outer tubular member 34 and an inner tubular member 35 of a diameter adapted to be slidably engaged within the outer member 34. At the end 36 of the member 34 within which the inner member 35 is telescoped the member 34 is formed with a 180° sector of its wall cut out as indicated at 37 and a clamp 38 is provided comprising two parts 39, 40 pivotally interconnected by a pin 41 and having a conventional tightening arrangement as indicated at 42. The part 39 of the clamp engages the wall of the outer part 34 opposite the cut out part 37 whilst the part 40 is adapted to be received within the cut out part 37 and to engage the periphery of the inner member 35. Thus, by tightening the nut of the clamping means 42 the inner and outer members of the adjustable brace can be clamped in any desired relative position.

At the end of the inner member 35 distant from the end telescoped within the member 34 an enlarged diameter tubular member 43 is welded thereto to provide a part of the same diameter as that of the outer member 34 and both the part 43 and the part 34 are provided with means for connecting the brace to the jack at one end and a cross member 15 at its other end. The connecting arrangements are the same at each end and hence only that at the end of the member 34 will be described. The connecting means comprises a transversely extending pin 44 welded in aligned holes formed at diametrically opposite positions at or adjacent the end of the outer member 34 of the brace. The pin 44 projects substantially to one side of the brace and is formed with a tapered nose portion 44a to facilitate its passage through the apertures 28 or apertures formed in the part 18 of the cross member 15.

55 In use, the brace is secured in position simply by offering up the pins 44 to the respective apertures and moved into place sideways in the direction of the length of the 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 of the pins.

60 To prevent substantial movement of the brace longitudinally of the pins, and thereby to prevent inadvertant disengagement of the

brace, respective displaceable catches 46 are provided in association with each pin 44. As most clearly seen in Figure 6 each catch 46 comprises a plate-like member which is pivotally mounted on a pin 47 which extends internally across the tubular brace member 34 at a position adjacent the pin 44 and perpendicular thereto. Conveniently, the pivot pin is formed as a rolled pin of spring steel so that it can be transversely inserted through aligned holes formed in the tube for this purpose, and be self retaining.

70 The catch 46 includes an arm 48 of which the inner face 49 is normally arranged to extend generally parallel to the length of the brace whilst being spaced outwardly from the surface thereof by a distance sufficient to enable the lug 25 or the flattened end part 18 of the cross member 15 to be received between the arm 48 and the part 34 of the brace.

75 The catch 46 is biased into this operative position by means of a torsion spring 50 which is coiled around the pivot pin 47 with one end 51 thereof engaging the catch 46 and the other end 52 thereof engaging the internal face of the brace member 34. The arrangement is such that the catch 46 is biased by the spring 50 so that the free end of the arm 48 is urged towards the adjacent pin 44.

80 The outer face 53 of the arm 48 is tapered inwardly towards the pin and serves as a lead in face so that when the tapered end portion 44a of the pin is offered up to the respective aperture the outer edge 53 of the arm 48 engages the outer face of the lug or relevant part of the cross member 15 and, in riding over this face, the catch 46 is displaced away from the pin 44. This allows the pin to be fully inserted through the associated aperture and, when the pin is fully inserted, the catch 46 returns to its operative position so as to trap the lug or part of the cross member 15 between the end portion of the brace and the arm 48 of the catch.

85 In order to release the brace the catch 46 can be manually displaced to its releasing position and for this purpose a finger piece 54 is formed on the catch; the catch described hereinbefore is similar to that described in our co-pending application No. 20818/76 (Serial No. 1579825) to which reference may be made for a more detailed description.

90 By providing for the pivotal mounting of the collar and lugs relative to the jack if it is desired to twist the support members 22 by engaging a wedge between a side wall of the wedge members 22 and the timbers 10 to wedge the timbers 10 in position this pivotal displacement of the support member is permitted whilst still enabling the telescopic braces 31 to be engaged with the upper end of the jack.

95 Although in this example the collar and

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lugs have been described as being pivotable relative to the remainder of the jack, and this facilitates adjustment of the height of the jack since the rod 21 can be rotated whilst the brace members 31 are in position, if desired the lugs 25 could be fixed relative to the threaded rod 21 and the head 22 mounted for movement relative to the rod 21. In this case adjustment of the height of the jack could not be performed by rotating the rod whilst the brace members 31 are connected to the jack. The head may in this case be provided with a spigot rotatably received in a blind bore in the end of the jack rod or received in the central passage if the rod is made tubular. The collar could be welded to the rod, or the lugs could be welded directly to the rod. Or, both the collar and the head could be rotatable relative to the rod and to each other.

In a further embodiment of the invention, shown in Figures 9 and 10 (in which corresponding parts are referred to by the same reference numerals as in Figures 1 to 8 but with the addition of a prime sign) the scaffolding structure is substantially as described with reference to Figures 1 to 8 except for the construction of the jack 20', support head 22' and collar 24'. In this embodiment as shown in Figures 9 and 10, the support head 22' is again of channel section but the base of the channel in this embodiment has a pair of downwardly depending brackets 80 which pivotally receive a pin 81 welded as shown at 82, to the top of the collar 24'. Thus the head 22' is prevented from rotation relative to the collar 24' about the longitudinal axis of the jack whilst relative rotation is permitted about the axis of the pin 81. The collar 24' is again rotatably mounted on the upper end of the rod 21', the upper end surface of the rod 21' abutting the pin 81 to limit movement of the collar 24' downwardly of the rod 21'. In all other respects the parts are as described with reference to Figures 1 to 8.

In a still further embodiment shown in Figure 11, (in which corresponding parts are referred to by the same reference numerals as in Figures 1 to 8 but with the addition of a double prime sign) the scaffolding structure is substantially the same as described with reference to Figures 1 to 8 except for the construction of the jack 20'', support head 22'', and collar 24''. In this embodiment the channel section support head 22'' is welded to a spigot 90 which is rotatably received within the passage 91 of a tubular member or collar 23'' which is welded to the upper end of a jack rod 21''. The collar 24'' has lugs 25'' as described hereinbefore welded thereto. The upper end of the lugs can support the underside of the head. In other respects the parts are as described with reference to Figures 1 to 8.

In all embodiments, at the lower ends the uprights 11 are provided with adjustable length jacks 60 similar to the jacks 20 except that at their lower ends the jacks 60 are provided with flat ground engaging plates 61 instead of the support heads 22 of the jacks 20. Since the orientation of the plates 61 relative to the axis of the upright does not matter there is no need to provide a rotatable collar and lugs, although they may be provided if desired in a manner similar to any of those described hereinbefore with the upper ends of the uprights.

At the lower end adjustable braces 31 identical to the braces described hereinbefore extend between appropriate cross members 15 and attachment means 62 provided on the jacks 60. Referring now to Figures 7 and 8 the attachment means 62 comprises a conventional scaffold clamp 63 comprising two parts 64 and 65 pivotally connected together by a pin 66 and provided with a conventional clamping arrangement 67. The clamp 63 is thus clamped to the lower end of the rod of the jack 60. The part 65 of the clamp has welded thereto a plate 68 having inclined end portions 69, 70 in which are welded tubular bosses 71 to provide apertures to receive the pins 44 of the braces 31.

If in any particular application the pivotal collars and lugs 25 are not required on the upper jacks 20 then attachment means identical to the clamping means 62 may be provided.

WHAT WE CLAIM IS:—

1. A scaffolding of the kind specified wherein at least some of the uprights include an adjustable length jack provided at the upper end thereof, a support head provided at the upper end of each jack and a telescopic brace extending from the jack adjacent the support head to an adjacent upright.

2. A scaffolding according to Claim 1 wherein the support head is pivotally mounted for rotation, about a vertical axis, relative to the upright upon which it is carried.

3. A scaffolding according to Claim 2 wherein the support head is fixed relative to the jack and the jack is permitted to rotate relative to the upright about said axis.

4. A scaffolding according to Claim 2 wherein the support head is rotatable relative to the jack about said axis.

5. A scaffolding according to any one of the preceding claims wherein the jack is provided with a collar mounted on the jack adjacent to the underside of the support head, means being provided to permit of relative rotation, about the longitudinal axis of the jack, between the support head and the collar, the collar having attachment means whereby one end of the telescopic brace may be engaged therewith.

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In a further embodiment of the invention, shown in Figures 9 and 10 (in which corresponding parts are referred to by the same reference numerals as in Figures 1 to 8 but with the addition of a prime sign) the scaffolding structure is substantially as described with reference to Figures 1 to 8 except for the construction of the jack 20', support head 22' and collar 24'. In this embodiment as shown in Figures 9 and 10, the support head 22' is again of channel section but the base of the channel in this embodiment has a pair of downwardly depending brackets 80 which pivotally receive a pin 81 welded as shown at 82, to the top of the collar 24'. Thus the head 22' is prevented from rotation relative to the collar 24' about the longitudinal axis of the jack whilst relative rotation is permitted about the axis of the pin 81. The collar 24' is again rotatably mounted on the upper end of the rod 21', the upper end surface of the rod 21' abutting the pin 81 to limit movement of the collar 24' downwardly of the rod 21'. In all other respects the parts are as described with reference to Figures 1 to 8.

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In all embodiments, at the lower ends the uprights 11 are provided with adjustable length jacks 60 similar to the jacks 20 except that at their lower ends the jacks 60 are provided with flat ground engaging plates 61 instead of the support heads 22 of the jacks 20. Since the orientation of the plates 61 relative to the axis of the upright does not matter there is no need to provide a rotatable collar and lugs, although they may be provided if desired in a manner similar to any of those described hereinbefore with the upper ends of the uprights.

At the lower end adjustable braces 31 identical to the braces described hereinbefore extend between appropriate cross members 15 and attachment means 62 provided on the jacks 60. Referring now to Figures 7 and 8 the attachment means 62 comprises a conventional scaffold clamp 63 comprising two parts 64 and 65 pivotally connected together by a pin 66 and provided with a conventional clamping arrangement 67. The clamp 63 is thus clamped to the lower end of the rod of the jack 60. The part 65 of the clamp has welded thereto a plate 68 having inclined end portions 69, 70 in which are welded tubular bosses 71 to provide apertures to receive the pins 44 of the braces 31.

If in any particular application the pivotal collars and lugs 25 are not required on the upper jacks 20 then attachment means identical to the clamping means 62 may be provided.

WHAT WE CLAIM IS:—

1. A scaffolding of the kind specified wherein at least some of the uprights include an adjustable length jack provided at the upper end thereof, a support head provided at the upper end of each jack and a telescopic brace extending from the jack adjacent the support head to an adjacent upright.

2. A scaffolding according to Claim 1 wherein the support head is pivotally mounted for rotation, about a vertical axis, relative to the upright upon which it is carried.

3. A scaffolding according to Claim 2 wherein the support head is fixed relative to the jack and the jack is permitted to rotate relative to the upright about said axis.

4. A scaffolding according to Claim 2 wherein the support head is rotatable relative to the jack about said axis.

5. A scaffolding according to any one of the preceding claims wherein the jack is provided with a collar mounted on the jack adjacent to the underside of the support head, means being provided to permit of relative rotation, about the longitudinal axis of the jack, between the support head and the collar, the collar having attachment means whereby one end of the telescopic brace may be engaged therewith.



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6. A scaffolding according to Claim 5 when dependant on Claim 3 wherein the collar is rotatable relative to the jack about said longitudinal axis.

7. A scaffolding according to Claim 5 when dependant on Claim 4 wherein the collar is fixed relative to the jack.

8. A scaffolding according to any one of Claims 1 to 4 wherein the jack is provided with a collar mounted on the jack adjacent to the underside of the support head, means being provided to prevent substantial relative rotation, about the longitudinal axis of the jack, between the support head and the collar, means being provided to permit of relative rotation, about the longitudinal axis of the jack, between the collar and the jack, and the collar having attachment means whereby one end of the telescopic brace may be engaged therewith.

9. A scaffolding according to Claim 8 wherein the support head is pivotally connected to the collar for rotation about an axis normal to the longitudinal axis of the jack.

10. A scaffolding according to any one of Claims 5 to 9 wherein the collar has four lugs extending radially outwardly thereof at equi-angularly spaced positions, the lugs being provided with an aperture in which an element of the brace can be engaged.

11. A scaffolding according to Claim 4 wherein an attachment means for one end of the telescopic brace is fixed directly to the jack.

12. A scaffolding according to Claim 11 wherein the attachment means comprises a plurality of lugs extending radially outwardly of the jack at equi angularly spaced positions, the lugs being provided with an aperture in which an element of the brace can be engaged.

13. A scaffolding according to Claim 10 when dependent on any one of Claims 5 to 7 or Claim 12 wherein the lugs are adapted to be engaged by the underside of the support head to provide additional support therefor.

14. A scaffolding according to any one of the preceding claims wherein the jack comprises a threaded rod having a generally channel section support head mounted at one end thereof.

15. A scaffolding according to any one of Claims 1 to 4 or Claim 14 when dependant upon any one of Claims 1 to 4 wherein a clamp is engaged with the jack beneath the support head, the clamp having an attachment means whereby one end of the telescopic brace may be engaged therewith.

16. A scaffolding according to any one of the preceding claims wherein the brace is provided with at least one transverse pin and means captively associated with the brace for releasably restraining the brace from movement in a direction longitudinally of the pin relative to an attachment means associated

with the jack.

17. A scaffolding according to Claim 16 wherein the pin is rigidly secured to the brace so as to project transversely therefrom and the means for restraining the brace from movement comprises a displaceable locking member which in an operative position engages the attachment means.

18. A scaffolding according to Claim 17 wherein the locking member embraces the attachment means adjacent to an aperture formed therein in which the pin is received.

19. A scaffolding according to Claim 17 or Claim 18 wherein 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 attachment means between the arm and the brace.

20. A scaffolding according to any one of the preceding claims wherein at the lower end of at least some of the uprights a telescopic jack is provided having at its lower end a ground engaging element and a telescopic brace extending from the jack adjacent the ground engaging element to an adjacent upright.

21. A scaffolding according to Claim 20 wherein the jack at the lower end of at least some of the uprights is provided with a clamp adjacent the upper side of the ground engaging element and having an attachment means for engagement by the telescopic brace.

22. A scaffolding of the kind specified substantially as hereinbefore described with reference to and as shown in Figures 1 to 8 of the accompanying drawings or Figures 1 and 9 and 10 of the accompanying drawings.

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