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(19)



(54) IMPROVEMENTS RELATING TO BUILDERS SCAFFOLDING

(71) We, KWIKFORM LIMITED, a British Company of Waterloo Road, Birmingham, B25 8LE, West Midlands, do hereby declare the invention for which we

- 5 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:-
 10 This invention relates to builders scaffolding of the kind which comprises an upright member, a cross-member and connecting means for detachably connecting the upright member and cross-member together, wherein the connecting means
 15 comprises a socket mounted on the exterior of the upright member, the socket being open at each of its two opposite ends which are spaced apart along the length of the upright member, the connect-
 20 ing means further comprising connector means provided at or near one end of the cross-member and including two limbs which in the operative position are spaced apart vertically to permit of the upright
 25 member socket being received therebetween, each limb having an abutment face adapted to abut against the upright member, each limb further being provided with an opening which receives a wedge
 30 clamping member forming part of the connecting means, the arrangement being such that in connecting the cross-member to the upright member of the two limbs of the
 35 connector means are disposed vertically spaced apart and straddle the socket with the wedge clamping member extending through the two open ends of the socket in pressure-engagement with an edge of the
 40 opening of each of the two limbs which is nearest to the upright member and also with an internal clamping face of the socket, in such a manner that the said abutment faces of the two limbs are brought
 45 into pressure-engagement with the upright member at positions above and below the

socket. Such scaffolding is hereinafter referred to as being of the kind specified and is the subject of our British Patent No. 1,180,562.

In the previous arrangement the wedge clamping member is provided with a retaining formation on the lowermost end portion thereof, and in its raised position, the lowermost end portion of the wedge clamping member remains beneath the upper limb of the connector means, and in order to enable the connector means to straddle the socket the two limbs were spaced apart by a distance substantially greater than the corresponding dimension of the socket.

The present invention resides from one aspect in an improvement in builders' scaffolding of the kind specified wherein at least the in situ uppermost one of the two limbs of said connector means provided at the end of the cross-member is upwardly recessed from a socket engaging face which, in use, contacts the upper edge of the socket to define a cavity adapted to receive the lowermost end portion of the wedge clamping member when in its raised position and to accommodate therein a retaining formation which is provided on said lowermost end portion to render the wedge clamping member captive relative to said connector means, the spacing between said socket engaging face of the uppermost limb and the socket engaging face of the other limb of said connector means being such as to receive said socket therebetween.

From another aspect the invention resides in an improvement in builders' scaffolding of the kind specified wherein the socket comprises a generally channel section member mounted on the upright member, at least the in situ uppermost one of the two limbs of said connector means provided at the end of the cross-member

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being upwardly recessed from a socket engaging face which, in use, contacts the upper edge of the socket to define a cavity adapted to receive the lowermost end portion of the wedge clamping member when in its raised position and to accommodate therein a retaining formation which is provided on said lowermost end portion to render the wedge clamping member captive relative to said connector means, the spacing between said socket engaging face of the uppermost limb and the socket engaging face of the other limb of said connector means being such as to receive said socket therebetween.

From a further aspect, the invention resides in an improvement in builders' scaffolding of the kind specified wherein at least the in situ uppermost one of the two limbs of said connector means provided at the end of the cross-member is upwardly recessed from a socket engaging face which, in use, contacts the upper edge of the socket to define a cavity adapted to receive the lowermost end portion of the wedge clamping member when in its raised position and to accommodate therein a retaining formation which is provided on said lowermost end portion to render the wedge clamping member captive relative to said connector means, the spacing between said socket engaging face of the uppermost limb and the socket engaging face of the other limb of said connector means being such as to receive said socket therebetween and said connector means is provided with a hole extending through the connector means and adapted to receive part of a diagonal bracing member.

The socket may comprise a strip of metal bent to a generally U-shape.

The present invention enables the limbs of the connector means to embrace the socket closely, and thereby improve the rigidity of the connection, whilst still enabling the wedge clamping member to be captively associated with the connector means.

In accordance with a further feature of the invention an abutment face of the uppermost limb which, in use, abuts the upright has a vertical dimension (that is to say in a direction parallel to the wedge clamping member) which is substantially equal to or greater than the depth of said cavity. Conveniently, this is achieved by forming said limb to an inverted U-shape in transverse section, said cavity being defined by the interior of said section, and the abutment face being likewise generally of inverted U-shape in elevation.

Such increase in the vertical dimension of the abutment face further enhances the rigidity of the joint, and preferably both limbs of the connector means are of simi-

lar form, the lower limb conveniently being arranged with its cavity facing the cavity of the upper limb. In such an arrangement, the connector means may be formed as a fabrication comprising a pair of said U-section limbs secured, as by welding, to a plate-like part provided at the end of the cross-member, the upper and lower margins of said plate-like part being accommodated with the channel of said U-section limbs, at the end of those limbs remote from the abutment faces. Where the cross-member is of tubular form, such plate-like part may be formed as a locally flattened end portion thereof.

Abutment blocks may be provided within the two limbs adjacent the free ends thereof for engagement by the wedge clamping member.

In an alternative arrangement the connector means may be formed as a casting comprising a body integral with the two limbs. In this case, the body may be formed with a spigot adapted to enter the end of a hollow tubular scaffolding member (i.e. the cross-member) for the purpose of securing the connector means to the cross-member.

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 utilising a first embodiment of connecting means in accordance with the present invention:

Figure 2 is a view in end elevation of the cross-member of Figure 1 provided with the connector means;

Figure 3 is a plan view corresponding to Figure 1;

Figures 4 to 6 are views corresponding respectively to Figures 1 to 3 showing a second embodiment of connecting means; and

Figures 7 and 8 are respectively vertical sections on the lines VII-VII and VIII-VIII of Figure 4.

In the accompanying drawings there is shown a single connection between a scaffolding upright 10 and a horizontally extending cross-member 12 or 112. 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 connecting means which additionally comprises connector means, indicated generally at 13 in Figures 1 to 3 and at 113 in Figures 4 to 6, at the

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end of a cross-member such as 12, and a wedge clamping member 14 which is cap-
tively associated with such connector
means.

In the embodiment illustrated in Figures
1 to 3, 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 spac-
ing between the socket engaging faces 16b,
17b of upper and lower limbs 16 and 17
where they protrude beyond the end por-
tion 15 is only slightly greater than the
vertical depth of the socket 11 so as to be
capable of being assembled therewith.
However where the limb 16 and 17
embrace the end portion 15, the sides
thereof are of increased depth as indicated
at 16a and 17a respectively.

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, as seen in Fig-
ure 1, the wedge clamping member 14
extends through the socket 11 so that the
edge thereof remote from the upright 10
engages the internal surface of the socket
11 where indicated at 21, whilst the edge
of the wedge clamping member 14 nearest
the upright 10 engages the ends 22 and 23
of the slots 18 and 19 nearest the upright.
The wedge clamping member 14 also
engages appropriately inclined faces 22a
and 23a, respectively aligned with the ends
22 and 23 of the slots, afforded by abut-
ment pieces 24 and 25 secured within the
limbs 16 and 17 adjacent to the free ends
thereof.

The connecting means is so arranged
that the end abutment faces 26 and 27 of
the limbs 16 and 17 furthest from the
cross-member 12 are thereby brought into
pressure-engagement with the exterior sur-
face of the upright 10.

To release the connection, the wedge
clamping member 14 is withdrawn
upwardly through the socket 11 until the
protrusion 20 is disposed within the cavity
33 afforded by the inverted U-section
upper limb 16. In this position, the wedge
clamping member may be inclined out-
wardly away from the upright 10 into a
stable position in which its centre of grav-
ity is outside the length of the slot 18. In
this condition, the cross-member 12 can be
laterally withdrawn from the socket 11.

The limbs 16 and 17 are formed with
aligned holes 28 in their sides, as seen in

Figure 1, which register with openings 28a
formed in the upper and lower margins
respectively of the flattened end portion
15 for the attachment of diagonal bracing
members (not shown).

It will be understood that although
cross-member 12 is described above as
being a horizontal member, it could alter-
natively extend in an inclined plane if so
desired, and for this purpose the limbs
could be secured to a plate extending paral-
lel to the end portion 15 and pivotally
connected thereto about an axis perpen-
dicular thereto.

If desired it would be possible to modify
the upper limb 16 by providing thereon a
pair of downwardly directed lips to engage
the socket member 11 either internally or
externally in order to assist in the lateral
location of the cross-member while it is
being assembled with the upright. In this
case the lips are of a vertical height less
than that of the protrusion 20 so that the
consequential increase necessitated in the
vertical spacing of the two limbs 16 and 17
is also less than the vertical dimension of
the protrusion 20.

In the embodiments illustrated in Fig-
ures 4 to 8, the cross-member 112 is again
of round tubular form but does not have
the flattened end portion. Instead, the
connector means 113 comprises a casting
including a flat body or web 129 which
extends perpendicularly from a disc 130
carrying a short spigot 131 adapted to
enter the end of the cross-member 112
and be secured for example by welding.

Adjacent to its upper and lower edges,
the web 129 is formed on each side with
pairs of laterally projecting bosses 132
affording through holes 128 which serve
the same purpose as the holes 28 of the
previously described embodiment. The
bosses 132 are formed with integral exten-
sions which protrude beyond the web 129
to form a pair of spaced parallel limbs 116
and 117 which are adapted to embrace a
socket 11 with a clearance between the
socket engaging surfaces 116b and 117b
and the corresponding surfaces of the soc-
ket which is less than the vertical dimen-
sion of the protrusion 20 as shown in Fig-
ure 4.

The upper limb 116 is provided with a
through slot 118 having a transverse width
only slightly greater than the thickness of
the wedge member 14. The lower limb
117 is formed with a relatively wider slot
119 such that the protrusion 20 of the
wedge member 14 can pass through the
lower slot 119 but not through the upper
slot 118. However, to accommodate the
protrusion 20, the upper limb 116 is
formed at its underside with a cavity 133
formed by lateral extensions of the slot

118. Thus, the wedge member 14 can be raised to the position shown in chain-dot lines in Figure 4, with the protrusion 20 within the recess 133 and with the straight edge of the wedge member resting against the end 134 of the slot 118 remote from the upright 10. As can be seen, this end of the slot 118 is inclined upwardly away from the upright member 10 so as to ensure that the angle at which the wedge member 14 is inclined is such that its centre of gravity is outside the length of the slot 118.

As can be seen from Figure 4, the ends 122 and 123 of the slots 118 and 119 respectively nearer to the upright member 10 are inclined at an angle complementary to the tapered face of the wedge member 14 so that when the wedge member is driven through the socket member 11 and the slots 118 and 119 the connector member 113 as a whole is urged towards the upright member 10 so that the curved abutment end faces 126 and 127 of the limbs 116 and 117 are in pressure engagement with the outer surface of the upright member.

To assist in the location of the connector member 113 on a socket member 11, the web 129 may be formed with a curved lip 135 which is offset laterally therefrom and adapted to engage the socket member 11 externally in such a manner that the slots 118 and 119 are then laterally aligned with the hollow interior of the socket member.

Although the cross-member 112 is described above as being a horizontal member, it could alternatively extend in an inclined plane if so desired. For this purpose, the end portions of the cross-member 112 could be bent relative to the main length thereof, or alternatively the body of the connector member 113 could be modified so that the disc 130 and spigot 131 are arranged on an axis which is inclined relative to the lengths of the limbs 116 and 117 instead of being parallel thereto.

It will also be appreciated that the upper limb 116 could be modified by the provision of a pair of downwardly directed shallow lips as previously described in relation to the first embodiment.

WHAT WE CLAIM IS:-

1. Builders' scaffolding of the kind specified wherein at least the in situ uppermost one of the two limbs of said connector means provided at the end of the cross-member is upwardly recessed from a socket engaging face which, in use, contacts the upper edge of the socket to define a cavity adapted to receive the lowermost end portion of the wedge clamping member when in its raised position and to

accommodate therein a retaining formation which is provided on said lowermost end portion to render the wedge clamping member captive relative to said connector means, the spacing between said socket engaging face of the uppermost limb and the socket engaging face of the other limb of said connector means being such as to receive said socket therebetween.

2. Builders' scaffolding of the kind specified wherein the socket comprises a generally channel section member mounted on the upright member, at least the in situ uppermost one of the two limbs of said connector means provided at the end of the cross-member being upwardly recessed from a socket engaging face which, in use, contacts the upper edge of the socket to define a cavity adapted to receive the lowermost end portion of the wedge clamping member when in its raised position and to accommodate therein a retaining formation which is provided on said lowermost end portion to render the wedge clamping member captive relative to said connector means, the spacing between said socket engaging face of the uppermost limb and the socket engaging face of the other limb of said connector means being such as to receive said socket therebetween.

3. Builders' scaffolding of the kind specified wherein at least the in situ uppermost one of the two limbs of said connector means provided at the end of the cross-member is upwardly recessed from a socket engaging face which, in use, contacts the upper edge of the socket to define a cavity adapted to receive the lowermost end portion of the wedge clamping member when in its raised position and to accommodate therein a retaining formation which is provided on said lowermost end portion to render the wedge clamping member captive relative to said connector means, the spacing between said socket engaging face of the uppermost limb and the socket engaging face of the other limb of said connector means being such as to receive said socket therebetween and said connector means is provided with a hole extending through the connector means and adapted to receive part of a diagonal bracing member.

4. Builders' scaffolding according to Claim 2 wherein the socket comprises a strip of metal bent to a generally U-shape.

5. Builders' scaffolding according to any of the preceding claims wherein said spacing is such that the clearance between the socket and said faces is less than the vertical dimension of the retaining formation.

6. Builders' scaffolding according to any one of the preceding claims wherein

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118. Thus, the wedge member 14 can be raised to the position shown in chain-dot lines in Figure 4, with the protrusion 20 within the recess 133 and with the straight edge of the wedge member resting against the end 134 of the slot 118 remote from the upright 10. As can be seen, this end of the slot 118 is inclined upwardly away from the upright member 10 so as to ensure that the angle at which the wedge member 14 is inclined is such that its centre of gravity is outside the length of the slot 118.

As can be seen from Figure 4, the ends 122 and 123 of the slots 118 and 119 respectively nearer to the upright member 10 are inclined at an angle complementary to the tapered face of the wedge member 14 so that when the wedge member is driven through the socket member 11 and the slots 118 and 119 the connector member 113 as a whole is urged towards the upright member 10 so that the curved abutment end faces 126 and 127 of the limbs 116 and 117 are in pressure engagement with the outer surface of the upright member.

To assist in the location of the connector member 113 on a socket member 11, the web 129 may be formed with a curved lip 135 which is offset laterally therefrom and adapted to engage the socket member 11 externally in such a manner that the slots 118 and 119 are then laterally aligned with the hollow interior of the socket member.

Although the cross-member 112 is described above as being a horizontal member, it could alternatively extend in an inclined plane if so desired. For this purpose, the end portions of the cross-member 112 could be bent relative to the main length thereof, or alternatively the body of the connector member 113 could be modified so that the disc 130 and spigot 131 are arranged on an axis which is inclined relative to the lengths of the limbs 116 and 117 instead of being parallel thereto.

It will also be appreciated that the upper limb 116 could be modified by the provision of a pair of downwardly directed shallow lips as previously described in relation to the first embodiment.

WHAT WE CLAIM IS:-

1. Builders' scaffolding of the kind specified wherein at least the in situ uppermost one of the two limbs of said connector means provided at the end of the cross-member is upwardly recessed from a socket engaging face which, in use, contacts the upper edge of the socket to define a cavity adapted to receive the lowermost end portion of the wedge clamping member when in its raised position and to

accommodate therein a retaining formation which is provided on said lowermost end portion to render the wedge clamping member captive relative to said connector means, the spacing between said socket engaging face of the uppermost limb and the socket engaging face of the other limb of said connector means being such as to receive said socket therebetween.

2. Builders' scaffolding of the kind specified wherein the socket comprises a generally channel section member mounted on the upright member, at least the in situ uppermost one of the two limbs of said connector means provided at the end of the cross-member being upwardly recessed from a socket engaging face which, in use, contacts the upper edge of the socket to define a cavity adapted to receive the lowermost end portion of the wedge clamping member when in its raised position and to accommodate therein a retaining formation which is provided on said lowermost end portion to render the wedge clamping member captive relative to said connector means, the spacing between said socket engaging face of the uppermost limb and the socket engaging face of the other limb of said connector means being such as to receive said socket therebetween.

3. Builders' scaffolding of the kind specified wherein at least the in situ uppermost one of the two limbs of said connector means provided at the end of the cross-member is upwardly recessed from a socket engaging face which, in use, contacts the upper edge of the socket to define a cavity adapted to receive the lowermost end portion of the wedge clamping member when in its raised position and to accommodate therein a retaining formation which is provided on said lowermost end portion to render the wedge clamping member captive relative to said connector means, the spacing between said socket engaging face of the uppermost limb and the socket engaging face of the other limb of said connector means being such as to receive said socket therebetween and said connector means is provided with a hole extending through the connector means and adapted to receive part of a diagonal bracing member.

4. Builders' scaffolding according to Claim 2 wherein the socket comprises a strip of metal bent to a generally U-shape.

5. Builders' scaffolding according to any of the preceding claims wherein said spacing is such that the clearance between the socket and said faces is less than the vertical dimension of the retaining formation.

6. Builders' scaffolding according to any one of the preceding claims wherein

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the abutment face of the uppermost limb has a vertical dimension which is substantially equal to or greater than the depth of said cavity.

70 5 7. Builders' scaffolding according to Claim 6, wherein the upper limb is of inverted U-shape in transverse section, said section being defined by the interior of said section, and the abutment face being defined by the interior of said section, and the abutment face being of generally inverted U-shape in elevation.

75 10 8. Builders' scaffolding according to Claim 7 wherein the lower limb is of U-shape in transverse section and its abutment face is of U-shape in elevation.

80 15 9. Builders' scaffolding according to Claim 7 wherein said two U-section limbs are secured in spaced parallel relation to a plate-like part provided at the end of the cross-member, the upper and lower margins of said plate-like part being accommodated within the channel of said U-section limbs, at the end of those limbs remote from the abutment faces thereof.

85 20 10. Builders scaffolding according to Claim 8 wherein the cross-member is of tubular form and said plate-like part is formed as a locally flattened end portion of such cross-member.

90 25 11. Builders scaffolding according to any one of Claims 1 to 5 wherein the connector means comprises a body integral with the two limbs.

95 30 12. Builders scaffolding according to Claim 11 wherein the cavity at the underside of the upper limb is formed as at least one lateral extension of the opening formed in that limb.

100 35 13. Builders scaffolding according to Claim 11 or Claim 12 wherein the ends of the openings nearest the respective abutment faces are inclined to the plane defined by said abutment faces at an angle complementary to that of the tapered edge of the wedge clamping member.

105 40 14. Builders scaffolding according to any one of Claims 11 to 13 wherein the body of the connector means is formed with respective pairs of laterally protruding bosses adjacent to its upper and lower margins, such bosses being formed with through holes.

110 45 15. Builders' scaffolding according to Claim 14 wherein the limbs are formed as integral extensions of the bosses.

115 50 16. Builders' scaffolding according to Claim 9 wherein abutment blocks are disposed within the U-section limbs at positions between the opening and the abutment faces, said abutment block affording inclined faces aligned with the ends of the slots nearest the abutment faces.

120 55 17. Builders' scaffolding according to claim 2 or any one of claims 4 to 16 when

dependent on claim 2 wherein said connector means is provided with a hole extending through the connector means and adapted to receive part of a diagonal bracing member.

18. Builders' scaffolding according to Claim 3 or Claim 17 wherein said hole extends parallel to said socket engaging face.

19. Builders' scaffolding according to Claim 18 wherein said hole is provided adjacent to the end of one of said limbs distant from said abutment face.

20. A cross-member for use in builders' scaffolding of the kind specified wherein each end of said cross-member is provided with connector means of which the in situ uppermost one of the two limbs of said connector means is upwardly recessed from a socket engaging face which, in use, contacts the upper edge of the socket to define a cavity adapted to receive the lowermost end portion of the wedge clamping member when in its raised position and to accommodate therein a retaining formation which is provided on said lowermost end portion to render the wedge clamping member captive relative to said connector means whilst allowing the lowermost end portion of the wedge clamping member to be withdrawn clear of said socket engaging face.

21. A cross-member according to Claim 20 wherein said connector means is provided with a hole extending through the connector means and adapted to receive part of a diagonal bracing member.

22. Builders' scaffolding of the kind specified including connection means substantially as hereinbefore described with reference to and as shown in Figures 1 to 3 of the accompanying drawings.

23. Builders scaffolding of the kind specified including connection means substantially as hereinbefore described with reference to and as shown in Figures 4 to 8 of the accompanying drawings.

24. A cross-member for use in builders scaffolding of the kind specified including at one end connector means substantially as hereinbefore described with reference to and as shown in Figures 1 to 3 of the accompanying drawings.

25. A cross-member for use in builders scaffolding of the kind specified including at one end connector means substantially as hereinbefore described with reference to and as shown in Figures 4 to 8 of the accompanying drawings.

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