

IMPROVEMENTS IN JOINTS FOR SCAFFOLDING

The present invention relates to joints for a system of scaffolding and to a scaffolding system which is held together by such joints.

5 Presently, scaffolding consists of a number of components, standards (vertical posts), transoms and putlogs (horizontal load-bearing members adapted to support planking and/or prefabricated platforms and planks for work platforms), ledgers (horizontal longitudinal members), braces
10 (diagonal members, transverse, vertical or in plan) and accessory equipment including means to connect the foregoing members together and means for specialised purposes. These components may be joined or erected together in a wide variety of ways to provide runs of scaffold, bird-cage scaffold,
15 fold, formwork, towers and other means to provide work areas, and/or access to work areas or support methods and/or application. The scaffolding joints are customarily made of heavy duty aluminium, and such joints tend to bind together.

20 The object of the present invention is to provide scaffolding wherein the binding of connections is avoided and yet the scaffolding is capable of performing most common noted tasks that the published scaffolding regulations
(relevant Government authorities) allows, e.g. runs of
25 scaffolding, either mobile, free standing or tied into a structure, bird-cage, either mobile or free standing, formwork or tower, either mobile, free standing or tied into a structure, with improved ease of handling, and speed of erection and dismantling, eliminating many of the associated tools and handling costs of current methods. We
30 have devised a novel joint structure for this purpose.

Accordingly, the present invention provides a scaffolding joint comprising (i) a cluster adapted to at least partially enclose a scaffolding standard and to be crimped,
35 swaged, welded or otherwise secured thereto or integral therewith, said cluster comprising a member having up to

eight vertical slots or grooves located about its periphery, the upper surface of said cluster having radial ribs and intervening recesses adjacent said slots, each said slot being tapered, with the wider end at the top and adapted to receive and fully accommodate a complementary tapered tongue on a transom, putlog, ledger or brace, and the slot being narrower at its radially outer portion than at its inner portion and (ii) a plurality of tapered tongues each having a load-bearing flange adapted to be complementary to and retained within one of said recesses in the cluster upper surface and bearing on said adjacent ribs, said flange preventing the tongue from binding in the slot, providing extra support both vertically and laterally and protecting the slot from foreign matter; said cluster when receiving said tongue acting to join and retain said transom, putlog, ledger or brace to the standard.

The invention also includes a scaffolding system comprising a number of standards to which are crimped, swaged, welded or otherwise secured, clusters as aforesaid in combination with one or more of the following: transoms, putlogs, ledgers or braces, each having at either end a tapered tongue adapted to be received into and fully accommodated by a complementary slot in a cluster, the upper surface of the tongue being extended to form said flange which seats in the complementary recess and over the adjacent ribs on the cluster, said transoms and putlogs being adapted to receive and support planks or prefabricated planking or platforms, with or without locking hooks or fixing mechanisms thereon; and planks, prefabricated planking or platforms adapted to fit to, over or around the transoms or putlogs to tie-in or hold down the planks, planking or platforms.

Said transoms, putlogs, ledgers and braces can be of steel, aluminium stock reinforced, possibly redesigned for improved strength and rigidity to achieve or allow for the predetermined gazetted weights; said transoms and putlogs can be adapted to receive and support planks or

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prefabricated planking or platforms, either with or without locking hooks thereon. The planks or prefabricated planking platforms may have a series of spaced hooks at either end thereof adapted to fit over or around the transoms to tie-in or hold down the planks to provide work platforms, to facilitate what is known in the industry as a captive plank system. A transom or putlog can also be adapted to use continuous planks or work platforms.

Use of aluminium ensures that the scaffolding system is easy to transport, handle and erect, being lighter than known scaffolding, yet performing similar tasks, redesigning sections or reinforcing of the stock, tube or section ensuring that the system can take the prescribed loads. In certain cases, reinforced fibre-glass tubes may be used instead of aluminium, especially in electrical installations.

The tongue and groove connections linking the transoms, putlogs, ledgers and braces to the standards ensure ease and speed of erection. It is important that the design of the tongue and groove facilitates each of dismantling, the
5 tongues sliding readily out of the grooves without adjacent aluminium members binding together. Self locking clips, plates or safety locks, either spring loaded or otherwise capable of being locked or unlocked without the aid of tools or traditional equipment, may be provided on a surface
10 of the cluster preferably, or on the tongue to assist in holding the tongue within the groove, to ensure stability and to promote and satisfy safety requirements, and the system maintains the need for the locking system not to unlock itself of its own accord readily.

15 Bayonet-type fittings, wherein one member slides first vertically longitudinally and then transversely within another to lock the two members together may be used to ensure that each standard is attached to the next adjacent standard below, all the factory set clusters of the two standards
20 being in alignment. Other connection fittings, such as an expandible sectioned split tube forming a spigot, the section expanding to lock within both adjoining standards, may be used. Thus it is possible to erect to any height equipment with transoms and ledgers horizontal and, where
25 necessary in the same plane, and/or parallel to each similar member within the scaffolding.

Bracing can also be fitting in all required directions in order to eliminate the need for using foreign stabilising equipment on standard applications, the tongues on the
30 bracing being pivotally connected to bracing stock for transverse and vertical angular connection to the clusters. Standard components will be provided where tie-in or standard configuration is required by the scaffolding regulations, including truss frames to increase the transom span and
35 load-bearing capacity.

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Thus, during erection, other than is normal, no additional stresses nor strains are introduced into the system by reason of misalignment of members, application of foreign equipment, or by excess movement, other than is normal, in the structural design of the erected scaffolding due to alignment of clusters and locking of members therein.

The scaffolding system is so designed to accept or apply additional tie-in equipment or accessories, e.g. adjustable base plates, adjustable castor assemblies, stage board brackets or hand rails needed in traditional methods of providing work platforms, walkways or access means or truss frames.

But in order that the invention may be more clearly understood, reference will now be made to the accompanying drawings, wherein:-

Figure 1 shows the top view of a cluster according to the present invention;

Figure 2 shows the bottom view of the cluster of Figure 1;

Figure 3 shows a side elevation of the cluster of Figure 1;

Figure 4 shows a side elevation of one embodiment of a complementary tapered tongue unit adapted to fit within the cluster of Figure 1;

Figure 5 shows a front elevation of the tongue unit of Figure 4;

Figure 6 shows a rear elevation of the tongue unit of Figure 4;

Figures 7 and 8 show top and bottom views of the tongue unit of Figure 4;

Figure 9 shows the tongue unit of Figure 4 with a swivel T-piece for diagonal bracing;

Figure 10 shows a similar fitting to Figure 9, for use with diagonal plan braces;

Figures 11 to 13 show views similar to those in

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Figures 4 to 6 of a tongue unit with an alternative putlog shank;

Figure 14 shows a perspective view of a bay of scaffolding according to the present invention;

5 Figure 15 is an elevation of a frame attached to joints of the invention;

Figure 16 shows a double tongue unit; and

Figure 17 is a top view of a spigot coupling as seen in Figure 15.

10 The clusters 11 which are attached to the standards to receive the transoms, putlogs, ledgers and braces are shown with eight vertical grooves 12 cut therein, the grooves having vertical axes lying on radii having 45° angles between each other. A lesser number of grooves may be provided
15 and in that case the same set of radii are used, but not all radii have a groove at their end. It is possible to manufacture a similar cluster assembly with only four grooves at right angles to each other. The section accommodating the grooves can then be fixed onto the standard at desired
20 angles, without the need to totally surround the tube of the standard. The use of this system requires less material and less expensive methods of manufacture, for systems intended for only a limited range of use.

As seen in Figures 1 and 2, each groove 12 has a narrow
25 neck portion 13 expanding into a circular shaped hole 14 to accommodate a complementarily shaped tongue 15, the tongue 15 and groove 12 each having complementary tapers and one or more tapers along each respective length to assist in providing a linking system capable of eliminating
30 excess movement, ease of erection by simple and positive self alignment procedures and ease of dismantling the assembly, due to the design which avoids the inherent characteristics of two aluminium surfaces tending to bind

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or lock up when subject to friction or surfaces bearing hard against each other. A spring-loaded locking plate 16, turning on the lower surface of the cluster 11, is provided to assist in locking the tongues 15 within the grooves 12, the plate 16 extending for the complete diameter of the cluster 11 as shown. Alternatively, independant plates may be provided for each tongue. The locking plate 16 comprises a flanged

collar 17 having openings therein corresponding to the grooves 12 in the cluster 11. The plate 16 is spring loaded, by spring 19, so that openings 18 move to allow entry of the tongues 15 automatically, and then return to a locking position with their smaller diameter part 20 about the recess 21 of the tongue. It is necessary to physically operate the collar 17, or other locking device, to release the tongue.

The upper surface 22 of the cluster 11 is recessed at 23 about the groove 12 to receive a flange 24 on the tongue unit 25, thereby assisting in supporting and distributing the weight of the tongue unit and its associated member and so reducing the possibility of binding of aluminium surfaces. In addition the fit of the flange 24 within recess 23 helps prevent slow twisting of the tongue unit within the cluster and also prevents excessive dust from contaminating the groove. Backing flanges 33 are positioned against complementary cluster faces 33' for further strength and stability.

Also to avoid self releasing of the tongues 15 within the grooves 12, snap locks and clips, (not shown) adapted to be tripped by the entry of the tongue 15 into the groove 12 and to maintain the tongue 15 within the groove 12 may be provided, the locks being easily released manually but ensure the greatest possible safety.

The shank units 27 and 29 are crimped, swaged, riveted, welded or otherwise secured within the tubular or bar stock forming the transoms, putlogs and ledgers, the shank of each tongue unit corresponding in cross-section to the cross-section of the bar stock.

When used with diagonal or transverse braces, the tongue shank 27 pivotally supports a T-piece 28 which in turn is secured within the stock of the brace.

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The tongue unit 25 shown in figures 4 to 8 is adapted for use with circular tubular stock, while the tongue unit 26 of figures 11 to 13 is for use with triangular-sectioned bar stock.

5 The tongue unit 25 comprises the tapered tongue 15 adapted to be received within a complementary tapered groove 12, the entering end 29 of the tongue having a recess 21 therein to receive and be locked by small diameter part 20 of collar 17. The other end of the tongue unit has a
10 flange 24 complementary to and seating within the recess 23 of the cluster 11. The tongue 15 may have one, two or more tapers, as shown at 30, 31.

15 The tongue 15 is preferably of circular cross-section and supported along most of its length by web 32 and backing flange 33 which is part of or secured to the shank 27 which fits within the tubular stock forming the transom, putlog, brace or ledger (figures 4 to 8) or supports the T-piece 28 of a diagonal and transverse brace (figure 9). The outer
20 end 34 or shank 27 may be provided with a groove 35 to receive a circlip 36 or other securing device to secure the T-piece on the shank.

25 The tongue unit 26 shown in Figures 11 to 13 has the same tongue 15 and flange 24 as tongue unit 25, but the backing flange 37 is extended downwardly into arrow head shape 38 to support the complementary triangular-sectioned shank 39, a peripheral flange 40 providing an end surface or stop for the triangular-sectioned stock into which
30 shank 37 is secured. The triangular-sectioned stock has an upstanding central flange 41 which may be used to support and/or secure planks or platforms.

The clusters 11 are mounted onto or around the standards 42 at predetermined intervals, normally at half meter distances, by swaging, welding, crimping or combinations

thereof, to ensure that the clusters 11 are positively and permanently located on the standards 42, so that no twisting nor movement other than normal arises.

5 The standards are provided in sections of a predetermined length, each section being adapted to be fastened to another so that the desired height of equipment may be build up with the clusters 11 at the required repeat distances. The standards 42 are open at each end to receive a spigot 43 or end coupling for connection to the next adjacent standard
10 or to receive the end of a formwork support jack, (not shown), or an adjustable caster assembly (not shown).

The spigot assembly may comprise a bayonet-type fitting or an expandible sectioned split-tube, one section expanding to lock within two adjoining standards to so clamp them
15 securely together.

As the standards 42 have the clusters 11 secured thereto in the factory, the positions of the clusters 11 and their grooves 12 can be accurately set, so that during erection of the scaffolding, connection of the standards 42 assists
20 the clusters 11 to be accurately set one above the other and to withstand movement, other than is normal, the friction of the spigot tightening and assisting locking of the standards.

Transoms 44, putlogs 45, ledgers 46, braces 47, platforms
25 48 and other desired accessories or equipment may be connected to the standards 42 as required to build up the desired scaffold configuration.

As the cluster design means that transoms 44, putlogs 45 and ledgers connected to one cluster 11 can be in the
30 sample plane, in order that the planking forming the work platforms 48, can be tied-in, the planks are formed with hooks 49 or otherwise shaped to fit over or into the transoms.

The hooks or fittings are spaced apart, thereby allowing fittings on adjacent planks in the longitudinal direction to also hook or fit over or into the particular transom, with fittings from adjacent planks alternating with each.

5 By reason of strength requirements, the transoms 44 and putlogs 45 particularly, and possibly also the ledgers 46 and braces 47 are made from redesigned or reinforced aluminium stock, such as the triangular-sectioned stock shown in figures 11 to 13 or reinforcing within the tube
10 or section by means of a diametric bar, or a number of radial bars or both. Alternatively, the tube may be extruded with reinforced opposite inner walls, possibly even distorted to an oval outer wall, or external reinforcements such as flanges, bars or wings may be
15 extruded thereon. The ledgers and braces will be made of a sufficient rigidity and strength stock and if necessary of reinforced walls or redesigned sections as described above to achieve the necessary prescribed loads.

20 Truss frames may be used to increase the span and accordingly the load-bearing capacity and stability either in free-standing, tied-in and primarily mobile scaffolding. The truss frames can be prefabricated in which case tongue units are incorporated at spacings to suit the clusters on the standards. Alternatively the truss frame can be
25 constructed using existing ledgers, transverse bracing, transoms and putlogs with tongue fittings, the configuration being chosen to form a truss frame.

A spigot coupling for use with the truss frame (see Figure 15) may be positioned on the upper transom part of
30 the frame, either permanently or as a hinged or otherwise attachable coupling (see Figure 16 for a coupling which is hinged at 48' to allow it to be attachable to the truss) formed over or around the transom part of the truss frame, at nominal centres in order that the bayonet section of
35 the spigot will support additional standards in a vertical

position, such spacings being controlled by the published regulations.

5 Where it is necessary to use double standards, a double ended tongue unit (see figure 17) may act as standards, couplers or ties, the tongues each mating in adjacent clusters on the adjacent standards.

10 Thus in use, the various scaffolding members of the present invention may be readily stored in bulk bin systems or racked, readily transported to the site, either loose or in bins, and there erected with a minimum of manpower and tools, the use of aluminium members ensuring ease of transport and handling. The standards are formed to the desired heights, transoms, putlogs, ledgers and braces connected thereto to form the desired scaffolding with
15 members being connected to each other without the use of special tools, the tongue and groove connections allowing easy connection, eliminating other than normal movement without binding or locking up, and easy dismantling, and ensuring self-locking connections. The planking is then
20 tied-in by way of the hooks or fittings over or into the transoms or putlogs so that the scaffolding is built-up to the final desired form.

25 From the above, it will be seen that the present invention provides an improved scaffolding system and components therefor, which components could also be slightly modified to enable use thereof with existing scaffolding. Further, although aluminium is the preferred material for the members, they may also be formed of other suitable materials, such as steel and reinforced fibre-glass.

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CLAIMS

1. A joint comprising (i) a cluster adapted to at least partially enclose a scaffolding standard and to be crimped, swaged, welded or otherwise secured thereto or integral therewith, said cluster comprising a member having up to eight vertical slots or grooves located about its periphery, the upper surface of said cluster having radial ribs and intervening recesses adjacent said slots, each said slot being tapered, with the wider end at the top and adapted to receive and fully accommodate a complementary tapered tongue on a transom, putlog, ledger or brace, and the slot being narrower at its radially outer portion than at its inner portion and (ii) a plurality of tapered tongues each having a load-bearing flange adapted to be complementary to and retained within one of said recesses in the cluster upper surface and bearing on said adjacent ribs, said flange preventing the tongue from binding in the slot, providing extra support both vertically and laterally and protecting the slot from foreign matter; said cluster when receiving said tongue acting to join and retain said transom, putlog ledger or brace to the standard.
2. A joint as claimed in Claim 1, wherein the slots are located at radial intervals of 45° or multiples thereof.
3. A joint as claimed in Claim 1 or 2, wherein a locking plate is provided on the lower surface of the cluster, said locking plate having slots and the plate being rotatable to retain said tongues within the cluster.
4. A joint substantially as hereinbefore described with reference to Figures 1 to 3, and any one of Figures 4 to 8, 9, 10, 11 to 13 or 17 of the accompanying drawings.



5. A scaffolding system comprising a number of standards to which are crimped, swaged, welded or otherwise secured, clusters as claimed in any one of Claims 1 to 4 in combination with one or more of the following: transoms, putlogs, ledgers or braces, each having at either end a tapered tongue as defined in Claim 1 adapted to be received into and fully accommodated by a complementary slot in a cluster, the upper surface of the tongue being extended to form said flange which seats in the complementary recess and over the adjacent ribs on the cluster, said transoms and putlogs being adapted to receive and support planks or prefabricated planking or platforms, with or without locking hooks or fixing mechanisms thereon; and planks, prefabricated planking or platforms adapted to fit to, over or around the transoms or putlogs to tie-in or hold down the planks, planking or platforms.
6. A scaffolding system as claimed in Claim 5 wherein said tongues have two or more taper angles to enable the tongues to slide more readily into and out of the correspondingly tapered slots and are designed to be located or disengaged without undue impact.
7. A scaffolding system substantially as hereinbefore described with reference to Figure 14 of the accompanying drawings.

