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Description

This invention relates to formwork ties for use in the casting of concrete. Such ties are used to support the formwork in place and to restrain wet concrete loads on the formwork caused by hydrostatic pressure in the wet concrete or the dead load of the concrete, or a combination of both.

Many systems of formwork ties are known in the prior art. A conventional system, which is still used, comprises a tensile tie rod having, for wall construction, a spacer, or cone, threadedly connected or welded to each end. The spacers or cones abut the inner surfaces of the formwork members and hold them in the desired spaced apart relationship to define the wall thickness. Retaining bolts or threaded rods with plane washers and nuts or clamps are then screwed into the cones from outside the formwork members to restrain the members from outward movement under the concrete loads mentioned above. After the concrete has been poured and has set the bolts are removed, the formwork is removed, and if, threadedly connected to the tie rod, the cones may also be extracted from the concrete.

This conventional system has a number of inherent disadvantages in operation, a main one of which is the difficulty of effecting registry of the retaining bolts and cones at the stage of erection of the formwork. Access to the inner faces of the formwork is required. This problem was resolved by a further prior art system, sometimes known as the "she bolt" system. This involved a tie rod threaded at both ends as before but to each end is threadedly connected a she bolt. Such bolts comprise a tapered shank portion adjacent the tie rod, the remainder or part of the remainder of the shank being threaded, for example with an Acme or like thread, and having a squared outer end or other provision at the larger end of the tapered shank portion for fitting a spanner to rotate the she bolt relative to the tie rod.

In use, the she bolts are connected at each end to the tie rod and the assembly is then inserted, from one side only be it noted, through registering apertures in the formwork members. Clamps are then applied over the protruding threaded ends of the she bolts and abuttingly engaged with the outer faces of the formwork members or waling if provided. The clamps may be formed with an internal thread to engage the she bolts, or may include a nut held captive but rotatable thereon. To dismantle the formwork after use, the clamps are removed and the she bolts removed from the tie rod using a spanner or wrench on the squared ends or backs of tapered shanks thereof. The tie rod may be lost in the concrete.

While providing significant advantages over the conventional system in terms of ease of use, the she bolt system still has inherent difficulties in terms of efficiency of operation. The

problem lies in the necessity for the components to be suitably sized for the thickness of the wall and of the formwork. Tie lengths and she bolts must be fabricated in accordance with the wall thickness and shutter make-up respectively. Manufacturers therefore hold stocks of she bolts to "standard" lengths in increments and will also supply to specified lengths. Ties must be manufactured to specified lengths and to avoid delays some manufacturers hold stocks of ties for some common wall thicknesses. From the contractor's point of view an assessment of requirement has to be made quite early. Often assessments have to be made purely from tender drawings and prior to completion of contract drawings and prior to the establishing construction sequence. On large Civil Engineering works which require a very great number of ties of many different lengths early assessment of ties can lead to wrong lengths or wrong numbers being ordered. Changes of programme often mean rush orders or delays. The problem is worse on overseas contracts where supplies have to be shipped out and cases of last minute airfreighting are not uncommon. Some Civil Engineering works such as jetty construction require a variety of long she bolts the length of which cannot be assessed until the falsework schemes have been finalised.

It is therefore an object of this invention to provide an improved formwork tie system wherein the above-mentioned disadvantages are overcome.

Viewed from one aspect the invention provides a formwork tie comprising a tie rod threadedly engaged with the smaller end of an elongate tapered member with whose other end is threadedly engaged a connecting rod adapted to threadedly receive a formwork clamp, means being provided for securing the connecting rod and tapered member against relative rotation, the tie rod and connecting rod being continuously threaded along their lengths and being provided with longitudinally extending engagement means whereby the rods may be lockingly gripped for manual rotation. As will hereinafter be described, the longitudinal engagement means may also serve for the locking connection to the rod of other components of the system.

The invention represent a radical departure from the previously known systems since the provision of the tapered member and securing means as aforesaid enables the tie rod and connecting rod to be cut on site to the desired lengths from standard lengths of rod stock, already threaded and provided with said engagement means continuously along their lengths. In its assembled state, the tie functions in substantially exactly the same manner as the previously known she bolt tie, but is not subject to the inefficiencies mentioned above.

The combination of tapered member and connecting rod effectively forms a she bolt, and this may be sized on site as required. The con-

necting rod to form the she bolt may be cut on site to the desired length from the standard stock. This avoids the problem of having to plan and order she bolts of suitable lengths well in advance, and imparts flexibility to the system so that any last minute changes in or corrections to the building specification do not involve the urgent supply of further she bolts. The same is true of the tie rods. Thus in accordance with the invention the operational difficulties involved with the she bolt with regard to length requirements of both she bolts and ties are completely overcome.

Viewed from another aspect the invention provides a method of making a formwork tie comprising cutting a connecting rod from a length of rod stock, such stock being continuously threaded and formed with longitudinally extending engagement means whereby the rod may be lockingly gripped for manual rotation, threadedly engaging the connecting rod with the larger end of an elongate tapered member, providing means for securing the connecting rod and tapered member against relative rotation thus effectively forming a she bolt, repeating the process to provide a further she-bolt, cutting a tie rod from the or a further length of said stock, threadedly engaging the tie rod with the smaller ends of the tapered member of the she bolts and providing formwork clamps to be threadedly engaged on the connecting rods of the she bolts.

Viewed from yet a further aspect the invention provides a system of fabricating formwork ties comprising cutting tie rods and connecting rods from a length of rod stock, such stock being continuously threaded and formed with longitudinally extending engagement means whereby the rod may be lockingly gripped for manual rotation, and interconnecting the tie rods and connecting rods by threaded engagement with respective ends of a tapered member, providing means at the larger end of the tapered member for securing it against rotation relative to the connecting rod, and threadedly engaging formwork clamps with respective connecting rods.

The longitudinal extending engagement means may comprise one or more flat sides formed on the rod stock suitably sized for the operational purpose of their design. Two opposed flat sides would preferably be provided to enable the rods to be rotated by means of a spanner or like wrench. In a preferred embodiment however one or more, preferably two longitudinal slots are formed in the rods. Where two slots are provided, these may be diametrically opposed. A suitable tool will then be provided with a key or keys for engagement in the slot(s) to be able to rotate the rod. In both cases, i.e. flats or slots, it should be noted that the rods may be drivingly engaged by the appropriate rotating tool at any point along their length. Furthermore a flat or slot as aforesaid affords a convenient location for stamping on

the rod information regarding its tensile strength, safe working load etc. This may be advisable for recognition purposes when different types of stock are used as the purpose requires.

As mentioned above, the non-rotational fixing of the connecting rod to the tapered member effectively creates a she bolt. Once therefore the clamp has been removed after setting of the concrete, a suitable tool may be engaged with the exposed end of the connecting rod and the rod rotated so as to disengage the tapered member from the tie rod. The said securing means may take any one of a number of forms. Where the rods have one or more longitudinal slots, the securing means can comprise a key engaging in a said slot and in a locating groove formed in the tapered member. Such a key may be held in its locating slot by a locknut engaged with the rod. The slots may be of any cross section, but semi-circular is presently preferred. This enables the keys to be substantially cylindrical, which is easy to manufacture, and easy to insert in their receiving bores. The keys may be arranged to protrude from their bores so that their ends may be engaged for removal. A particularly convenient way of arranging this is to provide an annular groove at the end of the key for engagement by the edge of a tool, or a fingernail. A plurality of locating grooves may be provided, two being preferable. The disposition of said two grooves at a 90° radial separation will afford four relative radial locking positions for a two diametrically opposed slot rod. Depending on the configuration and the number and relative orientation of grooves in the tapered member and slots in the stock rod one or more securing lugs may be used.

The system may also be supplied with coupling members comprising a rod or tube with an internal thread at each end adapted to receive a length of said stock in threaded engagement. Theoretically, the provision of one such coupling member per standard length of stock will result in no waste of the stock through cutting. The coupling members may also be provided at one or both ends with relative rotation securing means as discussed hereinbefore. Thus they may be used to interconnect parts of a connecting rod as well as those of a tie rod.

Any number of she bolts of any desired lengths may be fabricated as described above and if necessary longer than the standard stock rod described above by coupling whole or parts of such rod stock with said coupling members. She bolts fabricated as described above may be retained for use in those lengths fabricated or if desired taken apart so that their constituent parts may be used for such or other configurations. Two such she bolts fabricated as above may be attached at each end of a formwork tie by threadedly engaging their elongated tapered ends at each end of such tie, where such tie

may be any length of stock rod as used for the fabrication of she bolts and where such a length of tie as required may be one single length of fabricated out of two or more lengths of stock rods used for she bolts and coupled together with coupling members as described above and where parts or the whole of these ties may be rod from dismantled she bolts. Two she bolts connected with a formwork tie at their elongate tapered ends and with threadedly engaged clamps at the other ends may constitute the entire formwork tie system.

The versatility of the system and its constituent components so far described as a formwork tie system is very great and it is envisaged that the constituent parts may be utilised singly or collectively in a variety of configurations to cover the great majority of requirements to be encountered.

A distinct advantage which clearly demonstrates the versatility of the system is the adaptation of the system with the same components as described above to its use as a cone spacer formwork tie system with the advantages of the cone spacer system over the she bolt formwork tie system. The advantage of the she bolt formwork tie system over the cone spacer formwork tie system is that it offers the facility to assemble the formwork tie to the formwork by offering the completely assembled parts of the tie assembly including one of the external clamps from one side only through registering apertures in the formwork is inherent of the disadvantage of the she bolt system in that it does not space or hold firmly apart at a specific distance apart the formwork at the position of the tie. It often becomes a criterion of the formwork design that the formwork ties must act as spacers in which event preference is given to the cone spacer system and it is quite common for both systems to be employed on the same site. It often becomes necessary to employ both systems on the same formwork shutter.

It should be noted therefore that with reference to the components so far described and the method of assembly and use of the components so far described, if the formwork tie is envisaged as assembled in the formwork with the exception that the lugs and locknuts holding the tapered members captive against rotation to the connecting rods are excluded and the registering holes in the formwork are larger than the rods but smaller than the larger ends of the tapered members which abut the internal faces of the formwork the system effectively becomes a cone spacer system.

The tapered members which when locked to a length of stock rod become the tapered ends of she bolts may be used as the cone spacers in a cone spacer tie system configuration. Therefore the system proposed according to the invention is designed in such a manner as to offer the user a choice for its use as either a she bolt or a cone spacer formwork tie system at

will and without any additions or modifications to the minimum essential standard components for its use as a she bolt system. In other words, the system proposed is designed in such a manner that it may be looked upon as a cone spacer formwork tie system which may be converted easily and at will to a she bolt formwork tie system purely by locking the tapered member to the connecting rod with the means provided.

It may be noted that this dual identity of the system is enhanced by the concept of stock rod supply and use to an extent that decision as to the mode of application of the system and sizing of the components may be left as late as the time at which formwork erection is actually in progress.

The clamping members may be of convenient design. Thus the clamping member may be provided with a fixed threaded bore for engaging the connecting rod such that rotation of the whole member is required for tightening or removal. Equally, clamping members of the kind incorporating a rotatable but captive nut may be employed, where rotation of the main body of the clamp is not required. As a particularly preferred feature of the invention however I have devised a novel clamping member whereby a plurality of functions of known clamps are incorporated in a single unit.

Viewed from yet a further aspect therefore, the invention provides a formwork clamp comprising a main clamp body having a part-spherical socket formed therein, a rod engaging member comprising an at least part-spherical body captively received in the socket for universal movement therein, said member including a threaded bore for threadedly receiving a rod therein, engagement means whereby the member may be lockingly gripped for manual rotation, and first locking means whereby the member may be fastened to the rod, said clamp body including second locking means adapted to prevent axial rotation of the member but permit pivoting thereof about a transverse axis.

The engagement means may most conveniently comprise a nut portion integral with or fixed to said member. The first locking means may comprise a transversely disposed screw adapted to engage a flat or longitudinal slot formed in the rod. The second locking means may comprise a further transversely disposed screw engaged in the clamp body and adapted to engage in an at least part-circumferential groove formed in the part-spherical body and lying in the plane of the axis of the threaded bore.

Such a clamp thus incorporates a plurality of selectable functions. With the second locking means engaged, the clamp performs substantially as a fixed clamp wherein the entire clamp body is rotated to effect tightening. Release of the second locking means enables the rod engaging member to be rotated relative

to the clamp body for example by a spanner or other wrench to achieve a greater tightening force. Engagement of the first locking means with the rod enables the clamp to be used as the rigid abutment of a formwork jack.

The ball and socket embodiment in the clamp design allows the axis of the rod to take up a position other than perpendicular to the plane of the face of the clamp and depending on the allowable deviation from the perpendicular governed by design parameters would partly or wholly eliminate the use of simple or compound wedge members as frequently used between the clamp face and the member on which this face abuts.

In order that the invention may be readily understood, certain embodiments thereof will now be described by way of example with reference to the accompanying drawings wherein:—

Fig. 1 is a part-sectional elevation of a formwork tie according to the invention;

Fig. 2 is a sectional view of erected formwork using formwork ties according to the invention; and

Fig. 3 is a side view of a clamp in accordance with the invention.

The tapered member 1 comprises a steel rod having a threaded bore 2 extending throughout its length, although separate blind threaded bores at its respective ends could be provided instead if desired. At the larger end a pair of diametrically opposed radial grooves 3 of semi-circular cross section are machined in the member. These may be machined out of the threaded bore, or may be formed by first drilling opposed blind bores in the larger ends of the tapered member 1 before machining out the central bore.

The rod stock shown as 4 combines with the tapered member 1 to form a she bolt. This stock will be supplied to the site in standard lengths in an appropriate quantity and then cut to size as required by the formwork dimensions. The rod 4 is a steel rod formed with an external rolled thread. Such rolling of the thread is expected to be the most economical way of producing the stock, but an Acme or similar or other thread could instead be used if desired. The rod 4 is also formed with a pair of diametrically opposed longitudinal slots 5 again of semi circular cross section, and of substantially the same radius as that of the grooves 3.

To form a she bolt the tapered member 1 is threadedly engaged with a length of connecting rod 4 to a sufficient depth, and the slots 5 and grooves 3 are aligned. A key 6 is inserted in each bore so formed, and it will be seen that the length of the keys is such that their end protrude from the receiving bores when pushed fully home. This is to facilitate removal of the keys when dismounting, whereby the edge of a tool may be engaged in an annular groove 7 formed at the ends of the keys to draw the keys out.

The she bolt assembly is completed by a lock nut 8 which is screwed up to engage the larger end of the tapered member, the nut being provided with a cavity 9 to receive the protruding ends of the keys 6.

The she bolts thus assembled may now be used in the conventional way, it being noted that a further length of the same rod stock is cut to provide the tie rod 10, which will be lost in the cured concrete. The formwork consisting of panels 11, walings 12 and soldiers 13 is erected in the usual way and supported by an array of she bolt/tie rod assemblies with clamps 14 threadedly engaged over the ends of the exposed rods to abut the soliders 13.

At this stage a further and substantially advantageous feature of the invention comes into play. The locknuts which are abutting the larger ends of the tapered members 1 can be unscrewed to abut the inner faces of the soldiers 13 by the intermediary of split washers 25, laterally engaged over the she bolts assembly, and thus provide a spacing function in the manner of known cone spacers.

Disassembly of the formwork is simple. Once the clamps 14 are removed the exposed rod is engaged by a tool (not shown) which as operative parts which engage in the longitudinal slots 5. The engagement of tool and rod may be anywhere along its length and permits the rod to be manually rotated to withdraw the tapered member from the concrete, since it is locked onto the rod by the keys 6.

The she bolts may now be used again, or may be disassembled for storage. Used rods may be connected together to form a desired new length by means of connecting members 15 which are provided with internal grooves for locking in the same way as the tapered members. The fact that tie rods and she bolts do not have to be ordered in advance and to the correct size makes the system extremely flexible, and the hitherto encountered problems regarding supply or parts is overcome simply but effectively.

A novel clamp which may be used with the formwork tie already described, or may indeed be used with existing she bolts or connecting rods, is shown in Fig. 3. It comprises a cast main clamp body 16 formed with a part-spherical socket 17. In this socket is captively received for universal swivelling a rod engaging member 18 comprising a substantially spherical body having an integral nut portion 19 formed therewith. Threadedly received in the member 18 (the threaded engagement may only be with nut portion 19) is a grooved threaded rod 21 as described previously. A radially disposed grub screw 20 is engaged in the nut portion 19, the inner end of which is arranged to be received in the groove 22 to lock member 18 to the rod.

A second grub screw 23 is threaded into the clamp body 16, whose inner end is adapted to

be received in a peripheral groove 24 formed in the spherical body.

It will thus be seen that with neither grub screw engaged, the clamp body can pivot in all directions with respect to the rod 21. With grub screw 20 engaged the clamp body is fixed in position on the rod and so may be used as the fixed abutment of a formwork jack, able to provide in all directions to attain the desired orientation. Its ability to pivot is restricted by engagement of the grub screw 23 in the groove 24 which restricts the pivoting to a single plane and prevents axial rotation of the body 18.

It will be appreciated that the novel system proposed according to the invention radically simplifies the planning as to hardware required in concrete construction. The adoption of uniform rod stock for both tie rods and she bolt assemblies imparts a hitherto unavailable flexibility to the system. Furthermore, the adoption of the multifunction clamp described lowers still further the number of basic parts required whereby any desired formwork may be erected and supported.

It will further be appreciated that the supply to a construction site of means for putting the invention into effect will at the same time provide materials for other functions, and the versatility of the material is such that it may be used on site for such other functions only. This is due to the fact that in particular the stock rod may be used for other purposes, for example as concrete reinforcement, or it can be cut up and used to make general purpose or special bolts. In the former example the use of the stock rod as reinforcement in view of its continuous thread, will lend itself particularly well in applications where end to end coupling of the reinforcement is required using said couplers and lock nuts and keys if necessary and will provide adequate bond strength with the surrounding concrete. The longitudinal flats or slots will in this case provide an engagement with the cured concrete which will be of substantial torsional resistance.

Claims

1. A formwork tie comprising a tie rod (10) threadedly engaged with the smaller end of an elongate tapered member (1) with whose other end is threadedly engaged a connecting rod (4) adapted to threadedly receive a formwork clamp (14), means (6) being provided for securing the connecting rod (4) and tapered member (1) against relative rotation, the tie rod (10) and connecting rod (4) being continuously threaded along their lengths and being provided with longitudinally extending engagement means (5) whereby the rods may be lockingly gripped for manual rotation.

2. A method of making a formwork tie comprising cutting a connecting rod (4) from a length of rod stock, such stock being con-

tinuously threaded and formed with longitudinally extending engagement means (5) whereby the rod (4) may be lockingly gripped for manual rotation, threadedly engaging the connecting rod (4) with the larger end of an elongate tapered member (1), providing means (6) for securing the connecting rod (4) and tapered member (1) against relative rotation thus effectively forming a she bolt, repeating the process to provide a further she bolt, cutting a tie rod (10) from the or a further length of said stock, threadedly engaging the tie rod (10) with the smaller ends of the tapered members (1) of the she bolts and providing formwork clamps (14) to be threadedly engaged on the connecting rods (4) of the she bolts.

3. A system of fabrication of formwork ties comprising cutting tie rods (10) and connecting rods (4) from a length of rod stock, such stock being continuously threaded and formed with longitudinally extending engagement means (5) whereby the rod may be lockingly gripped for manual rotation, and interconnecting the tie rods (10) and connecting rods (4) by threaded engagement with respective ends of a tapered member (1), providing means (6) at the larger end of the tapered member (1) for securing it against rotation relative to the connecting rod (4), and threadedly engaging formwork clamps (14) with respective connecting rods.

4. A tie, method or system according to claim 1, 2 or 3 in which the longitudinally extending engagement means (5) comprises one or more flat sides formed on the rod stock.

5. A tie, method or system according to claim 1, 2 or 3 in which the longitudinally extending engagement means (5) comprises one or more longitudinal slots (5) formed in the rod stock.

6. A tie, method or system according to claim 5 in which two said slots (5) are provided which are diametrically opposed.

7. A tie, method or system according to claim 5 or 6 in which the tapered member (1) is formed with one or more internal longitudinal grooves (3) registrable with said slot(s) (5) and including a respective key or keys (6) for insertion into the bore(s) formed by respective mating groove(s) (3) and slot(s) (5) to lock the rod and tapered member (1) against relative rotation.

8. A tie, method or system according to claim 7 in which the slot(s) (5) and groove(s) (3) are substantially semicircular in cross section and the key or keys (6) is/are in the form of a round pin.

9. A tie, method or system according to claim 7 or 8 including a lock nut (8) threaded on the rod to hold the key(s) (6) in position in the bore(s).

10. A tie, method or system according to claim 9 in which the end of the or each key (6) protrudes from the tapered member (1) to permit engagement thereof for withdrawal, the lock nut (8) being provided with an

accommodating skirt to cover the exposed end(s) of the key(s).

11. A tie, method or system according to any of the preceding claims including coupling members (15) comprising a rod or tube with an internal thread at each end adapted to receive a length of said stock in threaded and coupled engagement.

12. A tie, method or system according to claim 11 in which one or more of said couplers is formed with one or more internal longitudinal grooves (3) registrable with said slot(s) (5) and including a respective key or keys (6) for insertion into the bore(s) formed by respective mating groove(s) (3) and slot(s) (5) to lock the rod and coupler (15) against relative rotation.

13. A method according to claim 9 or 10 including disengaging the lock nut (8) from the tapered member and withdrawing it back along the rod to engage the formwork in a spacing manner.

14. A formwork clamp comprising a main clamp body (16) having a part-spherical socket (17) formed therein, a rod engaging member (18) comprising an at least part-spherical body captively received in the socket for universal movement therein, said member (18) including a threaded bore for threadedly receiving a rod therein, engagement means whereby the member may be lockingly gripped for manual rotation, and first locking means (20) whereby the member may be fastened to the rod, said clamp body (16) including second locking means (23) adapted to prevent axial rotation of the member but permit pivoting thereof about a transverse axis.

Patentansprüche

1. Schalungsspanner, gekennzeichnet durch eine Spannstanze (10), die sich im Gewindeeingriff mit dem kleineren Ende eines gestreckten, sich verjüngenden Teils (1) befindet, mit diesem anderen Ende sich eine Verbindungsstanze (4) im Gewindeeingriff befindet, welche über ein Gewinde eine Schalungsklammer (14) aufzunehmen vermag, wobei eine Einrichtung (6) für die Sicherung der Verbindungsstanze (4) und des sich verjüngenden Teils (1) gegen Relativdrehung vorgesehen ist, und wobei die Spannstanze (10) und die Verbindungsstanze (4) fortlaufend über ihre längs erstreckenden Eingriffseinrichtung (5) versehen sind, über die die Stangen zur manuellen Drehung formschlüssig einspannbar sind.

2. Verfahren zur Herstellung eines Schalungsspanners, gekennzeichnet durch Abtrennen einer Verbindungsstanze (4) von einer Länge eines Stangenvorrats, wobei dieser Stangenvorrat fortlaufend mit einem Gewinde versehen ist und mit einer sich in Längsrichtung erstreckenden Eingriffseinrichtung (5) gebildet ist, über die die Stanze (4) zur manuellen Drehung formschlüssig einspannbar ist, Her-

stellen eines Gewindeeingriffs der Verbindungsstanze (4) mit dem größeren Ende eines gestreckten, sich verjüngenden Teils (1), Vorsehen einer Einrichtung (6) für die Sicherung der Verbindungsstanze (4) und des sich verjüngenden Teils (1) gegen Relativdrehung, um so wirkungsvoll einen Aufnahmebolzen zu bilden, Wiederholen des Vorgangs zur Schaffung eines weiteren Aufnahmebolzens, Abtrennen einer Spannstanze (10) von diesem oder einer weiteren Länge des Stangenvorrats, Herstellen eines Gewindeeingriffs der Spannstanze (10) mit den kleineren Enden der sich verjüngenden Teile (1) der Aufnahmebolzen, und durch Vorsehen von Schalungsklammern (14) für den Gewindeeingriff an den Verbindungsstangen (4) der Aufnahmebolzen.

3. System zur Fertigung von Schalungsspannern, gekennzeichnet durch Abtrennen von Spannstanzen (10) und Verbinden von Stangen (4) aus einer Länge eines Stangenvorrats, wobei dieser Stangenvorrat fortlaufend mit einem Gewinde versehen ist und mit einer sich längs erstreckenden Eingriffseinrichtung (5) gebildet ist, durch die die Stanze zur manuellen Drehung formschlüssig einspannbar ist, und Zwischenbauen der Spannstanzen (10) und der Verbindungsstangen (4) durch Gewindeeingriff mit entsprechenden Enden eines sich verjüngenden Teils (1), vorsehen einer Einrichtung (6) an dem größeren Ende des sich verjüngenden Teils (1) zu dessen Sicherung gegen Relativdrehung gegenüber der Verbindungsstanze (4), und Herstellen eines Gewindeeingriffs von Schalungsklammern (14) mit entsprechenden Verbindungsstangen.

4. Schalungsspanner, Verfahren oder System nach Anspruch 1, 2 oder 3, dadurch gekennzeichnet, daß die sich längs erstreckende Eingriffseinrichtung (5) eine oder mehrere auf dem Stangenvorrat gebildete flache Seiten aufweist.

5. Schalungsspanner, Verfahren oder System nach Anspruch 1, 2 oder 3, dadurch gekennzeichnet, daß die sich längs erstreckende Eingriffseinrichtung (5) einen oder mehrere in dem Stangenvorrat gebildete Längsschlitze (5) aufweist.

6. Schalungsspanner, Verfahren oder System nach Anspruch 5, dadurch gekennzeichnet, daß zwei Schlitze (5) vorgesehen sind, die diametral gegenüber liegen.

7. Schalungsspanner, Verfahren oder System nach Anspruch 5 oder 6, dadurch gekennzeichnet, daß das sich verjüngende Teil (1) mit einem oder mehreren inneren Längsnuten (3) gebildet ist, die mit dem Schlitz bzw. den Schlitzen (5) ausrichtbar sind, und daß ein entsprechender Keil bzw. Keile (6) vorgesehen sind, die in die Bohrung bzw. Bohrungen einsetzbar sind, welche durch eine oder mehrere entsprechend zusammenpassende Nuten (3) und Schlitze (5) gebildet sind, um die Stanze und das sich verjüngende Teil (1) gegen Relativdrehung zu verriegeln.

8. Schalungsspanner, Verfahren oder System nach Anspruch 7, dadurch gekennzeichnet, daß der Schlitz bzw. die Schlitz (5) und die Nut bzw. die Nuten (3) wesentlichen einen halbkreisförmigen Querschnitt aufweisen, und daß der Keil bzw. die Keile (6) die Form eines runden Stiftes besitzen.

9. Schalungsspanner, Verfahren oder System nach Anspruch 7 oder 8, gekennzeichnet durch eine auf die Stange geschraubte Sicherungsmutter (8), durch die der Keil bzw. die Keile (6) in ihrer Lage in der bzw. den Bohrungen haltbar sind.

10. Schalungsspanner, Verfahren oder System nach Anspruch 9, dadurch gekennzeichnet, daß das Ende des oder jedes Keils (6) von dem sich verjüngenden Teils (1) zum möglichen Eingriff an demselben zum Entfernen vorsteht, wobei die Sicherungsmutter (8) mit einer Aufnahmeeinfassung zur Abdeckung des bzw. der freiliegenden Enden des bzw. der Keile versehen ist.

11. Schalungsspanner, Verfahren oder System nach einem der vorangehenden Ansprüche, gekennzeichnet durch Kuppelteile (15) aus einer Stange oder einem Rohr mit einem Innengewinde an jedem Ende für die Aufnahme einer Länge des Stangenvorrats im Gewinde und Kupplungseingriff.

12. Schalungsspanner, Verfahren oder System nach Anspruch 11, dadurch gekennzeichnet, daß ein oder mehrere der Kupplungsteile mit einem oder mit mehreren mit dem bzw. den Schlitz (5) ausrichtbaren Längsnuten (3) gebildet ist bzw. sind und daß ein entsprechender Keil bzw. Keile (6) für das Einsetzen in die Bohrung bzw. Bohrungen, die durch eine oder mehrere entsprechend zusammenpassende Nuten (3) und Schlitz (5) gebildet ist bzw. sind, zur Verriegelung der Stange und des Kupplungsteils (15) gegen Relativdrehung vorgesehen ist bzw. sind.

13. Verfahren nach Anspruch 9 oder 10, dadurch gekennzeichnet, daß die Sicherungsmutter (8) von dem sich verjüngenden Teil gelöst und für den beabstandeten Eingriff des Schalungsspanners längs der Stange zurückbewegt wird.

14. Schalungsklammer, gekennzeichnet durch einen Hauptklammerkörper (16) mit einem darin gebildeten teilsphärischen Sockel (17), ein Stangenangriffselement (18) das an wenigstens einem teil-sphärischen Körper unverlierbar in dem Sockel zur allgemeinen Bewegung in diesem aufgenommen ist, wobei das Element (18) eine Gewindebohrung für die Gewindeaufnahme einer Stange in dieser aufweist, eine Angriffseinrichtung, durch die das Element zur manuellen Drehung formschlüssig einspannbar ist, und eine erste Blockierungseinrichtung (20), durch die das Element an der Stange befestigbar ist, wobei der Klemmkörper (16) eine zweite Blockierungseinrichtung (23) enthält, durch die die axiale Drehung des Elements verhinderbar, jedoch das

Verschwenken desselben um eine Querachse möglich ist.

Revendications

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1. Dispositif de tirant pour coffrages comprenant un tirant (10) vissé dans la plus petite extrémité d'un élément conique allongé (1) et dans l'autre extrémité duquel est vissée une bride de serrage (14) du coffrage, des moyens (6) étant prévus pour empêcher toute rotation relative entre la tige de liaison (4) et l'élément conique (1), le tirant (10) et la tige de liaison (4) étant filetés de manière continue sur toute leur longueur et étant munis de moyens (5) d'engagement s'étendant longitudinalement, de sorte que la tige et le tirant peuvent être saisis pour être verrouillés par rotation manuelle.

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2. Procédé de fabrication d'un dispositif de tirant pour coffrages, dans lequel on coupe une tige de liaison (4) à partir d'une certaine longueur de tige en stock, ce stock étant fileté de manière continue et formé avec des moyens (5) de préhension s'étendant longitudinalement, de sorte que la tige (4) peut être saisie et verrouillée par rotation manuelle, on visse la tige de liaison (4) dans la plus grande extrémité d'un élément conique allongé (1), on monte des moyens (6) pour empêcher toute rotation relative entre la tige de liaison (4) et l'élément conique (1) de façon à former ainsi effectivement un "tirant she" on répète ce processus pour constituer un autre "tirant she", on coupe un tirant (10) à partir de la ou d'une autre longueur dudit stock, on visse le tirant (10) dans les petites extrémités des éléments coniques (1) des "tirants she" et on monte des brides de serrage (14) de coffrage en vissant celles-ci sur les tiges de liaison (4) des "tirants she".

3. Système de fabrication de tirants pour coffrages, dans lequel on coupe des tirants (10) et des tiges de liaison (4) à partir d'une certaine longueur d'une tige en stock, ce stock étant fileté de manière continue et comportant des moyens (5) de préhension s'étendant longitudinalement, de sorte que la tige puisse être saisie et verrouillée par rotation manuelle, et on relie les tirants (10) ainsi que les tiges de liaison (4) en vissant leurs extrémités respectives dans un élément conique (1), on monte des moyens (6) sur la plus grande extrémité de l'élément conique (1) pour bloquer ce dernier en rotation par rapport à la tige de liaison (4), et on visse des brides (14) de coffrage sur les tiges de liaison correspondantes.

4. Tirant, procédé ou système selon l'une des revendications 1, 2 et 3, dans lequel les moyens (5) de préhension s'étendant longitudinalement comportent au moins un côté plat agencé sur la tige en stock.

5. Tirant, procédé ou système selon l'une des revendications 1, 2 et 3, dans lequel les moyens (5) de préhension s'étendant longitudinalement comportent au moins une fente longitudinale (5) agencée dans la tige en stock.

6. Tirant, procédé ou système selon la revendication 5, dans lequel deux fentes (5) sont agencées, ces fentes étant diamétralement opposées.

7. Tirant, procédé ou système selon l'une des revendications 5 et 6, dans lequel l'élément conique (1) comporte au moins une rainure longitudinale interne (3) correspondant à la (les) fente(s) (5), et est pourvue d'au moins une clé correspondante (6) destinée à être introduite dans le(s) perçage(s) délimité par les rainure(s) (3) et fente(s) (5) conjuguées pour bloquer toute rotation relative entre la tige et l'élément conique (1).

8. Tirant, procédé ou système selon la revendication 7, dans lequel la (les) fente(s) (5) et la (les) rainure(s) (3) ont une section transversale sensiblement semicirculaire, et la clé ou les clés (6) a (ont) la forme d'une goupille arrondie.

9. Tirant, procédé, procédé ou système selon l'une des revendications 7 et 8, comprenant un écrou (8) de verrouillage vissé sur la tige pour maintenir la (les) clé(s) (6) en place dans le (les) perçage(s).

10. Tirant, procédé ou système selon la revendication 9, dans lequel l'extrémité de la ou de chaque clé (6) fait saillie de l'élément conique (1) pour permettre la préhension de celle-ci afin de la retirer, et l'écrou (8) de verrouillage est pourvue d'une chemise adaptée pour recevoir et recouvrir l'extrémité (les extrémités) exposée(s) de la clé(s).

11. Tirant, procédé ou système selon l'une quelconque des revendications précédentes, comprenant des organes d'accouplement (15) qui comportent une tige ou un tube présentant un taraudage à chaque extrémité, adapté pour

recevoir une certaine longueur de la tige en stock, laquelle est ainsi accouplée avec cet organe (15) par vissage.

12. Tirant, procédé ou système selon la revendication 11, dans lequel au moins l'un des organes d'accouplement comporte au moins une rainure longitudinale (3) correspondant à la fente(s) (5) et muni d'une clé ou de clés (5) correspondante destinée à être introduite dans le (les) perçage(s) formé par la (les) rainure(s) (3) et la (les) fente(s) complémentaire pour verrouiller la tige et l'organe d'accouplement (15) en rotation relative.

13. Procédé selon l'une des revendications 9 et 10, dans lequel on dégage l'écrou de verrouillage (8) de l'élément conique et on l'escamote vers l'arrière le long de la tige pour le faire coopérer avec le coffrage avec un espacement convenable.

14. Bride de serrage pour coffrages, comprenant un corps principal (16) qui présente une monture (17) partiellement sphérique formée dans ce corps, un élément (18) coopérant avec une tige et comportant un corps au moins partiellement sphérique retenu captif dans la monture et pouvant être déplacé librement dans celle-ci, cet élément (18) comportant un perçage taraudé dans lequel peut être vissée une tige, des moyens de préhension grâce auxquels l'élément peut être saisi pour être verrouillé par rotation manuelle, et des premiers moyens de verrouillage (20) grâce auxquels l'élément peut être fixé à la tige, le corps de bride (16) étant pourvu de seconds moyens de verrouillage (23) adaptés pour empêcher toute rotation axiale de l'élément tout en autorisant un pivotement de celui-ci au tour d'une axe transversal.

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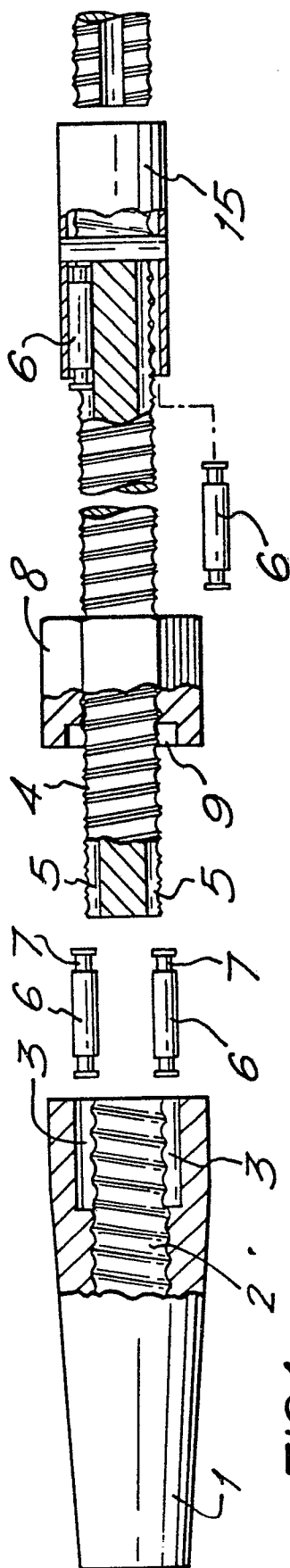


FIG. 1.

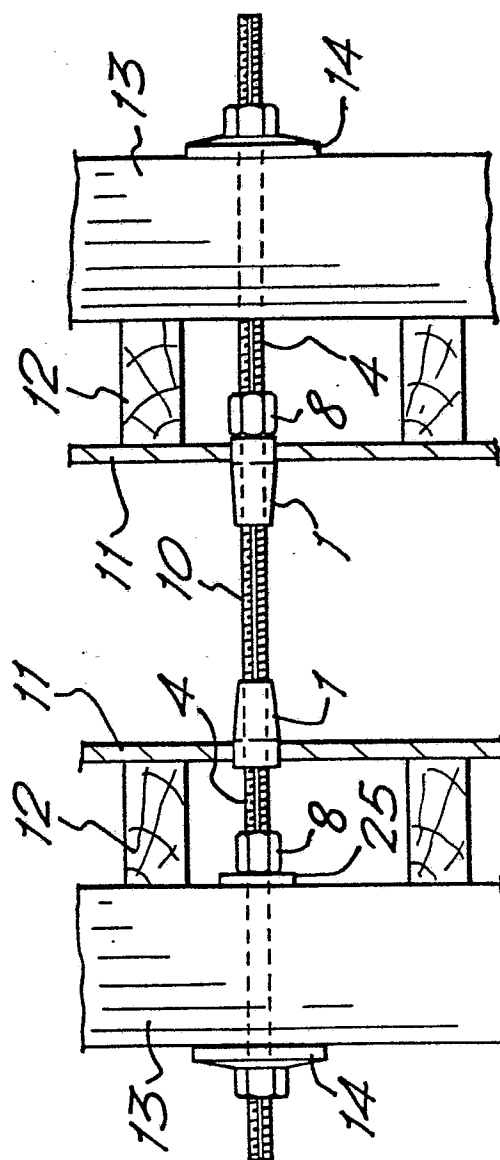


FIG. 2.

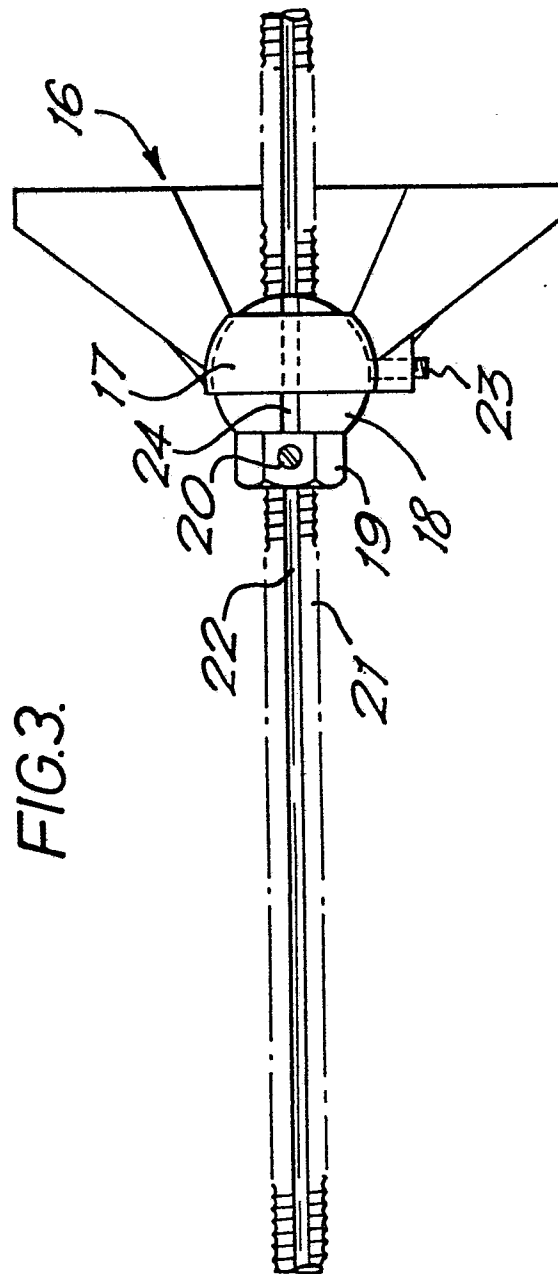


FIG. 3.