Sept. 2, 1958 C. F. GROVER ET AL 2,850,309

ADJUSTABLE CONNECTOR FOR SCAFFOLDS

Filed Feb. 13, 1957 3 Sheets-Sheet 1

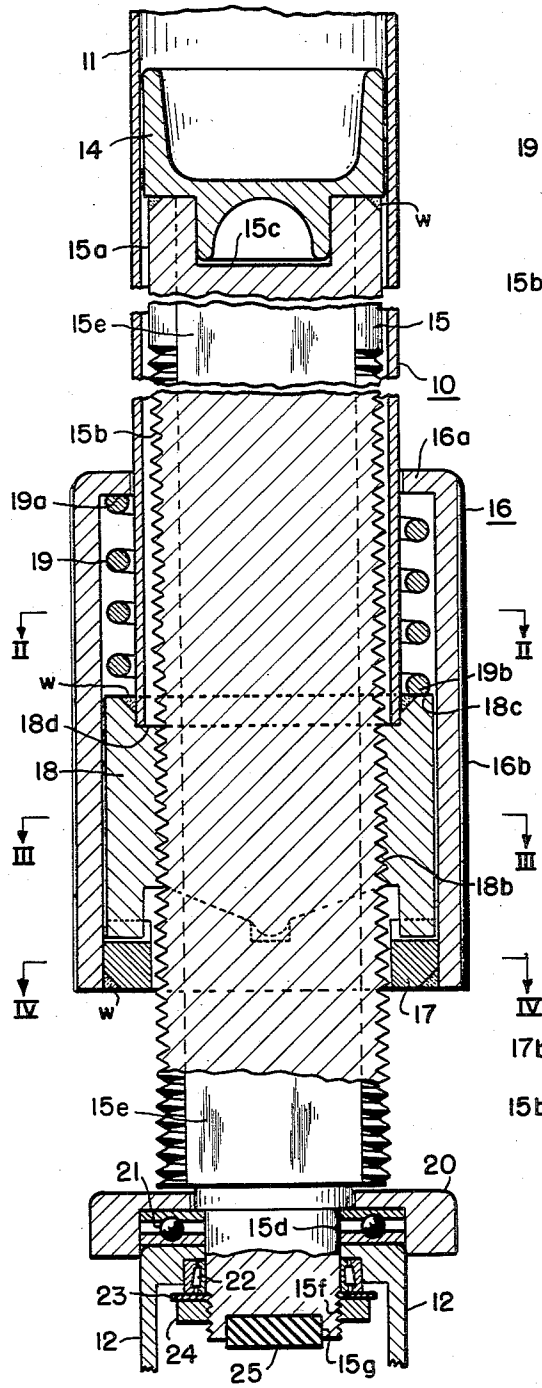

Fig. 1

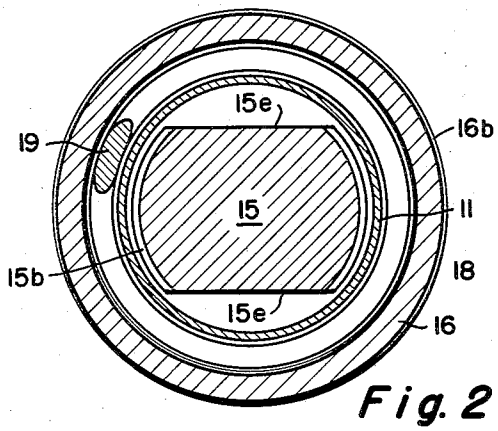

Fig. 2

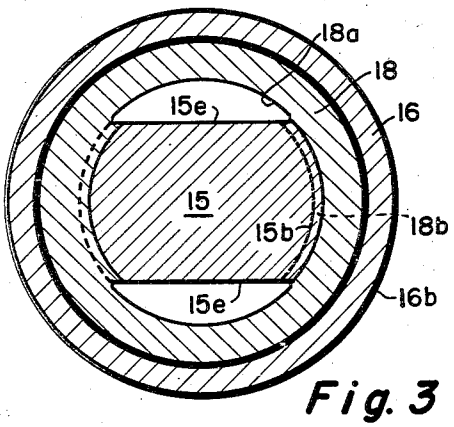

Fig. 3

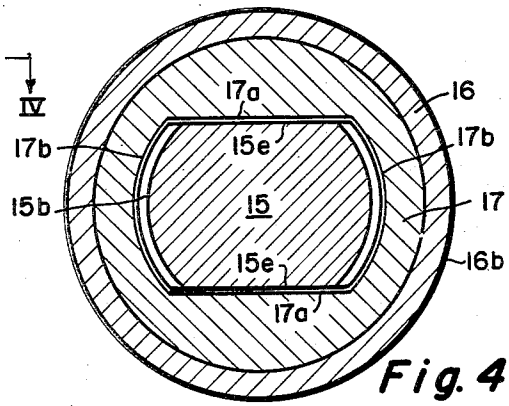

Fig. 4

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Sept. 2, 1958 C. F. GROVER ET AL 2,850,309

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Filed Feb. 13, 1957 3 Sheets-Sheet 2

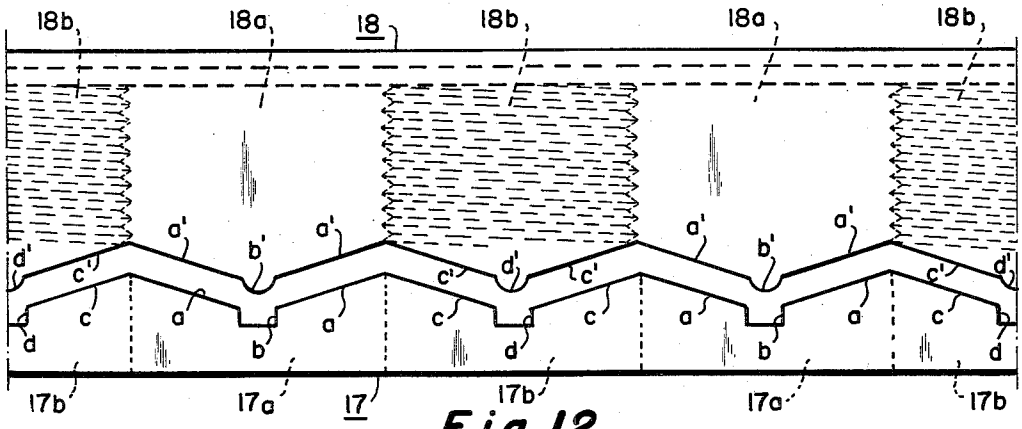

Fig. 12

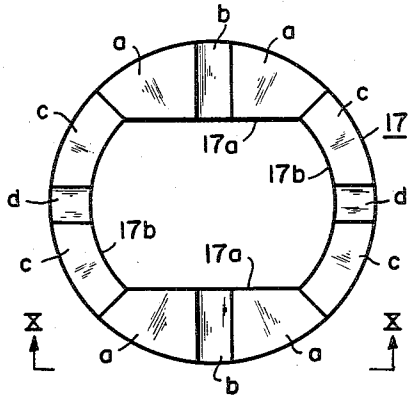

Fig. 11

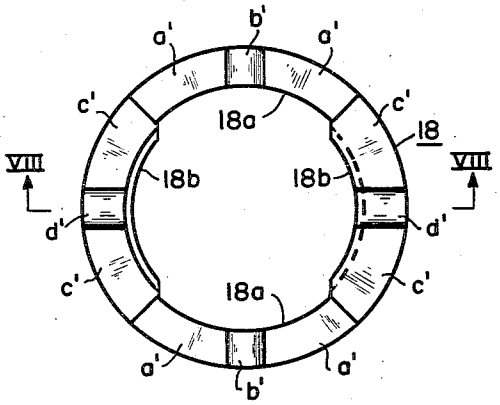

Fig. 9

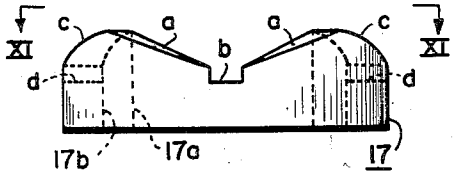

Fig. 10

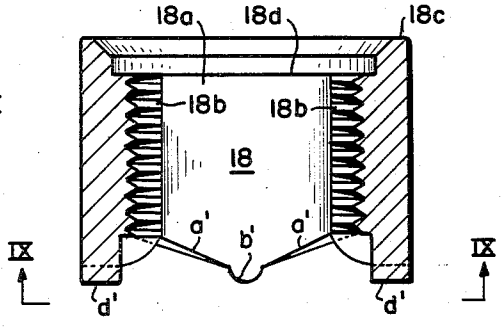

Fig. 8

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Sept. 2, 1958 C. F. GROVER ET AL 2,850,309

ADJUSTABLE CONNECTOR FOR SCAFFOLDS

Filed Feb. 13, 1957 3 Sheets-Sheet 3

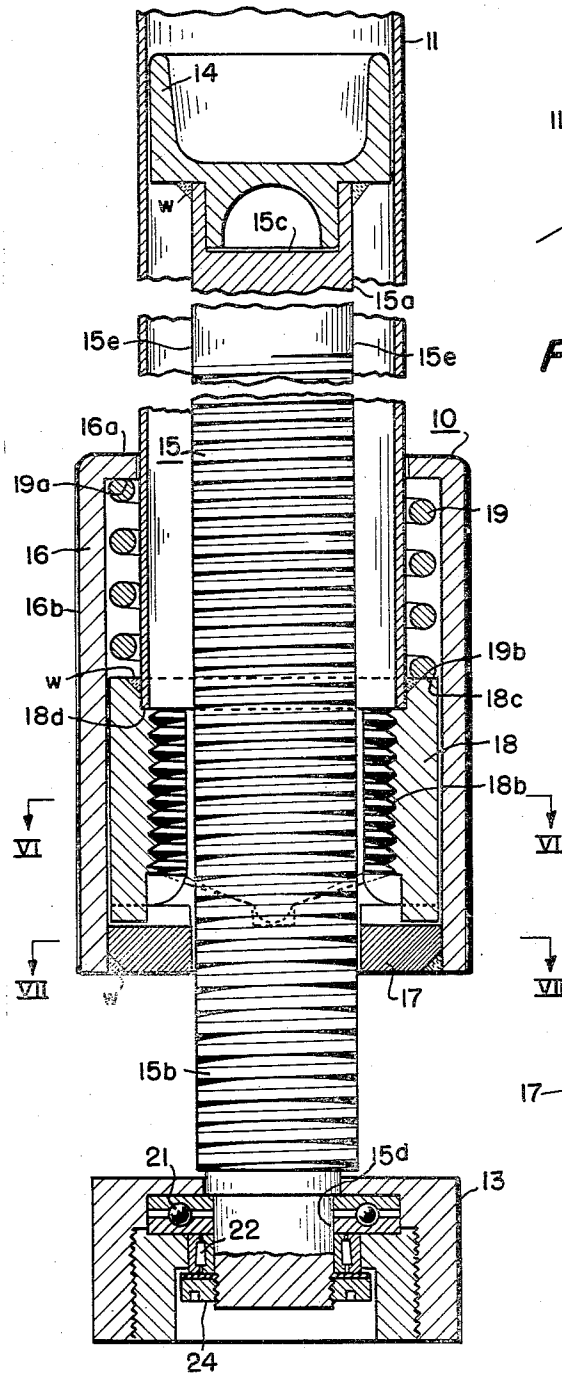

Fig. 5

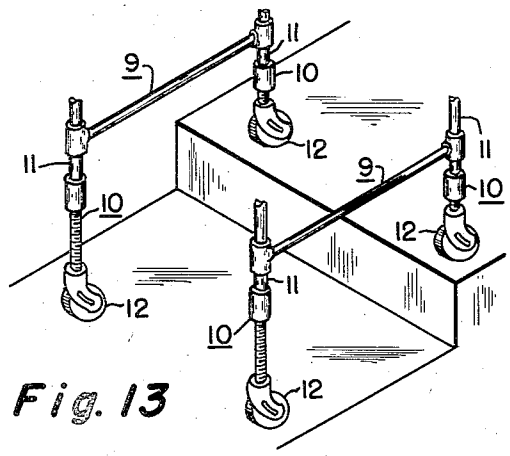

Fig. 13

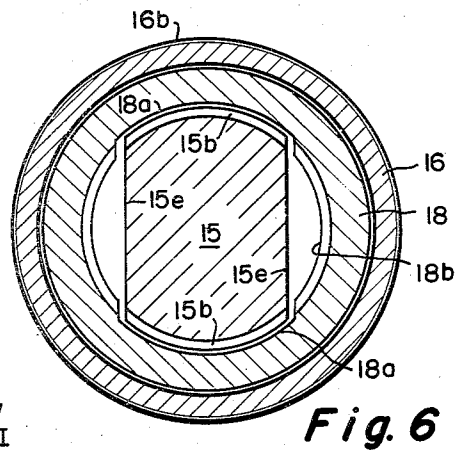

Fig. 6

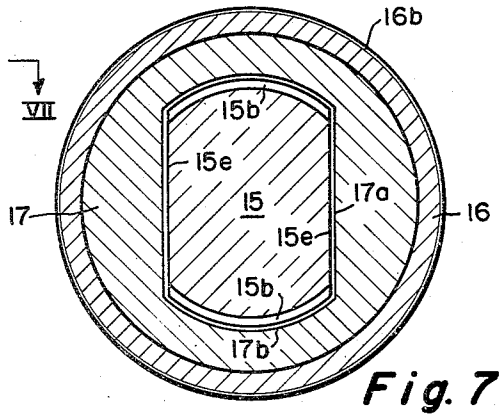

Fig. 7

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ADJUSTABLE CONNECTOR FOR SCAFFOLDS

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Application February 13, 1957, Serial No. 639,955

5 Claims. (Cl. 287—62)

This invention relates to a connector device or unit and particularly, to an adjustable connector device or construction for structures that are to be adapted to irregular support or floor surfaces and which may be of a type to be rolled or moved from one place to another.

The need for an adjustable construction of the above-mentioned type has been particularly urgent in the field of scaffold structures and particularly, collapsible scaffolds. In recent years, there has been a rapid growth in the provision and utilization of collapsible scaffolds. Scaffolds of this type may be readily assembled and disassembled at a given location and at such a location may be moved, as needed, to provide for repairing, cleaning, painting and general building maintenance work. Scaffold units are generally assembled for usage to become tiers or a vertical column of units of a desired operator-supporting height. The rolling type of scaffold has been preferred, in that it limits damage to floor or support surfaces, does not require hitches, and is more adaptable.

Although adjustable legs have heretofore been devised for support structures, such as scaffolds, our investigations have indicated that none of them fully meet requirements and particularly, from the standpoint of simplicity and accuracy of level adjustment, while at the same time permitting a fool-proof quick release of an adjusted relationship to facilitate adapting a scaffold to a new type of surface or to a new location. It is also important that adjustment constructions be absolutely fool-proof, in that the tilting of one end of a scaffold, due to the release or failure of one end post or leg device, may cause serious damage and may result in loss of life.

It has thus been an object of our invention to meet the problem involved in providing an adjustable device or connector and one that is suitable for use with a foot support assembly or construction which will fully meet requirements of the art as to strength, safety, adjustabiiity, etc., and that will, at the same time, provide a much stronger, easier to manipulate, and more practical structure;

Another object of our invention has been to devise a new and improved form of adjustable device that is suitable for use in a foot or leg construction of support structures such as scaffolds;

A further object of our invention has been to devise an adjustable connector unit or device that does not require a spring or resilient part for effecting its latching and releasing operations, and a device which may be turn-controlled to interlatch and release cooperating means of its adjustable parts;

A still further object has been to devise an adjustable connector whose adjustments may be quickly accomplished even when the connector is a part of a leg or foot system that is bearing some weight at the time an adjustment is being made;

These and other objects of our invention will appear

to those skilled in the art from the illustrated embodiment and the appended claims.

In the drawings, Figure 1 is a vertical section in elevation through an adjustable assembly, unit or device of our invention; in this figure, the parts are in an adjusted-locked, connected or supporting relationship with respect to each other;

Figures 2 to 4, inclusive, are horizontal sections on the same scale as and taken respectively along lines II—II, III—III, and IV—IV of Figure 1;

Figure 5 is a view similar to and on the same scale as Figure 1, but showing parts of the construction in a position-released or unlocked relationship with each other;

Figures 6 and 7 are horizontal sections on the same scale as and taken respectively along lines VI—VI and VII—VII of Figure 5;

Figure 8 is a vertical sectional detail showing the construction of latch collar part, taken along the line VIII—VIII of Figure 9, and on the same scale as Figures 1 and 5;

Figure 9 is a bottom end or plan view on the same scale as Figure 8 and taken along line IX—IX thereof;

Figure 10 is an outside view in elevation on the same scale as Figures 8 and 9, taken along line X—X of Figure 11, and showing the construction of an under-positioned, position-hold collar part or adjustment collar portion of the structure of Figures 1 and 5;

Figure 11 is a top end or plan view on the same scale as Figure 10 and taken along line XI—XI thereof;

Figure 12 is a somewhat diagrammatic flat plan showing the parts of Figures 8 and 10 with their opposed, interfitting, and cooperating end faces in a slightly spaced relationship for clarity of illustration; it also shows opposed or interlatching or cooperating surfaces of the latch collar part of Figures 8 and 9 and of the position-hold collar part of Figure 10 and;

Figure 13 is a greatly reduced perspective fragment showing a utilization of adjustable devices of our invention with a scaffold, where the scaffold is positioned on floor or support surfaces of uneven contour, such as represented by a pair of steps.

In carrying out our invention, we eliminate the need for a split-sleeve type of assembly, wherein the sleeve member must always retain its flexibility to effectively operate for the purpose intended, namely to alternately provide a close adjustment and a rough or loose adjustment. We have devised an adjustable unit, assembly, device, or structure 10, the operation of whose latching and releasing portions is positively effected by non-resilient or rigid members and without reliance upon the inherent resilience of one of the members. Our device may be height or length slide-adjusted and then, by a turn of an adjustment means or collar 16, be accurately and positively retained in such adjusted position. We, however, employ a position-retaining means 17 that may, in effect, be resiliently positioned.

As shown is Figures 1 and 13 of the drawings, an adjustable unit or device 10 of our invention is particularly suitable for adjusting the height or level of a unit 9, such as a scaffold. In Figure 13, I have somewhat diagrammatically indicated a lower portion of the frame of the scaffold 9 that has downwardly-depending end or corner, hollow-end, tubular, post or column members 11. Devices 10 of our invention are shown turnably or rotatably mounted between supported members or end posts 11 and support members, such as floor stand units 13 or rolling caster units 12. The latter may be of any conventional construction such as, for example, shown in the Darnell Patent No. 1,895,150. That is, if desired, the adjustment units or devices 10 may be carried on stationary bottom stands or feet 13

(see Figure 5) instead of caster assemblies **12** (see Figures 1 and 13). However, irrespective of the type of foot employed, whether it is of a rolling or of a stationary type, it will be noted that the unit **10** of our invention is rotatably or turnably mounted with respect thereto and has a part that is rotatably or turnably mounted with respect to the end post or leg members **11**.

As shown in Figure 13, the units **10** of our invention may be employed to hold the scaffold **9** on a level or firm foundation or base, so that it will not tilt, and so that different shapes, levels, and contours of supporting surfaces may be utilized. By way of example, we have found that a thirty inch length of adjustable stud or shaft **15** can provide an adjustment for two or three stair risers. In Figure 13, a one-stair riser is shown. Since each unit or device **10** is independently adjustable with respect to the others, the four points of support shown may all be of different levels to maintain the scaffold **9** in a level and non-tilting, supported relationship.

In Figures 1 to 4, inclusive, we have shown a locked position of a longitudinally-adjustable connector unit or device constructed in accordance with our invention. As previously intimated, the device **10** may be employed for a number of purposes, but importantly, to connect a foot or base part with a leg part of an overhead structure in such a manner that adjustments may be facilitated between the two parts and the adjusted relationship may be effected quickly, accurately and safely without the need for a slow, finer adjustment.

A projecting stud, bar, adjustment shaft part or member **15** is, as shown, adapted to extend longitudinally or vertically within the lower end portion of hollow end post, tube or column member **11** of the structure **9** to be supported. The shaft **15** has an upper cylindrical portion **15***a* which is positioned within the member **11** and is provided with an inwardly-offset, upper end having central bore **15***c*. The bore **15***c* receives a bearing leg guide, cup or part **14** therein. The part **14** may be secured in position by weld metal *w* and serves as an upper end bearing or rotatable support for the adjustment shaft **15** within leg **11**. It will be noted that a device, such as here involved, must withstand heavy longitudinal or compression force, as applied through the legs of the scaffolding to its feet or casters, and at the same time, must be entirely safe from the standpoint of having strength against bending movement of the two primary members making up or defining the joint.

The greater length or extent of the stud or shaft **15** is provided with latching portions or external threads **15***b* to cooperate with a stationary, locking part or latch collar member **18**. As shown in Figures 2 and 4 and 6 and 7, the shaft **15** has a pair of opposed flat, clearance or release sides or segments **15***e* and a pair of opposed threaded curvilinear sides or segments **15***b* that lie on a circumscribing circle or periphery about the locking part. The opposed flat sides **15***e* may, as shown, extend along the length of the latch portions **15***b* of the shaft **15**.

At its extreme lower end, the stud or shaft member **15** is provided with a reduced cylindrical pin-end journal portion **15***d* that may project longitudinally or downwardly into a suitable rotary bearing support. In Figure 1, this support comprises a top plate member **20** and main load bearings **21** operatively carried therein to cooperate with the journal portion **15***d*. The portion **15***d* also (as shown in Figure 1) may project as a neck into an upper portion of a wheel horn or frame **12**. A thrust bearing assembly **22** and a dust and dirt guard piece or annulus **23** are removably held in position against the horn **12** by an internally-threaded nut **24** that cooperates with external threads **15***f* on the lower end of **15***d*. In this manner, the horn **12** and the lower bearings are held in position on the shaft portion **15***d* to allow the latter to freely rotate or turn with respect to the caster assembly **12** and the bearings **21** and **22**. In Figure 1, we have also shown the lower end of the stud or shaft member **15** as having an inset portion **15***g* to receive a rubber stop block **25** for a wheel of the unit **12**.

In Figure 5, we have shown similar bearings **21** and **22** that rotatably carry or journal the journal portion **15***d* of the shaft member **15** within and with respect to a stationary foot, support or floor stand **13**. Nut **24** may be used to rotatably hold the stand **13** in position with respect to the shaft **15**.

To control adjustment of the unit **10**, we have provided an outer sleeve member or adjustment collar part **16** which has an in-turned annular rim portion **16***a* at its one (upper) end to guide along the outer wall or diameter of the post member **11** and retain an expansion spring **19** in position within an operating chamber defined by it and the post member **11**. To facilitate turning the sleeve or collar **16** about inner or latch collar **18**, we have provided it with a knurled or ribbed outer surface **16***b*. A lower or position-holding or retaining ring, collar part or member **17** is secured, as by weld metal *w*, within the inner periphery of the other (or lower) end portion of the collar member **16** to project radially or transversely-inwardly therefrom and cooperate with control, latching or locking collar member or part **18**.

The latch collar part **18** is internally threaded, as shown particularly in Figures 8 and 9, along opposed segments or portions **18***b* which lie on a cylindrical or peripheral axis. The threaded portions **18***b* correspond to and cooperate with the threaded segments or portions **15***b* of the stud or shaft member **15**. The upper end of the latch collar **18** has an inner ledge **18***d* to receive or seat the lower end of the post **11** (see Figures 1 and 5) and is secured in position with respect thereto by weld metal *w* (see Figure 1).

To resiliently retain the bottom collar or ring part **17** in a cooperating, meshing, position-retaining, latching engagement with the stationary collar **18**, we have provided a spiral, stainless steel, spring or resilient part **19**. The spring **19** is shown as a free length type having flattened or squared (as by grinding) upper and lower end portions **19***a* and **19***b*. Since the portions **19***a* and **19***b* abut between the rim **16***a* of the outer collar or sleeve part **16** and an upper abutment end **18***c* of the latch collar part **18**, the adjustment collar or sleeve part **16** and the collar part **17** carried thereby (as a portion thereof) will be resiliently held in a meshing relationship with the lower face portions of the latch collar **18**.

As shown in Figures 1 to 4, inclusive, when the parts of our construction or device are in a so-called locked or latched position, latch or threaded portions **15***b* of the central stud or shaft **15** are in interlatching engagement with corresponding threaded portions **18***b* of the inner or latch collar **18**, and the flattened or planar opposed sides **15***e* of the stud or shaft **15** lie in the same planes or project in the same direction as corresponding sides **17***a* of the lower collar part **17** (see Figure 4). When the outer or adjustment collar **16** is turned manually, the lower collar part **17** as well as the shaft **15** are turned simultaneously (compare Figures 3 and 4 with Figures 6 and 7). This is due to the fact that the part **17** and the shaft **15** have a complementary (but slide) fit (see Figures 4 and 7). However, the parts or members **11** and **18** are retained in a stationary relationship. Thus, relative movement is between such members and particularly, the inner collar **18** and the shaft **15**.

In other words, such a relative movement causes the shaft **15** to move at right angles to its original positioning, so that its threaded portions **15***b* are out of engagement with threaded portions **18***b* of the collar member **18** and are, in effect, in a sliding-clear or free relationship with respect to opposed curvilinear or clearance portions **18***a* of the member **18**. At this time, the shaft **15** may be freely slid longitudinally or vertically and with respect to the parts or members **11** and **18**, but will not carry the collar **16** and collar part **17** with it. This is true, since as shown in Figures 1 and 4, 5 and 7, the portions **17***a*

and 17*b* of the part 17 are always in a clearance-defining or free sliding relationship with the portions 15*b* and 15*e*. In Figures 5 to 7, our unit 10 is shown in an unlocked relationship, in the sense that its shaft or stud part or member 15 is loosely-slidable longitudinally or vertically with respect to lock, latch or control part 18.

Referring particularly to Figures 10, 11 and 12, the lower or end collar part 17 is of annular form having a circular or cylindrical outer periphery and a pair of opposed inner wall curvilinear surface portions 17*b* that are formed on an inner circular radius and are joined with a pair of opposed flat or planar inner wall surface portions 17*a*. The wall portions 17*a* have upper faces *a* which decline centrally towards a cross depression or groove *b* and the wall portions 17*b* have similar upper faces *c* which decline towards a central cross groove or cross depression *d*.

As shown in Figures 8, 9 and 12, the inner or latch collar 18 is of substantially cylindrical or annular form on both its inner and outer peripheries. However, opposed curvilinear portions or segment pairs 18*b* are internally threaded while opposed release portions or segment pairs 18*a* are smooth or unthreaded. Along their lower faces, the portions 18*a* and 18*b* each have tongues *b'* and *d'* which interfit respectively with somewhat complementary grooves *b* and *d* of the upper faces of the lower collar part 17. That is, the segments 18*a* have centrally-downwardly declining faces *a'* which terminate in the tongue or rounded nose *b'*, and the segments 18*b* have corresponding centrally-downwardly declining faces *c'* which terminate in the tongue or rounded nose *d'*.

As shown particularly in Figure 12, the surfaces or faces *a* and the grooves *b* of the bottom collar 17 are to be engaged or positioned-latched with corresponding faces *a'* and tongues *b'* of the inner collar member 18, while faces *c* and grooves *d* are to be engaged or position-latched with corresponding faces *c'* and tongues *d'*. This provides quadrant locking positions for the inner or locking collar member 18, as retained by the resiliency of the spring 19. However, when the outer or adjustment collar 16 is manually turned, a position change takes place between the opposed faces *a*—*c* and *a'*—*c'* against the resiliency of the spring and tongues *b'* and *d'* may snap into a new position within grooves *d* and *b*.

What we claim is:

1. A quick-adjustment connector device that will withstand longitudinal force along its axis without bending and that is suitable for supporting a compression leg of portable scaffolding which comprises, a pair of members to be adjusted longitudinally with respect to each other and defining a joint therebetween, one of said members being a tubular post and the other being an adjustment shaft extending in a telescopic relation within said post, said shaft having a bearing guide part at its inner end turnably and longitudinally-slidably mounted within said post, a latch collar carried by the end portion of said post that is adjacent to the joint and projecting about said shaft at a longitudinally-forwardly spaced-apart position with respect to said bearing part, said latch collar and said shaft having cooperating latching portions and at least one of them having an offset portion along its periphery to release the latching portions of the other when they are turned relatively with respect to each other, so that said shaft may be moved longitudinally with respect to said post to adjust its position with respect thereto, an operating collar operatively positioned to project along and about said latch collar and about said post and shaft at the joint, an annular control ring adjacent an outer end portion of said latch collar and secured to project radially-inwardly of one end portion of said operating collar and having portions in a longitudinally-slidable interlatching relationship with said adjustment shaft to turn said shaft and to move longitudinally therealong, the outer end portion of said latch collar and an inner face of said control ring having opposed interlatching portions to lock said shaft against turning movement with respect to said post, said operating collar at its other end portion having a radially-inwardly projecting flange portion and defining an operating spacing about the adjacent end portion of said post, a spring operatively positioned within the operating spacing in an expanded relation between said flange portion and an inner end portion of said latch collar to urge the opposed interlatching portions of said latch collar and said control ring into a cooperating relation with each other, and said operating collar being positioned for longitudinal movement along the joint to compress said spring and move said opposed interlatching portions out of their cooperating relation with each other, so that said shaft may be turned with respect to said post to move their latching portions into and out of a released relation with each other.

2. A device as defined in claim 1 wherein interfitting tongue and groove portions constitute said opposed interlatching portions of said latch collar and control ring.

3. A device as defined in claim 2 wherein said tongue and groove portions have centrally-declining faces which terminate in rounded nose faces.

4. A device as defined in claim 1 wherein the latching portions of said shaft and said latch collar are spaced segments about their respective outer and inner peripheries.

5. A device as defined in claim 1 wherein, said shaft has a pair of opposed substantially flat sides and a pair of opposed threaded sides that constitute its latching and offset portions, and said latch collar has a pair of opposed clearance sides and a pair of opposed threaded sides that constitute its latching and offset portions, the flat and clearance sides cooperating with the threaded sides to release said shaft with respect to said latch collar, and the threaded sides cooperating with each other to lock said shaft in position with respect to said latch collar.

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