Dec. 21, 1965 R. E. FISHER 3,224,800

ADJUSTABLE SUPPORTING LEG

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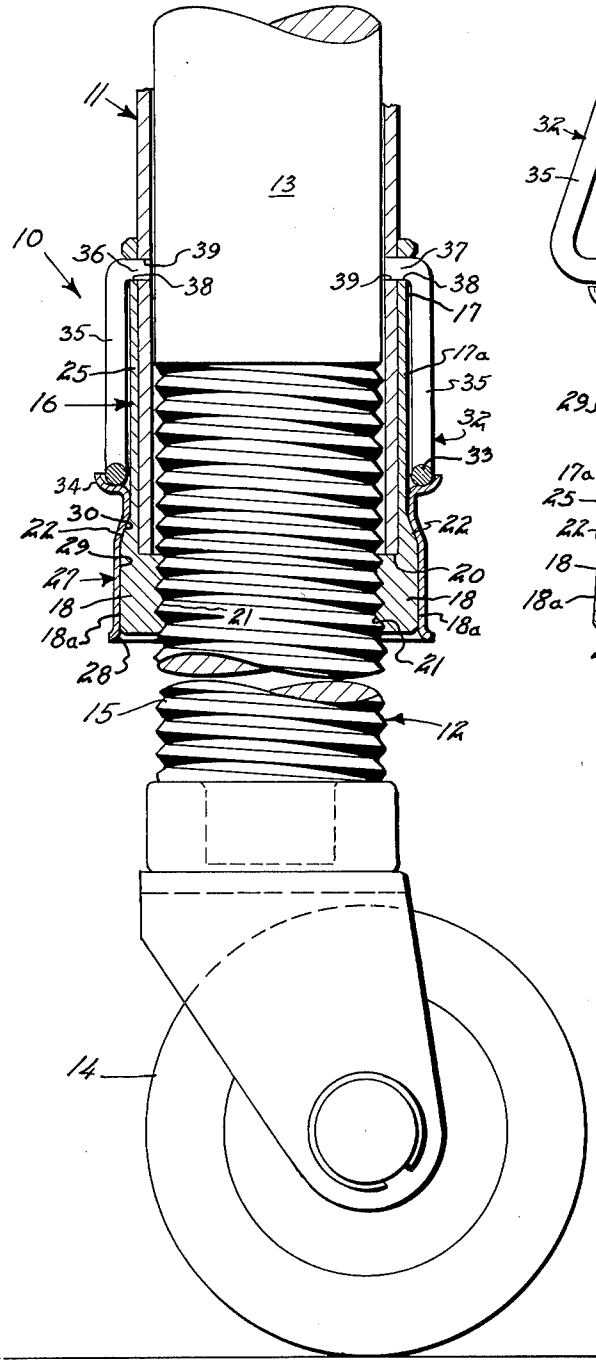

FIG. 1

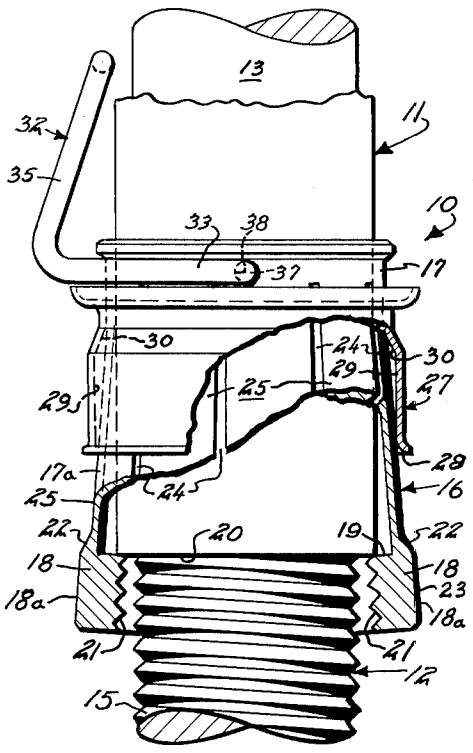

FIG. 2

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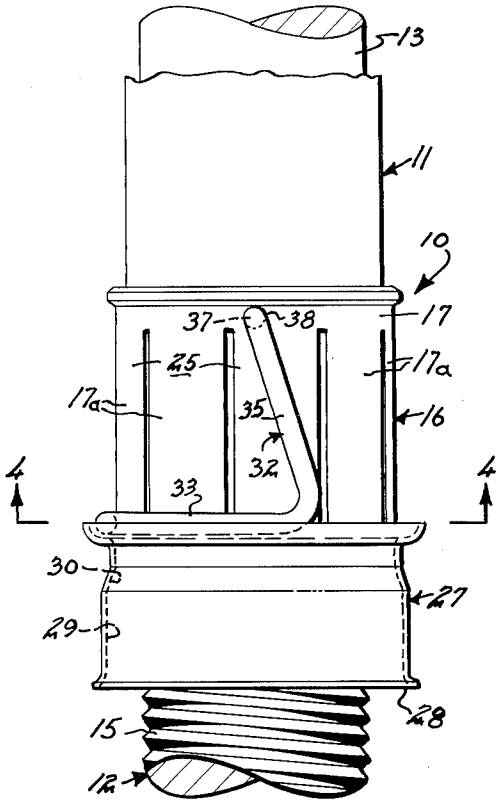

FIG. 3

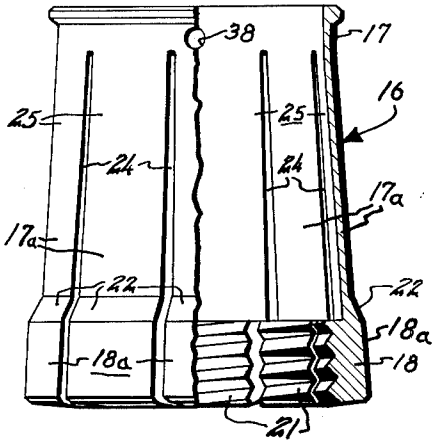

FIG. 5

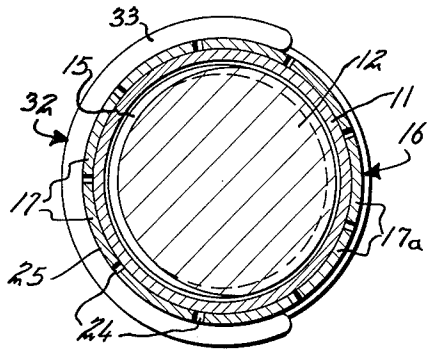

FIG. 4

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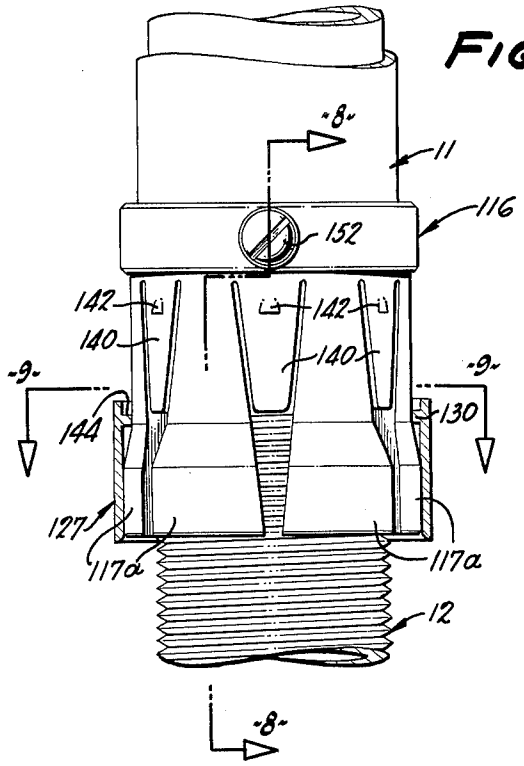
FIG. 6



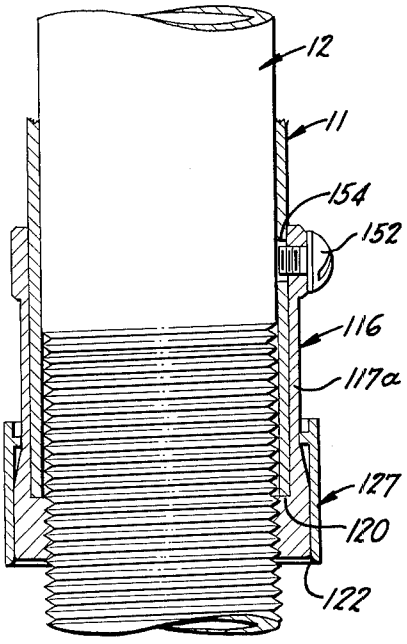


FIG. 8

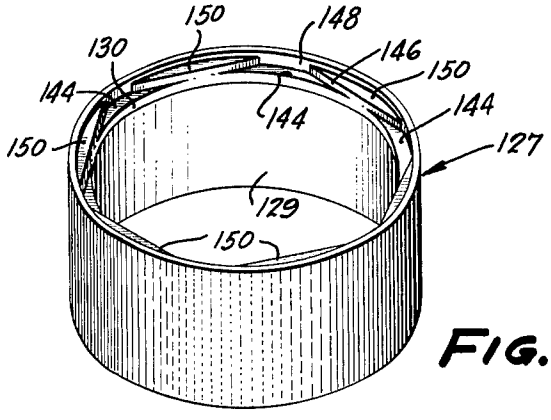


FIG. 7

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FIG. 9

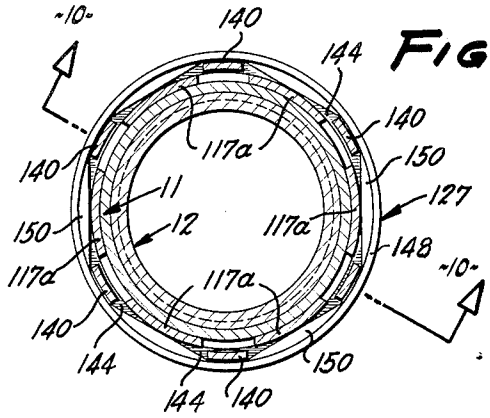


FIG. 11

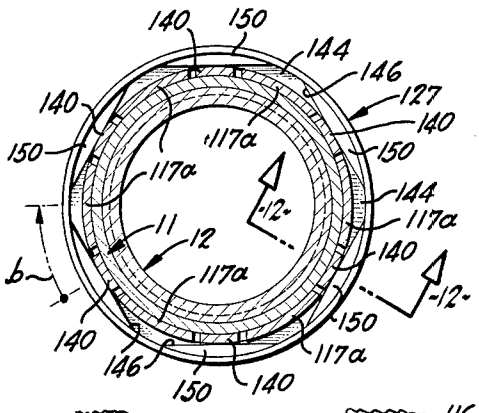
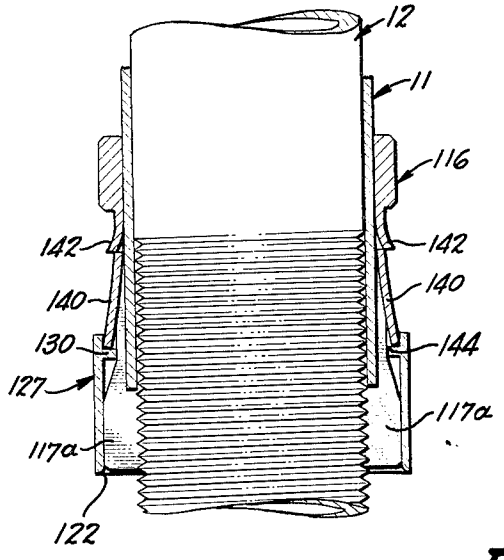


FIG. 10



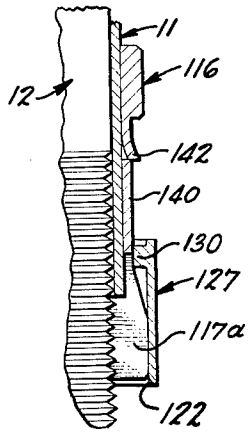


FIG. 12

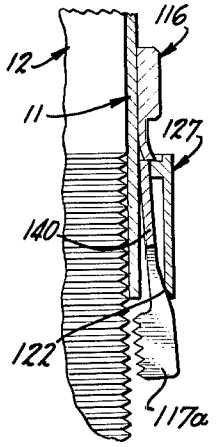


FIG. 13

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United States Patent Office 3,224,800 Patented Dec. 21, 1965

3,224,800

ADJUSTABLE SUPPORTING LEG

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Filed Nov. 29, 1963, Ser. No. 329,339
3 Claims. (Cl. 287—62)

The present application is a continuation-in-part of my copending application Serial No. 279,858, filed in the United States Patent Office on May 13, 1963, now abandoned.

This invention relates to a supporting leg construction, and more particularly to an adjustable supporting leg adapted to form part of a scaffold, bed, table or other device in which the effective length of one or more supporting legs is to be varied. Even more particularly, this invention is an improvement on the adjustable leg shown in U.S. Patent No. 2,618,496, issued to Wallace J. S. Johnson on November 18, 1952.

An object of this invention is to provide a supporting leg for a device whose effective length can be adjusted to comparatively coarse and fine degrees.

Another object of the invention is to provide an adjustable leg that is comprised of two telescoping members and in which one member is threaded throughout its length and in which the other member has a threaded portion that can be releasably connected in threaded engagement with the first member.

A further object of the invention is to provide an adjustable leg that is comprised of two telescoping members in which one member is threaded throughout its length and in which the other member has resilient fingers having threaded nut portions which can be moved into and out of threaded engagement with the first member, and in which stress is placed only on the nut portions of the resilient fingers when the adjusted leg is placed under compression.

Other objects and advantages will become apparent in the course of the following detailed description.

In the drawings forming a part of this application, and in which like parts are designated by like reference numerals throughout the same,

FIG. 1 is a vertical cross-sectional view of an adjustable leg incorporating the principles of the invention, and showing the leg in locked position;

FIG. 2 is a view partly in elevation and partly in section, showing the leg in unlocked position;

FIG. 3 is an elevational view of the leg in locked position;

FIG. 4 is a sectional view taken on line 4—4 of FIG. 3;

FIG. 5 is a three-quarter view of the split sleeve.

FIG. 6 is a side elevation of a preferred alternative embodiment of the sleeve member of this invention;

FIG. 7 is a top perspective view of a special collar adapted to co-operate with the sleeve of FIG. 6;

FIG. 8 is a partial vertical section along line 8—8 of FIG. 6 showing the co-operation of the preferred sleeve and collar in the locked position;

FIG. 9 is a horizontal section along line 9—9 of FIG. 6;

FIG. 10 is a vertical section along line 10—10 of FIG. 9;

FIG. 11 is a view similar to FIG. 9 but showing the parts in the unlocking process;

FIG. 12 is a fragmentary section along line 12—12 of FIG. 11; and

FIG. 13 is a view similar to FIG. 12 but showing the parts in their relation when the collar is unlocked.

Referring now to the drawings, the adjustable leg **10** comprises an outer tubular member **11** and an inner member **12** telescopically inserted into member **11**. The outer member **11** is secured to a scaffold or the like to form an integral part thereof, and the inner member **12** extends downwardly into engagement with the ground. The inner

member **12** has an upper bearing portion **13** having an outer diameter substantially equal to the inner diameter of member **11** in order to have a sliding telescopic fit therewith. The lower end of inner member **12** may be provided with a caster **14**, if desired.

The inner member **12** is threaded, as at **15**, for a substantial portion of its length, but the upper bearing portion **13** is unthreaded for a purpose to be hereinafter described.

The sleeve member **16** utilized in this invention is formed from a tubular member having a relatively thin-walled upper portion **17** which has an inner diameter substantially equal to the outer diameter of member **11** to permit the insertion of the member **11** into the upper end of the sleeve. The lower portion of the sleeve **16** is formed with a relatively thick-walled nut **18** which has an upper shoulder **19** to vertically engage the lower end **20** of the tubing member **11**. The nut **18** has an interior surface extending downwardly from shoulder **19** which is threaded at **21** complementary to the threads **15** of the inner member **12**. The nut **18** is provided with an exterior downwardly and outwardly sloping cam surface **22** and a vertical surface **23** extending downwardly from the cam surface **22**.

After the threads **21** in the nut have been cut to receive the inner member **11**, the sleeve is vertically slotted, as at **24**, to form a plurality of fingers **25**, each having a relatively thin and flexible upper portion **17***a* formed from the thin wall part **17** of the sleeve and a lower, relatively thick-walled nut segment **18***a* formed from nut **18**. The flexible finger portions **17***a* are bent outwardly to impart an inherent tendency to expand the nut segments **18***a* away from threaded engagement with the inner member when the sleeve is positioned on the outer member **11** as shown in FIGS. 1 and 2.

A locking collar **27** is disposed about the sleeve for vertical movement thereon. To lock the inner and outer members **11** and **12** together, the collar **25** is moved downwardly so that the lower end **28** thereof engages the cam surfaces **22** of the fingers and forces the nut segments **18***a* radially inwardly to engage the nut threads **21** with the threads **15** of the inner member **12**. With the collar **27** moved all the way downwardly, the lower inner vertical surface **29** of the collar embraces the outer vertical surface **23** of the nut so that the nut segments are locked into firm threaded engagement with the inner member **12**. Downward movement of the collar is limited by the engagement of the collar surface **30** with the cam surface **22**.

The locking collar **27** is held in locked position by a generally bail-shaped locking spring **32**. This spring has a central portion **33** extending around more than half of the sleeve and vertically engages the upper surface of collar **27** to prevent accidental upward displacement of the collar from locked position (FIG. 3). In addition, the collar has a cupped upper end **34** in which spring **32** is disposed when locked, which prevents accidental dislodgment of the spring.

The spring **32** has portions **35** extending upwardly from the central portion, which portions are bent radially inwardly at **36** and **37** to fit in the diametrically disposed and registering holes **38** and **39** in the sleeve and tubular member **11**. As will be noted in FIG. 1, this last arrangement prevents vertical separation of, and relative rotation between, the sleeve and tubular member.

When adjustment of the leg **10** is desired, the spring **32** is pried out of the cupped end **34** of the collar **27** and is pivoted to the position shown in FIG. 2. The collar **27** is moved upwardly from engagement with the nut segments **18***a*, which permits the latter to expand outwardly from threaded engagement with the inner member **12**. The inner member may then be moved upwardly or downwardly within the outer member **11** to adjust the effective length of the leg structure. The collar is then moved

downwardly to force the nut segments 18*a* back into threaded engagement with the inner member 12.

The spring 32 is then pivoted downwardly and the central portion 33 thereof is snapped into place in the cupped upper end of collar 27 to lock the collar in place.

By virtue of the telescopic movement of the inner and outer members 11 and 12, a rapid adjustment can be made in the effective length of the leg 10. If a finer adjustment is desired, the threaded nut segments 18*a* are clamped onto the inner member 12 by collar 27, and the inner member is then rotated in the proper direction, which threads the inner member through the nut and produces a corresponding alteration of the telescopic relation of the inner and outer members, thereby modifying the effective length of the leg to a fine degree, depending upon the lead or pitch of the threads.

The major portion of the inner member 12 is threaded, but its upper end is unthreaded so as to prevent complete unscrewing of the members. It is apparent that the unthreading of the inner member within the threaded fingers eventually engages the lower end of its unthreaded portion with the threaded nut, which precludes further rotation and unscrewing of the inner member. The unthreaded upper portion of the inner member has a sufficient length to provide a proper telescopic fit with the outer member 11 and insure appropriate support of the latter by the inner member without lateral deflection.

Modification

In a preferred embodiment of the invention, the release of the locking collar is facilitated by using a sleeve-and-collar unit such as that shown in FIGS. 6 through 13. In this case, the locking feature is provided by special locking fingers on the sleeve itself, and a special configuration of the collar facilitates purposeful unlocking of the collar while at the same time preventing any accidental unlocking of the mechanism.

In FIG. 6 the preferred sleeve member is generally shown at 116. The threaded fingers 117*a* of the sleeve member 116 are similar in construction and function to the threaded fingers 17*a* of the previously described sleeve member 16. However, in the sleeve member 116, it will be noted that the upper ends of the threaded fingers 117*a* are tapered inwardly, and that locking fingers 140 are provided in the spaces created thereby. Each locking finger 140 is provided with a stop 142 which may be stamped out of or embossed into the locking fingers 140 in any convenient manner.

For co-operation with the sleeve member 116, the preferred embodiment of this invention provides a collar 127 best shown in FIG. 7. The collar 127 has an inner vertical surface 129 which serves the same purpose as the inner vertical surface 29 of the collar 27, and a limit flange 130 whose function is similar to that of surface 30 of the collar 27. The upper horizontal side of the limit flange 130 forms a locking shoulder 144 extending circumferentially of the collar 127. The locking shoulder 144 is interrupted at intervals around its perimeter by unlocking surfaces 146 extending tangentially to the inner perimeter of the limit flange 130. As will be more clearly seen from FIG. 10, the locking fingers 140 are resiliently bent outwardly and may, if desired, be retained against excessive outward movement by the retaining flange 148 of the collar 127. With the collar 127 in locked position, the collar 127 is prevented from sliding upwardly along the sleeve member 116 by engagement of the lower ends of the locking fingers 140 with either the locking shoulder 144 or the radial shoulder 150 of the unlocking surfaces 146. It will be understood that when the collar 127 is in its lowermost locked position, the lower ends of the locking fingers 140 will be somewhat above the level of the radial shoulders 150 of the unlocking surfaces 146.

When it is desired to unlock the sleeve members 116, it is only necessary, as best shown in FIGS. 11–13, to rotate the collar 127 through an angle *b* (FIG. 11) while

pushing it upwardly. In the course of the rotation, the unlocking surfaces 146 engage the locking fingers 140 and bring them into tangency with the inner surface of the limit flange 130. An upward push at this point (FIG. 12) causes the limit flange 130 to slip over the ends of the locking fingers 140 so as to allow the collar 127 to be raised to its unlocked position shown in FIG. 13. When collar 127 has been fully raised to its unlocked position, the stops 142 engage the shoulders 144 or 150 to prevent further upward movement of the collar. At the same time, the locking fingers 140, whose ends are now free of the restraint of the inner surface of limit flange 130, expand again and assist the cam surface 122 of fingers 117*a* in preventing the collar 127 from falling back down into the locked position until it is purposely pulled back down.

Inasmuch as the preferred embodiment just described dispenses with the spring members 35, the interlock between the sleeve member 116 and the outer member 11 may be accomplished by means of a screw 152. The screw 152 is threaded into the sleeve member 116 and protrudes into an aperture 154 in outer member 11 sufficiently large to permit the weight of outer member 11 to rest on the shoulder 120 of sleeve member 116 rather than on the screw 152.

The above described invention has many significant advantages over adjustable legs such as shown in the above-referred-to Patent No. 2,618,436. The outer member 11 rests directly on the nut segments 18*a*, and thus there is no force to buckle the relatively thin upper portions 17*a* of the resilient fingers when the leg 10 is subjected to compressive loads.

The split finger segments 17*a* of the sleeve are supported throughout their length by the tubular member 11 and thus there is little likelihood of external damage to these fingers.

Since the flexible parts of the fingers do not have to support a load, the fingers can be more numeous and more flexible, and it is possible to employ a shorter, more compact sleeve which opens and closes more easily as the locking collar is moved up and down.

The locking spring 32, when pivoted upwardly, permits the locking collar to be moved upwardly to unlock the inner and outer members, but when pivoted downwardly it locks the locking collar securely in two ways. In the first place, the spring grips radially against the sides of the sleeve because it extends more than half-way therearound. Secondly, it rests within the cupped upper end of the collar. Thus, double security is provided against the collar being displaced vertically by accident, which would permit the members 11 and 12 to unlock.

The sleeve 16 is separate from the outer tubular member 11 and can be easily replaced if damaged merely by removing the spring ends 36 and 37 or screw from the holes 39 and by sliding the sleeve off from the tubular member 11.

It is to be realized that the form of the invention herein illustrated and described is a preferred embodiment of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the attached claims.

Having thus described my invention, what I claim is:

1. An adjustable leg comprising:

a tubing member;

a sleeve telescoped onto an end of said tubing member and fixed with relation thereto, said sleeve having a plurality of resilient outwardly biased gripping and locking fingers, said gripping fingers extending beyond the ends of said locking fingers;

an inner member extending telescopically into said tubing member, said inner member being externally threaded for at least a portion of the length thereof;

said gripping fingers being provided with nut segments on their ends, said nut segments each having an inter-

nal shoulder extending inwardly and adapted to abut said end of said tubing member, said nut segments being internally threaded complementarily to said inner member but being biased therefrom by said gripping fingers, said nut segments having a raised portion opposite said threaded portion and joined to said gripping finger by a cam surface;

a collar axially movable on said sleeve, said collar having an inner surface adapted to engage said cam surface to force said nut segments radially inwardly into threaded engagement with said externally threaded inner member;

and means for locking said collar in position, said means including a radially inwardly extending flange on said collar having portions of the upper horizontal side thereof substantially normal to the axis of said tube, at least one cam surface on said horizontal side as an embossment thereon and at least one additional embossment on said surface circumferentially spaced from said one cam surface a distance at least equal to the width of said locking finger, said locking finger being biased radially outwardly between said embossments whereby the free ends thereof engage said horizontal surface to lock said collar against retrograde movement from said position and said collar may be released from said position by twisting said collar

about said axis thereby engaging said locking fingers and forcing them radially inwardly.

2. The adjustable leg of claim 1 wherein each of said embossments includes an unlocking surface extending tangentially to the inner perimeter of said flange.

3. The adjustable leg of claim 2 and a stop extending radially outwardly from said locking fingers, said stop being adapted to engage said collar when said collar is out of engagement with said raised portion.

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