July 11, 1939. J. H. GROSS 2,165,478

TURNBUCKLE

Filed June 22, 1937

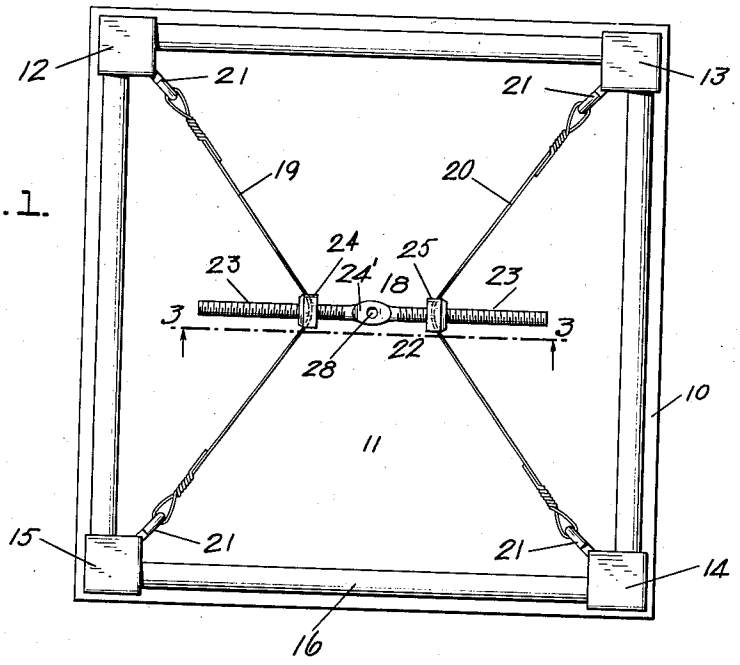


Fig. 1.

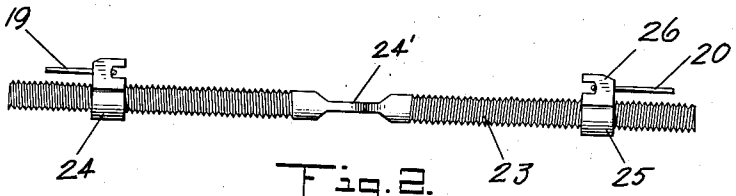


Fig. 2.

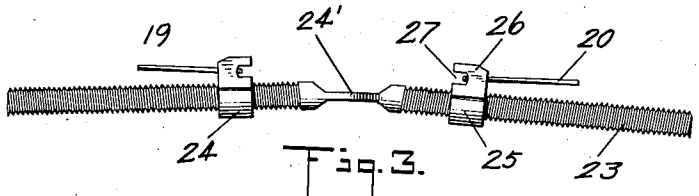


Fig. 3.

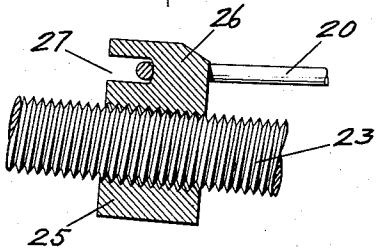


Fig. 4.

INVENTOR
JOHN H. GROSS
BY
Orton and Griswold
ATTORNEYS

Patented July 11, 1939

2,165,478

UNITED STATES PATENT OFFICE

2,165,478

TURNBUCKLE

John H. Gross, New York, N. Y.

Application June 22, 1937, Serial No. 149,614

2 Claims. (Cl. 287—60)

The invention relates in general to a turnbuckle of general application and specifically relates to a brace of the turnbuckle type for use in tying together the legs of furniture. The present disclosure constitutes a development of the screw rod element of the brace for furniture disclosed in my copending application Serial No. 113,100 filed November 28, 1936.

The present disclosure like that in the above identified copending application in its specific application to its use as a furniture brace relates to a brace structure wherein a pair of U or V-shaped tension members connect the furniture legs together in pairs and a turnbuckle acting between the wires draws them together under tension and thus interlocks the legs in firm engagement with the associated seat.

The present disclosure features an improved form of turnbuckle screw rod operable automatically as it is located in operative position for defeating any tendency of itself and thus of the turnbuckle to loosen itself after it has been in use for a while. In the prior device it was suggested that the screw rod element of the turnbuckle be locked from turning in its associated nuts first by causing the nuts each to cant more or less into an angled binding engagement with the screw rod, and, second, in order to more positively insure the non-rotation of the screw rod, it was therein suggested that a lock rod have one end passed through an opening in the screw rod and its other end secured to the underside of the chair and in this way prevent the screw rod from rotating.

It is an object of the present disclosure to obtain a locking of the screw rod in its set position and at the same time to simplify the structure disclosed in the pending application by omitting the lock rod and to depend upon a bending or distorting of the screw rod to defeat any tendency of the screw rod to re-rotate in its associated nuts by utilizing the spring or resiliency of the screw rod to effect a binding engagement between the rod and the nuts adjusted thereon.

Broadly, this objective is attained by providing midlength of the screw rod a weakened portion which will permit a bending or distorting of the screw rod and by providing the nuts each with a laterally extending projection which when engaged by the tension member will exert a leverage effect on the nuts to cant the same into binding engagement with the screw rod and to cause the two nuts to act on the rod to bend the same about its weakened central portion.

Various other objects and advantages of the invention will be in part obvious from an inspection of the accompanying drawing and in part will be more fully set forth in the following particular description of one form of device embodying the invention, and the invention also consists in certain new and novel features of construction and combination of parts hereinafter set forth and claimed.

In the accompanying drawing:

Fig. 1 is a plan view looking upwardly from the underside of a chair equipped with a preferred embodiment of the invention showing the brace in operative position;

Fig. 2 is an enlarged view in side elevation of the turnbuckle and associated parts, shown in plan in Fig. 1, and with the screw rod in its normal straight position before the brace has been tightened into its final position;

Fig. 3 is a view similar to Fig. 2 showing the turnbuckle in its operative position as viewed from the plane indicated by the line 3—3 of Fig. 1 looking in the direction of the arrows; and

Fig. 4 is an enlarged vertical sectional view taken axially through the right hand nut when in the position shown in Figs. 1 and 3 and illustrating the canted position of the nut angled on the screw rod.

The chair 10 is provided with a seat 11 and four legs, 12, 13, 14 and 15, and associated rungs 16 connecting the legs and otherwise the showing is intended to illustrate a standard form of four-leg chair. The brace 18 is formed of two U-shaped tension wires 19 and 20 provided at opposite ends with screws 21 by means of which the brace may be readily attached to the legs and in the illustrated showing wire 19 connects together legs 12 and 15 and wire 20 similarly connects the pair of legs 13 and 14. The wires 19 and 20 are connected at their crotch portion by means of a turnbuckle 22 which includes a normally straight, metal screw rod 23 having a flat disc-like portion 24^1 at its midlength and provided on opposite sides thereof with threads in relatively reversed direction. It is a feature of this disclosure and in this respect distinguishes from the similar part of the prior application in that the disc-like portion 24^1 is relatively thin considered in its vertical dimension and to this extent may be regarded as a weakened portion capable of being bent along a transverse line at its midlength as indicated in Fig. 3.

Mounted on opposite ends of the screw rod 23 are nuts 24 and 25, each provided with an upwardly projecting portion or post 26. Each portion is provided on its inner face wtih a groove 27

curved when viewed in plan and in which grooves are slidably mounted respectively the tension wires 19 and 20. The flat bendable portion 24 is provided centrally thereof wtih an eye 28 designed to receive a tool to rotate the screw rod. The lower portions of the nuts are of somewhat cylindrical form providing a relatively long bearing on the screw rod and the threads of the nut and screw rod are so designed that the rod can rotate about its own longitudinal axis with relatively easy rotary movement through the nuts while the rod is centered in the aligned bores of the nuts while the rod is in its normal straight position as shown in Fig. 2.

In this form of the invention it is preferable to so proportion the length of the wires 19 and 20 that the brace as a whole extends in a substantially horizontal plane at least during the initial part of its securing operation.

The parts are so arranged that rotating the screw rod 23 by means of a tool inserted in the eye 28 causes the nuts 24 and 25 to move towards each other as from the position shown in Fig. 2 towards the position shown in Figs. 1 and 3 and thus exert a powerful tension on the wires 19 and 20. This pull or tension reacts on the legs in a tendency to move them inwardly towards the center of the chair and thus cause the legs to bear towards each other against the several rungs. As the turning movement of the turnbuckle increases and severe pull is placed on the wires 19 and 20, the laterally offset pull of the wires 19 and 20 each on its associated nut as shown in Figs. 2 and 3 will cause the nut to rotate bodily clockwise about a self contained horizontal axis. In the case of the right nuts 25 as shown in Fig. 4 this movement will be clockwise, or anti-clockwise with reference to the left hand nut 24, to cause, as by reference to Fig. 4, the upper right hand side of the nut thread to dig down deeper into the thread of the rod and to lift the lower left hand side of the nut thus forcing the end turns of the nut thread firmly and laterally against the adjacent turns of the screw threads. This bending of one thread on to the other acts to resist any accidental rotary movement of the screw rod about its own axis relative to the nuts which are thus held in space in their normal upright position by the pull of the wires 19 and 20 as shown in Fig. 2.

A further rotary movement under any necessary force will cause a further movement of each nut towards the other and against the associated ends of the screw rod; the right hand nut tending to bear further downwardly in a clockwise direction and the left hand nut similarly bearing downwardly in an opposing or counterclockwise movement. This causes the rod as a whole to bend about its weakened portion 24^1 and the parts will eventually assume the position shown in Fig. 3 and which showing is slightly exaggerated to show clearly the relation of the two ends of the rod. In this condition the resilient rod in its reactory tendency to restore itself to its normal straight condition shown in Fig. 2 will tend further to secure the rod against any tendency to re-rotate itself into position to loosen the nuts and the parts are thus firmly maintained in their fixed position as long as this tension condition exists.

Should it be desired for any reason to loosen the turnbuckle, downwardly directed pressure is first applied on top of the disc portion 24^1 when in the position shown in Fig. 3, thus to restore the screw rod into or towards its normal straight position as illustrated in Fig. 2 thus restoring the nuts and rod to their normal coaxial position after which the screw rod can be re-rotated more or less easily until the tension of the wires 19 and 20 has been released on the nuts, after which the parts can be even more easily unscrewed and the parts demounted for repair or substitution of broken parts.

It is also suggested that in the case of small size chairs and large size braces that the nuts be reversed in position on their associated rod ends to locate the slots 27 in relatively outwardly facing position and the crotch portions of the wires 19 and 20 be arranged in overlapping relation and engaging in the outwardly facing grooves. In this case, of course, tension is placed thereon by rotating the screw rod in a direction to cause the nuts to recede from each other. Likewise in this case extensive tension on the wires 19 and 20 will cause the nuts to bind the turns of the nut threads into engagement with the turns of the screw rod threads as previously described for the Fig. 1 arrangement.

By means of the structure herein disclosed it is possible to lock the screw rod against accidental re-rotary, loosening movement without necessity of employing the lock rod featured in the prior application and incidentally effecting a saving not only in the necessity of supplying this extra part but also avoiding any necessity of providing a seat or other fixed part to which the lock rod must be secured.

I claim:

1. A turnbuckle comprising a screw rod having an unthreaded mid-portion of relatively reduced cross section in one transverse dimension, a pair of nuts in normally freely rotatable and oppositely threaded engagement with threaded portions of the screw rod on opposite sides of said mid-portion, tension means engaging the nuts on one side of the rod, reacting initially on the nuts in relatively opposing directions substantially parallel to the length of the rod and thus tending to reduce the normal freedom of rotary movement between the nuts and the rod and manually actuated means for rotating the screw rod to cause the nuts to approach each other and thus cause the tension members to cant the nuts into binding engagement with the screw rod and said nuts acting with a leverage effect on the rod to bend the same about said reduced mid-portion as an integral hinge, said mid-portion forming an area sufficiently weak to permit it being bent under the force inherent in such manual rotating of the screw rod and having sufficient resiliency when so bent to react on the nuts to hold them in binding engagement with the rod whereby the nuts and rod are secured automatically in a nonrotative manner to the screw rod by the relatively outwardly directed tension of the members acting in one direction and the tendency of the screw rod to revert to its initial configuration acting in the contra direction.

2. A self-locking turnbuckle including a normally straight rod comprising two long cylindrical threaded end portions integrally connected by a relatively short, flat central portion of less cross-sectional area than the end portions, said flat portion forming an integral hinge, a pair of nuts in oppositely threaded engagement with the end portions, oppositely directed tension means engaging the nuts on one side of the rod acting to prevent the nuts from rotating when the rod is rotated through the nuts, said rod being initially freely rotatable through the nuts in plac-

ing tension on said tension means and the tension means extending substantially parallel to the length of the rod when the latter is straight, said rod reacting through the nuts and tension means when the rod is rotated in one direction by a manual force to cause the nuts first to cant into binding engagement with the end portions and then to bend the rod about its flat hinge portion to cause the end portions to extend at an angle to each other, said end portions being sufficiently rigid to resist binding at any point along their lengths by any such manual force whereby the end portions each remain straight and form an angle with its associated tension means, the elasticity of the flat central portion in its tendency to restore the straight end portions to their designed positions acting to resist the normal freedom of rotary movement of the rod through the nuts.

JOHN H. GROSS.