



US00RE35358E

United States Patent [19]

[11] E

Patent Number: Re. 35,358

Belser

[45] Reissued Date of Patent: Oct. 22, 1996

[54] FASTENING BOLT ASSEMBLY WITH ANTI-ROTATION DEVICE AND PROVIDING BOTH AXIAL AND RADIAL HOLDING FORCES

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[57] ABSTRACT

[21] Appl. No.: 223,036

A tubular and preferably elastomeric radial holding and centering expandable bushing having a bore sized to pass a threaded shank of a fastening bolt and having a radially enlarged flanged one end thereof. The bore tapering outwardly toward the periphery to create a conical cavity between the bushing body from the flange rearwardly. The cavity receives a tubular expansion insert having a tapered periphery and internal bore slightly larger than the diameter of the threaded shank of the fastening bolt which insert is positioned to the side of the tubular bushing remote from the head of said fastening bolt. A folding wing nut structure includes a trunion nut having a tapped bore threaded on said shank of the bolt, axially outwardly of the tubular expansion insert to the side opposite to the tubular bushing. The structure includes a pair of foldable wings. A longitudinal slot within the body of the tubular bushing receives a mating rib which extends radially outwardly of the periphery of the tubular expansion insert. A pyramidal cross-section axial projection on the end of the tubular expansion insert facing the foldable wings is sized to project internally between laterally opposed side walls of one or both of the wings to prevent rotation of the folding wing nut structure during a tightening down of the folding wing nut structure as the wings are drawn into contact with the rear surface of the vertical wall via the trunion nut.

[22] Filed: Apr. 5, 1994

Related U.S. Patent Documents

Reissue of:

[64] Patent No.: 5,224,807
Issued: Jul. 6, 1993
Appl. No.: 968,367
Filed: Oct. 29, 1992

U.S. Applications:

[63] Continuation-in-part of Ser. No. 890,099, May 29, 1992, Pat. No. 5,163,796.

[51] Int. Cl. F16B 21/00

[52] U.S. Cl. 411/342; 411/55; 411/371; 411/915

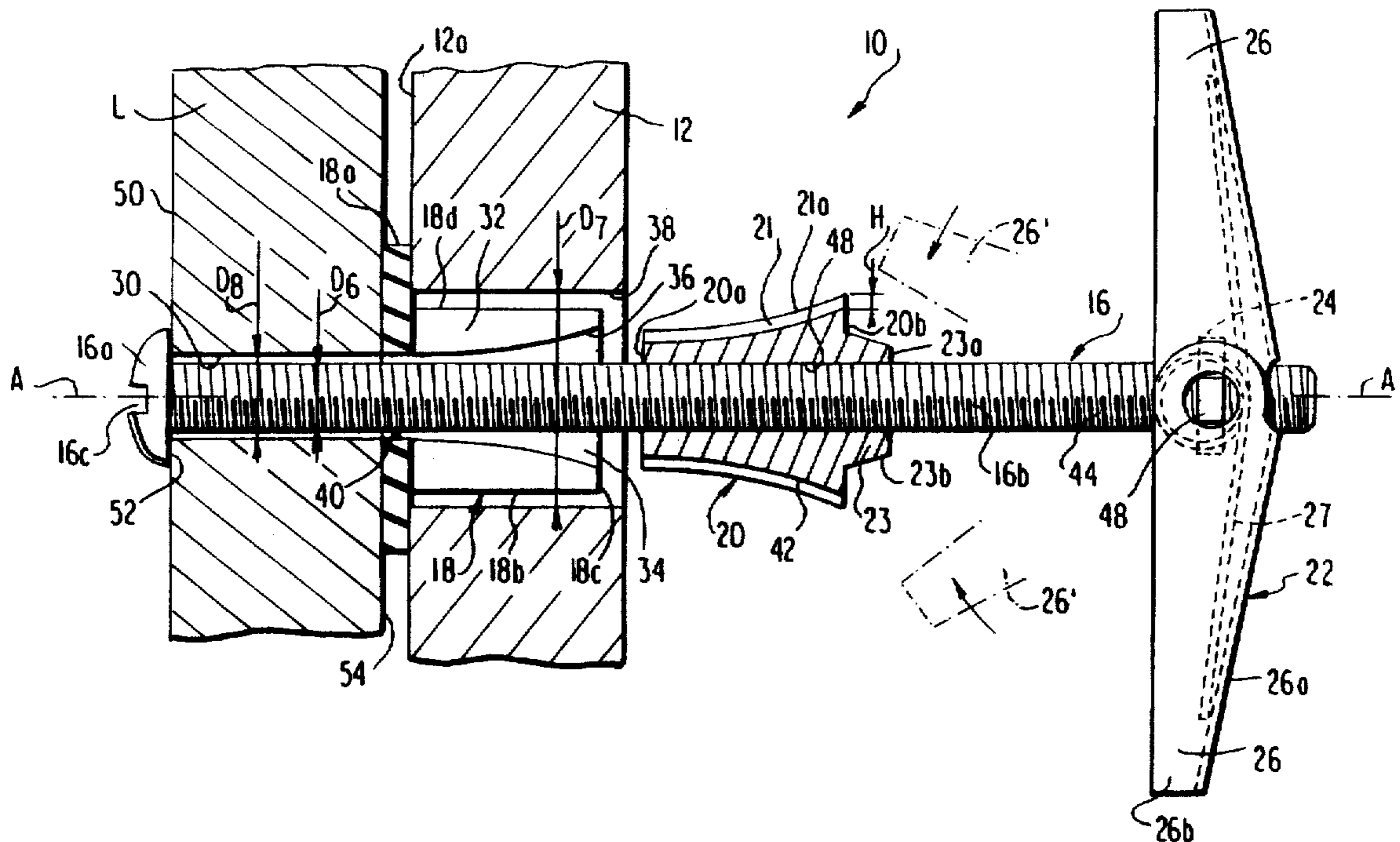
[58] Field of Search 411/342, 340, 411/341, 345, 542, 50, 51, 52, 53, 55, 371, 915, 38

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14 Claims, 1 Drawing Sheet



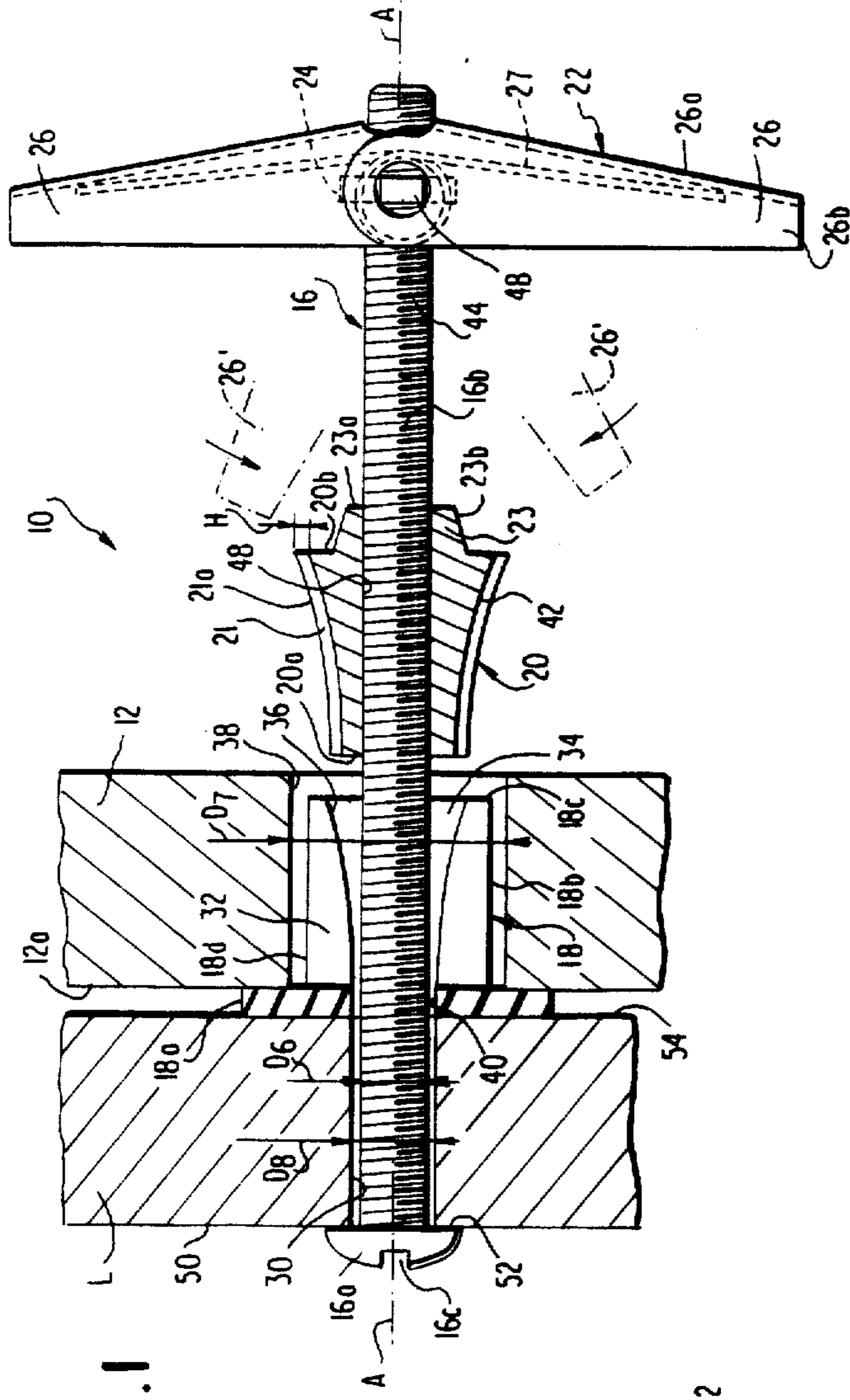


FIG. 1

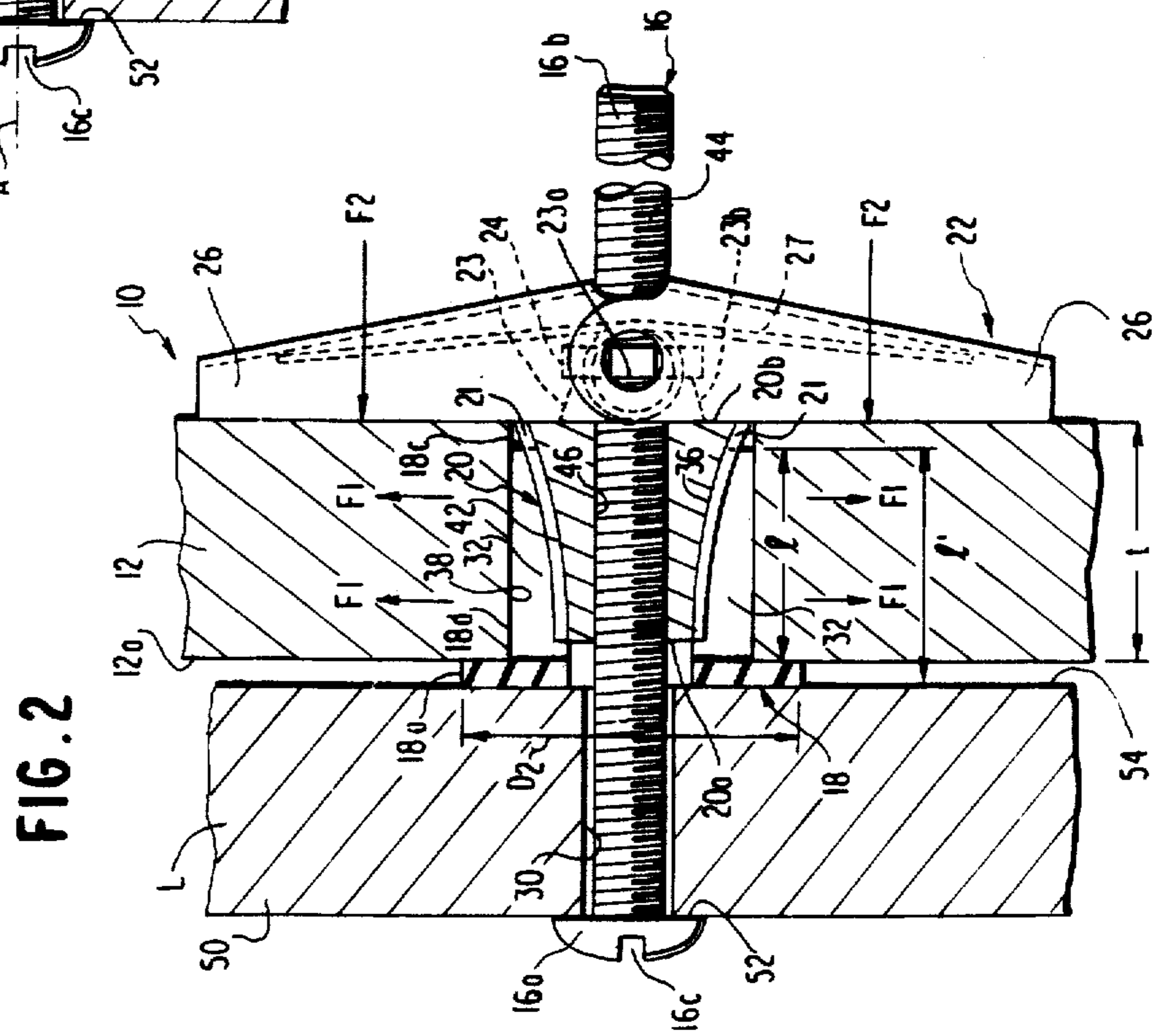


FIG. 2

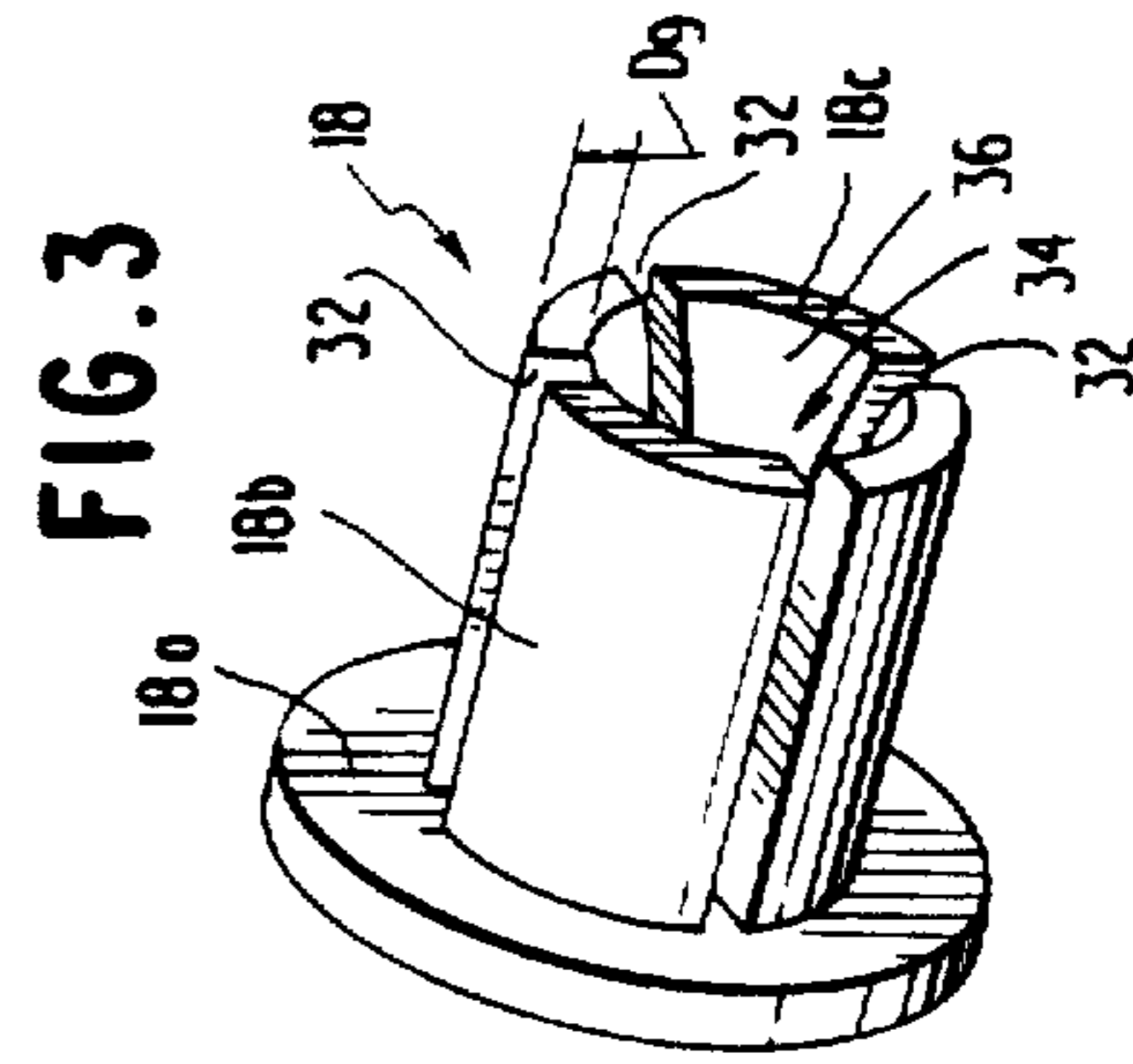


FIG. 3

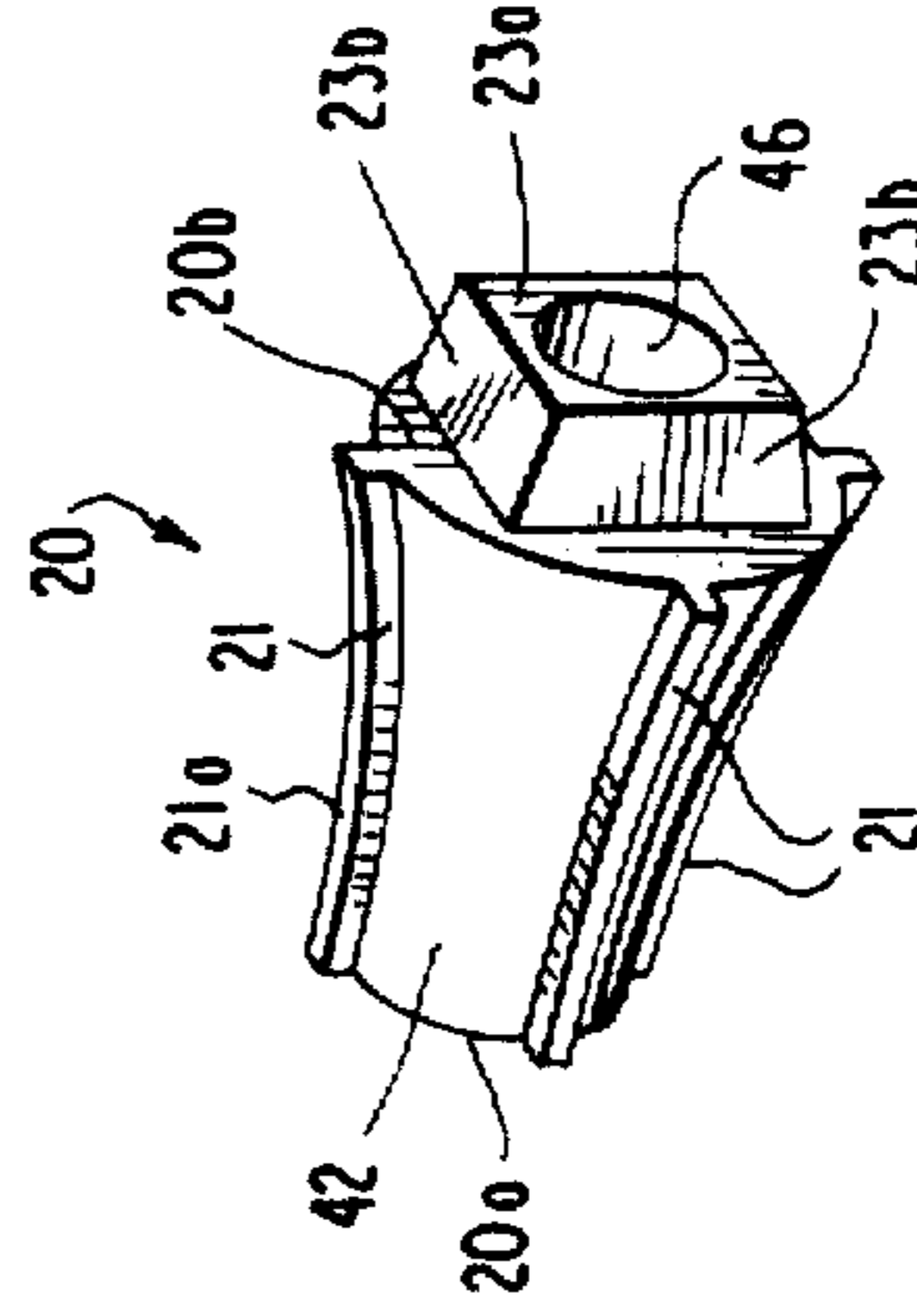


FIG. 4

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**FASTENING BOLT ASSEMBLY WITH  
ANTI-ROTATION DEVICE AND PROVIDING  
BOTH AXIAL AND RADIAL HOLDING  
FORCES**

**Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.**

This application is a continuation-in-part application of U.S. application Ser. No. 07/890,099 filed May 29, 1992, now U.S. Pat. No. 5,163,796.

**FIELD OF THE INVENTION**

This invention relates to a fastening means for mounting an object to a wall and more particularly to a fastening bolt or a toggle bolt wing nut retaining or fastening device.

Toggle bolts having expandable wing nuts are commonly used for attachment of an object in a blind bore and a vertical wall. Blind bores provide access to the opposite side of the wall not available to the worker to hold and retrieve a nut threaded to the shank of the toggle bolt or fastening bolt. Such structures are commercially available. Such fastening bolts have a radially expandable wing assembly or structure which is retained in a retracted or minimal diameter condition allowing insertion into the bore and then expanded by rotation of the fastening bolt about its axis or by force to cause a pair of diametrically opposite wing members to contact the rear face of the wall to prevent the nut from pulling out through the back of the hole. Typically, the fastening bolt assembly holds the object to the front of the wall by a reaction force set up axially through the radially enlarged wing nut assembly and specifically the diametrically opposed wings contacting the rear surface of the wall radially outward of the blind bore.

Such fastening bolt assemblies having expandable wing nut structures or their equivalent are exemplified by the following U.S. Pat. Nos. 499,444, 1,733,693, 3,248,994, 3,288,014, 4,286,497, 4,657,461 and 5,028,186.

While such fastening bolt assemblies operate satisfactorily to some degree, such fastening bolt assemblies, in some cases, are relatively complicated, provide retention forces which are axial or parallel thereto, fail to ensure centering of the fastening bolt or indeed holding the fastening bolt coaxial with the blind bore during force application.

It is therefore a primary object of the present invention to overcome the problems identified above, and to provide a simplified assembly which centers the fastening bolt fastening through the blind bore of the wall, which supports the fastening bolt during tightening down of the wing nut carried thereby, which provides both radially and axial fastening forces.

It is a further object of the invention to provide such an improved fastening bolt assembly which employs both axial and radial holding forces, which employs a radial holding and centering expandable bushing acting in conjunction with an expansion insert, both concentrically surrounding the shank of the fastening bolt and which may be made of a variety of materials such as rubber, plastic and ductile metal or composites of the same, and which may automatically seal to the blind bore within the wall to prevent liquid transmission through the assembly from one side of the wall to the other.

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It is a further object of the invention to provide such an improved fastening bolt assembly which additionally employs an anti-rotation device for preventing rotation of the wing nut carried by the fastening bolt during tightening down of the wing nut.

**SUMMARY OF THE INVENTION**

The present invention is directed to a fastening bolt assembly providing both axial and radial holding forces for mounting an object having a hole passing therethrough to a wall with opposite front and rear surfaces having a hole passing therethrough alignable with the holes within the wall and within the object. The fastening bolt assembly is comprised of a headed tubular bushing of an outer diameter on the order of that of said hole in the wall. The tubular bushing is insertable in the wall hole. A radial flange is carried on the end of the bushing which acts as a stop against the front surface of the wall. A threaded bolt has a radially enlarged head and a threaded shank extending axially therefrom with the shank insertable within the tubular bushing and with the shank diameter permitting such axial insertion. The shank extends through the aligned holes of the object and the wall blind bore. The tubular bushing is provided with a bore which flares outwardly in a direction away from the flanged end. A tubular expansion insert having an outer periphery which is correspondingly oppositely flared, and generally matching the flared bore of the tubular bushing is concentrically carried by the shank of the threaded bolt and is receivable within the flared bore of the tubular bushing. The bushing has an axial length on the order of the thickness of the wall. A folding wing nut structure having a tapped hole at the center of a trunion nut thereof is threaded to the shank and includes a pair of wings pivoting about axes, radially outward of a tapped bore of the trunion nut. The folding wing nut faces said end of said tubular expansion insert remote from said bushing whereby, rotation of said fastening bolt causes said folding wing nut structure to move axially on said threaded shank and to thereby force the expansion insert to move internally of the tubular bushing thereby radially expanding the bushing to cause a radial frictional locking force to be exerted on the blind bore within the wall. Simultaneously, the wings of the folding wing nut structure press against the rear surface of the wall to exert an axial holding force on said object captured between the radially enlarged head of the bolt and the front surface of said wall.

The tubular bushing may be slotted longitudinally over the length of the bushing within the blind hole. The bushing and insert may be formed of molded plastic and preferably an elastomeric material. Alternatively, the bushing may be formed of rubber to effect a liquid proof seal of the blind bore. Both the bushing and insert may be formed of a soft, ductile metal such as lead.

Preferably, the tubular expansion insert is further provided with at least one rib of a width sized to that of a longitudinal slot which projects radially from the periphery of the tubular expansion insert. The rib projects radially to a height which is less than the minimal depth of the longitudinal slot receiving the same. During the tightening down of the folding wing nut structure by rotation of the fastening bolt, thereby forcing the expansion insert to move internally of the tubular bushing, the engagement of the rib with the longitudinal slot prevents rotation of the folding wing nut structure. The tubular expansion insert may include the same number of ribs as longitudinal slots within the tubular bushing and at corresponding circumferentially spaced positions on the periphery of the tubular expansion

insert. The tubular expansion insert may be provided with an axial projection at the end of the tubular insert facing the folding wing nut structure which tapers inwardly towards the folding wing nut structure sized to enter between laterally spaced side walls of U-shaped folding wings and to prevent the wings from rotating on the bolt to which the folding wing nut structure is threaded.

The diameter of the flange of the bushing may be slightly larger than the wall blind bore diameter. The diameter of the expandable radially expandable portion of the bushing as an axial extension of the flange is slightly less than the diameter of the blind bore. The length of the bushing from the flange to the free end of the bushing remote from the flange may be approximately equal to the thickness of the wall and preferably slightly less than that thickness. The bore of the bushing is sized to freely accommodate the bolt while centering the same and the bore flares outwardly from the flanged end towards the opposite end thereof. The expansion insert has an axial bore sized slightly larger than that of the bolt shank, and the outer periphery thereof is flared oppositely to that of the bushing and interfits therewith. The tapered bore of the bushing and the tapered peripheral surface of the outer surface of the expansion insert may be conical. The end of the expansion insert facing away from the bushing may be of the same diameter as the threaded trunion nut of the folding wing structure.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a vertical sectional view of a fastening bolt assembly forming a preferred embodiment of the invention with the parts positioned for mounting to a blind bore within a vertical wall.

FIG. 2 is a similar vertical sectional view, with the fastening bolt tightened down, with the expansion insert driven into the interior of the bushing, and the folding wing nut wings in abutment with the rear surface of the wall.

FIG. 3 is a perspective view of the radial holding and centering expandable bushing forming one element of the assembly of FIGS. 1 and 2.

FIG. 4 is a perspective view of the tubular expansion insert illustrating the radially projecting ribs on the periphery of the tubular expansion insert, and the incorporation of an axial projection on the end of the insert facing the folding wing nut structure for engaging with the wings thereof.

#### DESCRIPTION OF THE PREFERRED EMBODIMENT

The drawings show a fastening bolt assembly indicated generally at 10 which provides both axial and radially holding forces for mounting an object L in this case, a flat plate, constituting a load against the front surface 12a of a vertical wall 12 which may be of plaster board or other material. The load L is provided with a hole or bore 30 which has a diameter  $D_8$  slightly larger than the diameter  $D_6$  of a threaded shank 16b of a fastening bolt, indicated generally at 16, and which shank passes therethrough. Bolt 16 has an enlarged head 16a at one end of the threaded shank. That head 16a includes a transverse slot 16c to receive the blade of a screwdriver (not shown) which effects rotation of the fastening bolt about its axis A, which is also constitutes the axis of the fastening bolt assembly 10. The fastening bolt assembly 10 in addition to the fastening bolt 16, is comprised of a radial holding and centering expandable tubular bushing 18, a tubular expansion insert 20, and a folding wing nut structure indicated generally at 22.

The plaster board or other material wall 12, is provided with a blind bore 14 of a diameter  $D_7$  which is in excess of fastening bolt shank diameter  $D_6$ , and which is somewhat larger than the outside diameter of the bushing 18. The radial holding and centering, expandable tubular bushing 18 has a radially enlarged, integral collar or flange 18a which is slightly larger in diameter  $D_2$ , than the specified wall blind bore diameter  $D_7$ .

The overall length  $l'$  of the bushing is in excess of the thickness  $t$  of the plaster board wall 12. The flange or collar 18a acts as a stop to prevent the bushing 10 from passing through the blind bore 14 within the plaster board wall 12 when, once the body 18b of the bushing is inserted into the blind bore 14. The length  $l$  of the cylindrical bushing body 18b is equal to or slightly less than the thickness  $t$  of the plaster board wall 12. As seen in FIG. 3, the radial holding and centering, expandable, tubular bushing 18 is provided with four radial slots 32, spaced equally at  $90^\circ$  to each other to facilitate the radial expansion of the slotted body 18b of the bushing when, the expansion insert 20 is forced interiorly of that member. The slots 32 extend the full length of body 18b. Alternatively, where the bushing is formed of a ductile metal the body 18b may be free of slots 32.

In that respect, the relatively small diameter bore 40 within the flange or collar 18a of the bushing 18 which matches that at  $D_8$  for the board L and which is slightly larger than the shank diameter  $D_6$  of the threaded fastening bolt 16, flares outwardly at 36 in bushing body 18b, in the direction toward the end 18c of the body 18b remote from the flange or collar 18a. This creates a frusto-conical cavity 34 which acts to receive expansion insert 20. The cylindrical, peripheral outer surface 18d of the body 18b of the bushing faces and is in the relaxed condition, radially spaced from the cylindrical surface 38 of the plaster board 12 formed by blind bore 14.

The tubular expansion insert 20 is of frusto-conical form having a forward, small diameter end 20a, and a radially enlarged, rear end 20b, an axial bore 46, and an outer outwardly and rearwardly flared or tapered peripheral surface 42. That tapered surface 42 is slightly curved and mirrors the slightly curved rearwardly and outwardly flared surface 34 of body 18b of the tubular bushing 18. Both the bore 36 within the tubular bushing, and the surface of the axial bore 46 of the tubular expansion insert 20, are smooth. Further, the diameter of axial bore 40 within the tubular expansion insert 20, is slightly larger than the shank diameter  $D_6$  of the threaded bolt 16. As a result, neither the radial holding and centering expandable, tubular, bushing 18 or the tubular expansion insert 20 is effected by the threads 44 on the outer periphery of the threaded bolt shank 16b.

As seen in FIG. 1, the folding wing nut structure 22 is comprised of a trunion nut 24 having pivotally mounted thereto by pivot pins or like pivot connections 48, a pair of elongated wings 26. The wings 26 may be pivoted towards each other and the axis A of the assembly 10 or, spring biased by spring 27 to an outwardly, oppositely oblique splayed position as shown in FIG. 1. As may be appreciated, by pivoting the folding wings 26 from the full line position shown in FIG. 1 to the dotted line position, the folding wing nut structure 22 can be inserted into the blind hole 14 and readily passed therethrough threaded to bolt 16 in succession with the tubular expansion insert 20. The body 18b of the tubular bushing can be inserted into the blind hole to the extent of abutment of the collar or flange 18a against the front surface 12a of the wall 12.

The makeup of the folding wing nut structure 22, is not unique to this invention and may constitute a wing nut

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structure similar or identical to that shown in U.S. Pat. No. 4,116,104 or U.S. Pat. No. 4,286,497 (listed above). The content of those patents are incorporated specifically by reference herein.

As is apparent from FIG. 1, the positioning of the components of assembly 10, and the load L is effected in a similar manner to the patents referred to above. Specifically, if the load L is not supplied with the appropriate throughhole as at 30, one may be drilled having a diameter  $D_8$  slightly in excess of the diameter  $D_6$  of the threaded shank 16b of bolt 16. Further, a blind hole or bore 14 must be drilled into the plaster board wall 12 of a much larger, diameter  $D_7$ . At that point, in succession the load L is placed on the shank 16b with its front surface 50 in abutment with the flat surface 52 of the bolt head 16a and next, the radial holding and centering expandable, tubular bushing 18 is mounted to the fastening bolt 16 by being slid over the threaded outer periphery of shank 16b with the collar 18a proximate to, and facing the rear surface 54 of the load L. The tubular expansion insert 20 is then slid onto the threaded shank 16b of bolt 16 such that the small diameter end 20a of the tubular expansion insert faces the rear end 18d of the radial holding and centering expandable, tubular, bushing 18. Lastly, the folding wing nut structure 22 is threaded onto the threaded bolt shank 16b via the tapped hole or bore 56 within the bolt shank 16b trunion nut 24. With that assembly completed, all that is necessary to permit the assembly 10 to mount the load L to the plaster board wall 12 is the folding of the wing nut structure 22 wings 26 towards each other from the full line position shown at 26 to the dotted line position 26', and the threaded bolt end remote from the head 16a inserted into the blind bore 14 within wall 12. After passage of the folding wing nut structure 22 through the blind hole 14, the arms can be expanded, by release of the biasing spring 27. Insertion is continued until the tubular expansion insert 20 passes fully through the blind bore 14 of wall 12, and the collar or flange 18a of the radial holding and centering expandable, tubular, bushing 18 abuts against the front surface 12a of the plaster board wall 12. The rear surface 54 of the load L will be in abutment with the front surface of the collar or flange 18a. Further, bushing 18 of the assembly 10 acts to center and hold the fastening bolt 16 while the fastening bolt is lightened down to draw the trunion nut 24 the folding wing nut structure 22 from right to left (FIG. 1). As this occurs, the trunion nut has its front surface, drawn against rear end 20b of the tubular expansion insert 20. Continued rotation of the fastening bolt 16 by a screw driver blade within the transverse slot 16c of the head 16a of the fastening bolt 16, causes the front end 20a of the tubular expansion insert 20 to enter cavity 34 of bushing 18 whereupon, the mirror image flared surface 42 of the tubular expansion insert 20 and the flared bore surface 36 of the tubular bushing 18 meet. Since these surfaces are oppositely flared, this forces a radial movement of the four sectors of body 18b of the bushing as seen in FIG. 2 under the compressive force of the trunion nut 24 as it continues to move from right to left along the threaded bolt shank 16b. Simultaneously, the radially outer ends of the oblique wings 26 of the folding wing nut structure 22 approach the rear surface 12b of the plaster board wall, and axial forces are extended through the assembly 10 against the plaster board material wall 12. The elements of the assembly 10 are compressed toward each other along with the load L. The thin collar or flange 18a compresses such that the rear surface 54 of the load L comes into abutment or near abutment with the front surface 12a of wall 12.

As may be appreciated, the tubular expansion insert 20 can be made from a ductile or non-ductile material. It may

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be made from hard plastic or metal. Preferably, the radial holding and centering expandable, tubular, bushing 18 is made from an elastomeric material such as rubber, and expands radially so as to create radial compression forces  $F_1$  acting on the peripheral surface of the blind bore 14. Simultaneously axial forces  $F_2$  are set up within the wings 26 of the folding wing nut structure 22 all of which acts to maintain the load in fixed abutment with the front surface 12a of the plaster board wall 12. The radial holding and centering expandable bushing 18 when formed of an elastomeric material such as rubber, may be used in situations where liquid passage through the drilled blind bore 14 is to be prevented. The radial forces  $F_1$  exerted on the plaster board material of wall 12 effects an outer seal while, the movement of the tubular expansion insert into cavity 34 and the abutment between the outer periphery 42 of that member and the inner periphery 36 of the bore within the tubular bushing 18 creates an effective inner seal to prevent liquid passage through blind bore 14 of wall 12.

The simplified assembly, therefore provides adequate radial and axial forces to maintain the load L rigidly, fixedly mounted to the face of the apertured plaster board or other material wall 12. Preferably, the diameter of flange 18a is slightly larger than the specified wall hole diameter which in turn is determined by the outside diameter  $D_2$  of the radially expandable bushing 18. This diameter  $D_2$  in turn is determined by the collapsed diameter of the folding wing nut structure 22. Preferably, the length l of the bushing body 18b should be approximately equal or preferably slightly less than the wall 12 thickness t. The plastic, rubber, ductile metal, composites of the same or other material of expandable tubular bushing 18 may be slotted at 32 to facilitate the radial expansion of the same. Preferably, the large end of the tubular expansion insert 20 is of approximately the same diameter  $D_4$  as the threaded trunion nut 24 of the folding wing nut structure 22.

The present invention advantageously provides means for preventing rotation of the folding wing nut structure as the bolt 16 is rotated during movement of the folding wing nut structure 22 axially on the bolt shank 16a in the direction of the rear surface 12b of the vertical wall 12. As illustrated particularly in FIGS. 1 and 4, the tubular expansion insert 20 is provided on its outer periphery 42 with a plurality of circumferentially spaced radially projecting ribs 21, preferably equal in number to the radial slots 32 within the body 18b of the tubular bushing 18 and extending the full length of the insert 20 from the front end 20a of the insert to the rear end 20b. The width or thickness of the rib is preferably slightly less than the width of the slots 32 so as to be freely received within respective slots during axial penetration of the tubular expansion insert 20 into outwardly flared bore within the body 18b of the tubular bushing 18. Preferably, the radial height H of the ribs 21 are less than the minimum depth of  $D_9$  of slots 32 at the rear end of the bushing 18, FIG. 3. As such, preferably the radially outer face 21a of the ribs do not project beyond the outer periphery 18b of the cylindrical bushing body 18b when the insert 20 is fully inserted, FIG. 2 within the tubular bushing 18. Upon entry of the ribs 21 into the respective slots 32, ribs 21 of the tubular expansion insert 20, into the slots 32 of the tubular bushing 18, rotation of the tubular expansion insert is prevented as the wing nut structure 22 is drawn towards the rear surface wall 12b of vertical wall 12.

Preferably, the tubular expansion insert 20 further includes an axial projection 23 of pyramidal cross-section formed by four flat surfaces 23b which taper radially inwardly away from rear end face 20b towards folding wing

nut structure 22. The wings 26 of this structure are formed preferably of metal, of U-shaped cross-section having an integral base 26a, FIG. 1, and laterally opposed side walls 26b which extend outwardly from the base parallel to each other. Both U-shaped wings 26 are open internally in the direction of the tubular expansion insert 20. Further, the axial projection 23 which projects from the rear end 20b of the tubular expansion insert 20 terminates in a flat, square end face 23a which is defined by a laterally opposed flat tapered side walls 23b. The thickness of the axial projections at end face 23a is less than the distance between the laterally opposed side walls 26b of the wings 26. As such, the axial projection 23 fits into the narrower of the two wings between the laterally opposed side walls 26b of that wing 26. In this case, upper wing 26, FIGS. 1, 2 as seen in FIG. 2 receives the axial projection 23. The axial length of projection 23 is limited such that the rear end face 23a of that projection abuts, or is spaced slightly from the trunion nut 48 of trunion nut 24 when the wings 26 abut the rear face of vertical wall 12. Further, it is only necessary for the axial projection 23 to have a loose fit within the interior of a U-shaped cross-section wing 26 to achieve the desired end, that is, to prevent rotation of the folding wing nut structure 22 about the axis A of bolt 16 during tightening down of the wing nut structure 22.

As may be appreciated, while the configuration given to the tubular expansion insert both in terms of the ribs 21 on the periphery 42 of that member, and the configuration of the axial projection 23 extending rearwardly therefrom may vary to suit the needs of the toggle bolt or fastening bolt 10, to match the internal configuration of the outwardly flared bore 36 of the tubular bushing 18, and to produce an interfering fit between the axial projection 23 and the wings 26 of the folding wing nut structure 22.

While the present invention has been described and illustrated by means of a single embodiment, it is to be understood that numerous changes and modifications may be made therein without departing from the spirit and scope of the invention as defined by the dependent claims.

What is claimed is:

1. A fastening bolt assembly providing both axial and radial holding forces for mounting an object having a hole passing therethrough to a wall having opposite front and rear surfaces and having a *blind* hole passing therethrough alignable with the holes within the wall and within the object, respectively, said fastening bolt assembly comprising:

a flanged tubular bushing including a tubular body having an outer diameter on the order of said blind [bore] hole and a length approximately equal to the thickness of said wall and having an axial bore, a thin, radially enlarged flange on one end of said bushing having a diameter in excess of the diameter of the blind [bore] hole and acting as a stop when abutting against the wall front surface with the bushing tubular body inserted within said blind [bore] hole from the front surface towards the rear surface, a threaded bolt having a radially enlarged head at one end and a threaded shank extending axially therefrom and said threaded shank being insertable through said hole of said object, and through said [headed] flanged tubular bushing with [the] a shank diameter being less than that of the bore of said tubular bushing, said tubular bushing bore being flared outwardly in a direction away from said flanged end, a tubular expansion insert having an axial bore of diameter in excess of the diameter of said threaded shank and being slidably, concentrically mounted on said threaded shank of said bolt, having an outer

periphery which is flared oppositely to that of the flared bore of the tubular bushing body and generally matching the same, and said tubular expansion insert being axially slidable into the flared bore of the tubular bushing, a folding wing nut structure having a trunion nut with a tapped hole in the center thereof threaded on the threaded shank of said [fastener] threaded bolt, and a pair of wings pivotably coupled to said trunion nut, outwardly of the tapped hole for pivoting about axes such that the wings fold toward each other in the direction of said expansion insert to extend generally parallel to the axes of the [fastener] threaded bolt and on opposite sides of the threaded shank thereof, said trunion nut facing the end of the tubular expansion insert remote from said bushing, whereby; rotation of the [fastening] threaded bolt causes the folding wing nut structure to move axially on said threaded shank and to thereby force the expansion insert to move internally of the tubular bushing to radially expand the bushing and cause a radial frictional locking force to be exerted by the tubular expansion insert and the wings of the folding wing nut structure to press against the rear surface of the wall and to exert an axially holding force on an object captured between the radially enlarged head of the bolt and the front surface of said wall, and, wherein said fastening bolt assembly further comprises means, responsive to positioning of said tubular expansion insert into the bore of said tubular bushing for preventing rotation of said folding wing nut structure with said bolt, during tightening down of the folding wing nut structure against the rear surface of the vertical wall by rotating said bolt about said axis.

2. The fastening bolt assembly as claimed in claim 1, wherein said means for preventing rotation of the folding wing nut structure during tightening down of the folding wing nut structure against the rear surface of the vertical wall comprises at least one longitudinal slot extending within the bushing body from the end remote from the flange in the direction of said flange and said tubular expansion insert further comprises at least one rib [and] projecting radially outwardly of the periphery of the tubular expansion insert having a width sized to the longitudinal slot within said bushing body and receivable therein such that said tubular expansion insert is prevented from rotation on said bolt as it is drawn into the bore of said tubular bushing.

3. The fastening bolt assembly as claimed in claim 2, wherein the said at least one rib is of the same length as at least one slot within said tubular bushing.

4. The fastening bolt assembly as claimed in claim 2, wherein said at least one rib has a radial height which is less than the radial depth of said at least one longitudinal slot within said bushing body such that said at least one rib does not project radially beyond the outer periphery of the bushing body when the tubular expansion insert is fully seated within the bore of said tubular bushing.

5. The fastening bolt assembly as claimed in claim 2, wherein said at least one slot within said body of said tubular bushing comprises a plurality of circumferentially spaced slots extending longitudinally over the length of the bushing body within the blind hole and wherein, said tubular expansion insert comprises a plurality of circumferentially spaced ribs on the outer periphery of said tubular expansion insert equal in number to said circumferentially spaced slots of said bushing body and at corresponding circumferentially spaced positions for reception within said slots.

6. The fastening bolt assembly as claimed in claim 2, said wings of said folding wing nut structure are of a U-shaped

cross-section defined by a base, and laterally opposed side walls integral with the base and spaced from each other such that said wings open in the direction of the rear face of said tubular expansion insert, and said tubular expansion insert further comprises an axial projection projecting from the rear face in a direction towards the folding wing nut structure sized to fit within an opening formed between laterally opposed side walls of said wings and engageable with said side walls to prevent rotation of the folding wing nut structure on said bolt during engagement and during tightening down of the folding wing nut structure against the rear surface of the vertical wall.

7. The fastening bolt assembly as claimed in claim 6, wherein said axial projection is of pyramidal cross-section defined by two pairs of circumferentially offset laterally opposed fiat tapered surfaces with the distance there between at the end of the axial projection proximate to said folding wing nut structure being less than the lateral distance between the opposed side walls of said one wing receiving said axial projections.

8. A fastening bolt assembly providing both axial and radial holding forces for mounting an object having a hole passing therethrough to a vertical wall having opposite front and rear surfaces and having a blind hole passing therethrough alignable with the holes within the wall and within the object, respectively, said fastening bolt assembly comprising:

*a flanged tubular bushing including a tubular body having an outer diameter on the order of said blind hole and a length approximately equal to the thickness of said wall and having an axial bore, a thin, radially enlarged flange on one end of said bushing having a diameter in excess of the diameter of the blind hole and acting as a stop when abutting against the wall front surface with the bushing tubular body inserted within said blind hole from the front surface towards the rear surface, a threaded bolt having a radially enlarged head at one end and a threaded shank extending axially therefrom and said threaded shank being insertable through said hole of said object, and through said flanged tubular bushing with the threaded shank having a shank diameter being less than that of the bore of said tubular bushing, said tubular bushing bore being flared outwardly in a direction away from said flanged end, a tubular expansion insert having an axial bore of diameter in excess of the diameter of said threaded shank and being slidably, concentrically mounted on said threaded shank of said bolt, having an outer periphery which is flared oppositely to that of the flared bore of the tubular bushing body and generally matching the same, and said tubular expansion insert being axially slidable into the flared bore of the tubular bushing, a wing structure having a tapped hole in the center thereof threaded on the shank of said threaded bolt, a pair of wings, means operatively coupling said wings to said wing structure for folding towards and away from each other on opposite sides of said threaded shank upon relative rotation of said threaded shank relative to said tapped hole from a position generally in line with each other and parallel to the axis of the fastening web to positions radially outwardly thereof such that the folding wings move axially on said threaded shank thereby forcing the expansion insert to move internally of the tubular bushing to radially expand the bushing and cause a radial frictional locking force to be exerted by the pair of wings against the rear surface of the wall and to exert an*

*axially holding force on an object captured between the radially enlarged head of the bolt and the front surface of said wall, and, wherein said fastening bolt assembly further comprises means, responsive to positioning of said tubular expansion insert into the bore of said tubular bushing for preventing rotation of the wing structure with said bolt, during tightening down of the pair of wings against the rear surface of the vertical wall by rotating said bolt about said axis.*

9. The fastening bolt assembly as claimed in claim 8, wherein said means for preventing rotation of the folding wing nut structure during tightening down of the folding wing nut structure against the rear surface of the vertical wall comprises at least one longitudinal slot extending within the bushing body from the end remote from the flange in the direction of said flange and said tubular expansion insert further comprises at least one rib projecting radially outwardly of the periphery of the tubular expansion insert having a width sized to the longitudinal slot within said bushing body and receivable therein such that said tubular expansion insert is prevented from rotation on said bolt as it is drawn into the bore of said tubular bushing.

10. The fastening bolt assembly as claimed in claim 9, wherein the said at least one rib is of the same length as at least one slot within said tubular bushing.

11. The fastening bolt assembly as claimed in claim 9, wherein said at least one rib has a radial height which is less than the radial depth of said at least one longitudinal slot within said bushing body such that said at least one rib does not project radially beyond the outer periphery of the bushing body when the tubular expansion insert is fully seated within the bore of said tubular bushing.

12. The fastening bolt assembly as claimed in claim 9, wherein said at least one slot within said body of said tubular bushing comprises a plurality of circumferentially spaced slots extending longitudinally over the length of the bushing body within the blind hole and wherein, said tubular expansion insert comprises a plurality of circumferentially spaced ribs on the outer periphery of said tubular expansion insert equal in number to said circumferentially spaced slots of said bushing body and at corresponding circumferentially spaced positions for reception within said slots.

13. A fastening bolt assembly providing both axial and radial holding forces for mounting an object having a hole passing therethrough to a vertical wall having opposite front and rear surfaces and having a blind hole passing therethrough alignable with the holes within the wall and within the object, respectively, said fastening bolt assembly comprising:

*a flanged tubular bushing including a tubular body having an outer diameter on the order of said blind hole and having a length approximately equal to the thickness of said wall and having an axial bore, a thin, radially enlarged flange on one end of said bushing having a diameter in excess of the diameter of the blind hole and acting as a stop when abutting against the wall front surface with the bushing tubular body inserted within said blind hole from the front surface towards the rear surface, a threaded bolt having a radially enlarged head at one end and a threaded shank extending axially therefrom and said threaded shank being insertable through said hole of said object, and through said flanged tubular bushing with the shank diameter of said shank being less than that of the bore of said tubular bushing, said tubular bushing bore being flared outwardly in a direction away from said flanged end, a tubular expansion insert having an axial*

bore of a diameter in excess of the diameter of said threaded shank and being slidably, concentrically mounted on said threaded shank of said bolt, having an outer periphery which is flared oppositely to that of the flared bore of the tubular bushing body and generally matching the same, and said tubular expansion insert being axially slidable into the flared bore of the tubular bushing, a folding wing nut means having a tapped hole in the center thereof threaded on the threaded shank of said fastener bolt, whereby rotation of the fastening nut causes the folding wing structure to move axially on said threaded shank and to thereby force the expansion insert to move internally of the tubular bushing to cause a radial frictional locking force to be exerted by the tubular expansion insert, and said folding wing structure to press against the rear surface of the wall and exert an axially holding force on an object captured between the radially enlarged head of the bolt and the front surface of said wall, and, wherein said fastening bolt assembly further comprises means responsive to positioning of said tubular expansion insert into the bore of said tubular bushing for preventing rotation of said folding wing structure with said bolt, during tightening down of the folding wing structure against the rear surface of the vertical wall by rotating said bolt about said axis.

14. A fastening bolt assembly providing both axial and radial holding forces for mounting an object having a hole passing therethrough to a vertical wall having opposite front and rear surfaces and having a blind hole passing there-through alignable with the holes within the wall and within the object, respectively, said fastening bolt assembly comprising:

a flanged tubular bushing including a tubular body having an outer diameter on the order of said blind hole, means on said bushing having a diameter in excess of the diameter of the blind hole and acting as a stop when abutting against the wall with the bushing tubular body

inserted within said blind hole from the front surface towards the rear surface, a threaded bolt having a radially enlarged head at one end and a threaded shank extending axially therefrom and said threaded shank being insertable through said hole of said object, and through said headed tubular bushing with the shank diameter being less than that of the bore of said tubular bushing, said tubular bushing bore being flared outwardly in a direction away from said flanged end, a tubular expansion insert having an axial bore of a diameter in excess of the diameter of said threaded shank and being slidably, concentrically mounted on said threaded shank of said bolt, having an outer periphery which is flared oppositely to that of the flared bore of the tubular bushing body and generally matching the same, and said tubular expansion insert being axially slidable into the flared bore of the tubular bushing, a folding wing nut means having a tapped hole in the center thereof threaded on the threaded shank of said threaded fastener bolt, whereby rotation of the fastening nut causes the folding wing structure to move axially on said threaded shank and to thereby force the expansion insert to move internally of the tubular bushing to cause a radial frictional locking force to be exerted by the tubular expansion insert, and said folding wing structure to press against the rear surface of the wall and exert an axially holding force on an object captured between the radially enlarged head of the bolt and the front surface of said wall, and, wherein said fastening bolt assembly further comprises means responsive to positioning of said tubular expansion insert into the bore of said tubular bushing for preventing rotation of said folding wing structure with said bolt, during tightening down of the folding wing structure against the rear surface of the vertical wall by rotating said bolt about said axis.

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