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(54) **CLAMP ASSEMBLY**

Related U.S. Application Data

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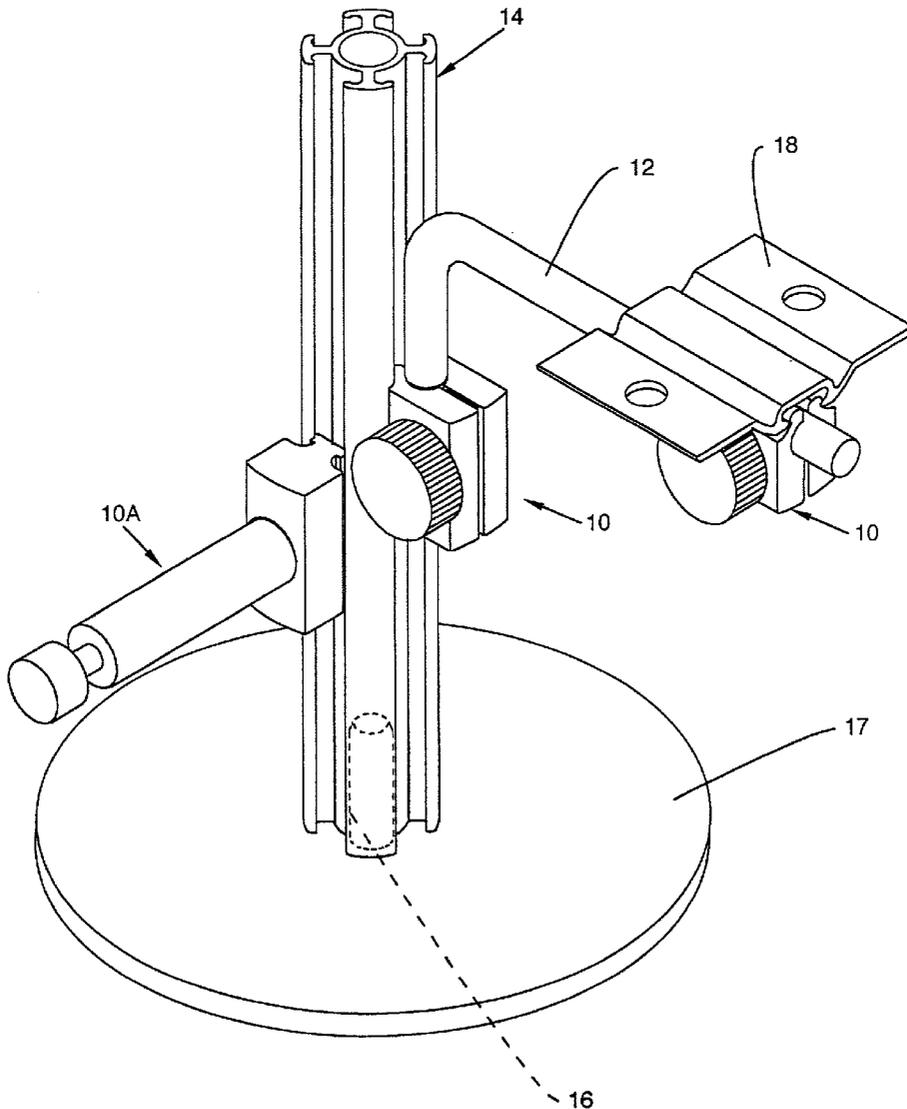
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(57) **ABSTRACT**

A clamp assembly including a slotted member with opposing jaws. A clamp with opposing teeth engages into said jaws and supports a rod.

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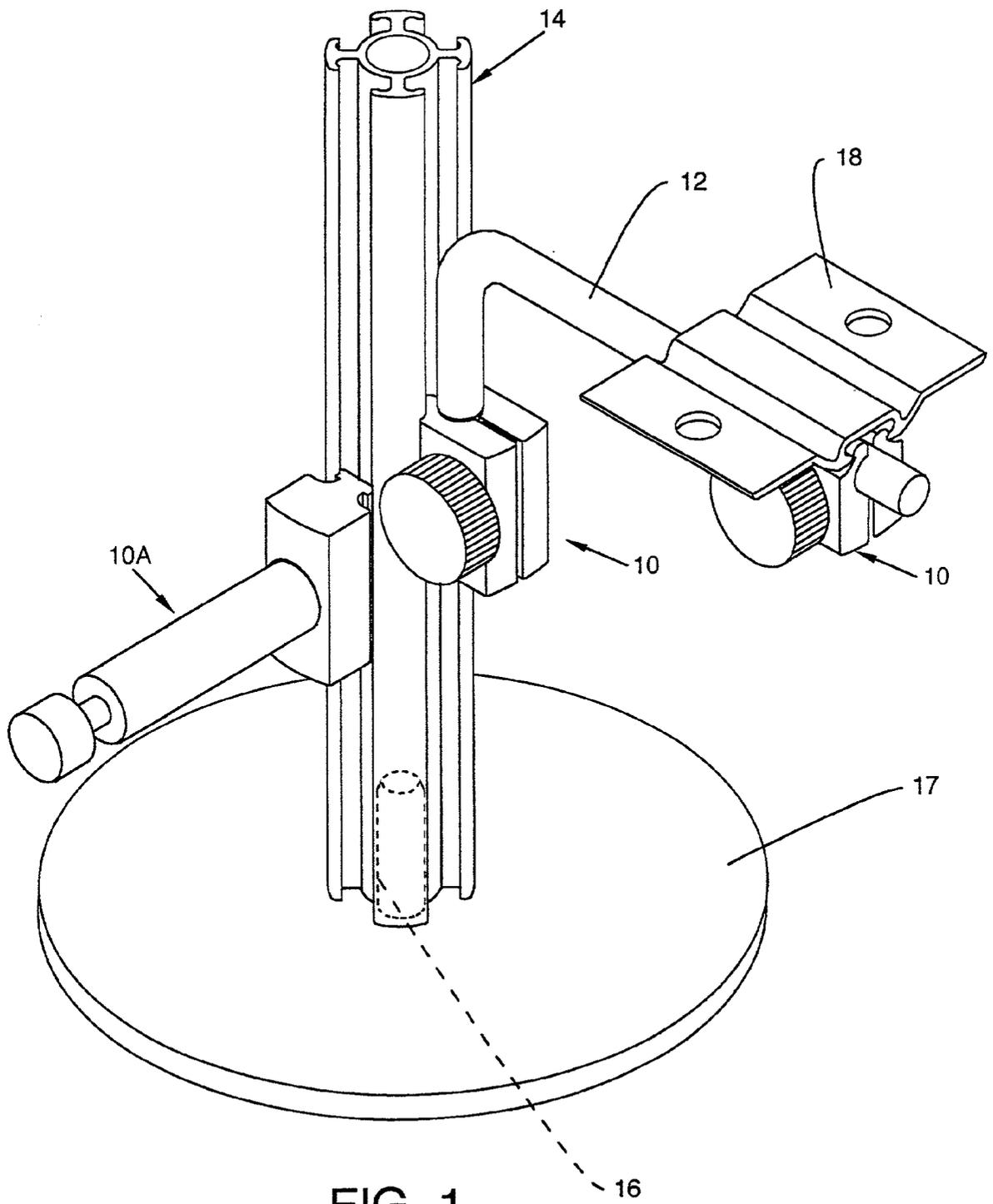


FIG. 1

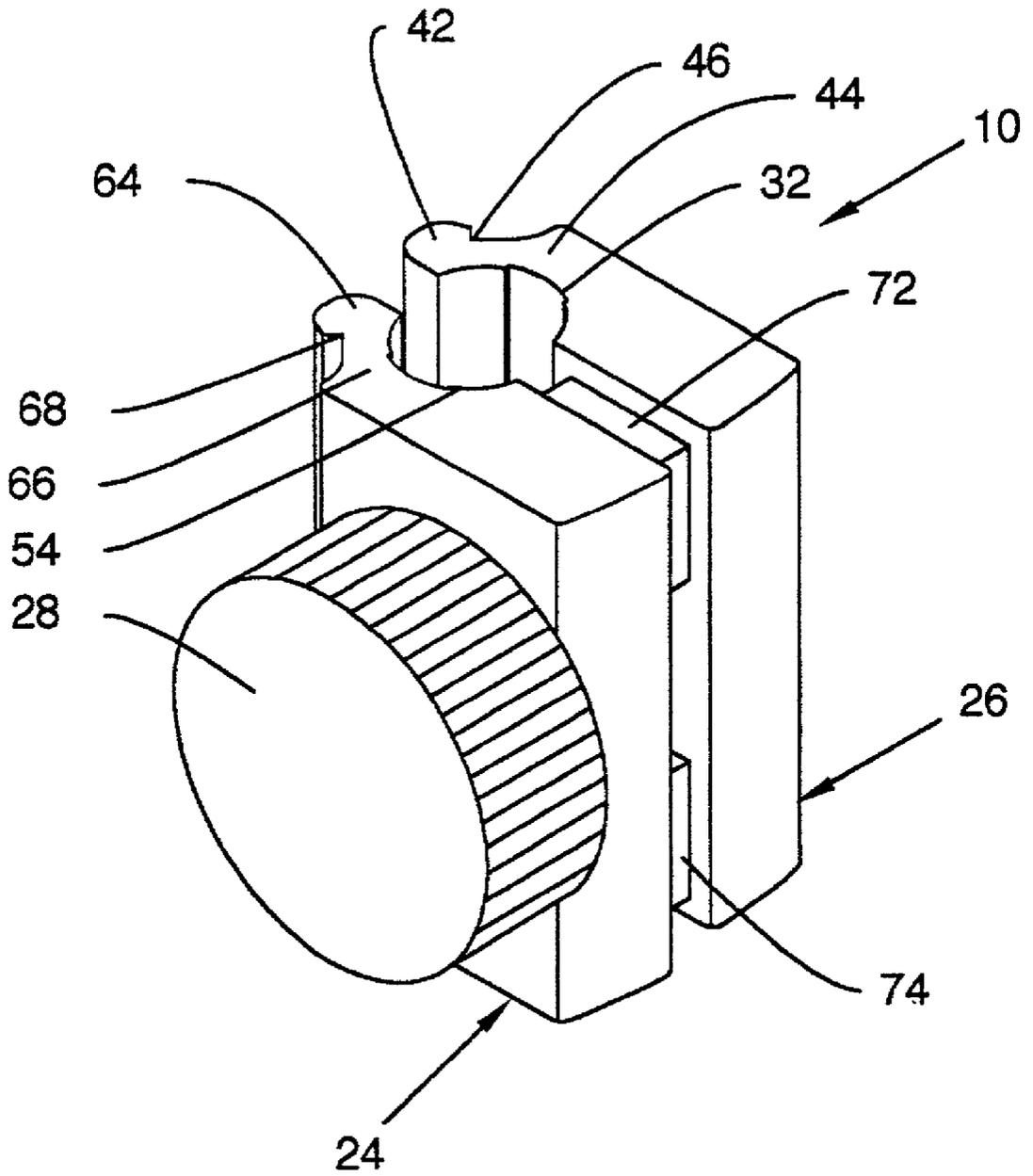


FIG. 2

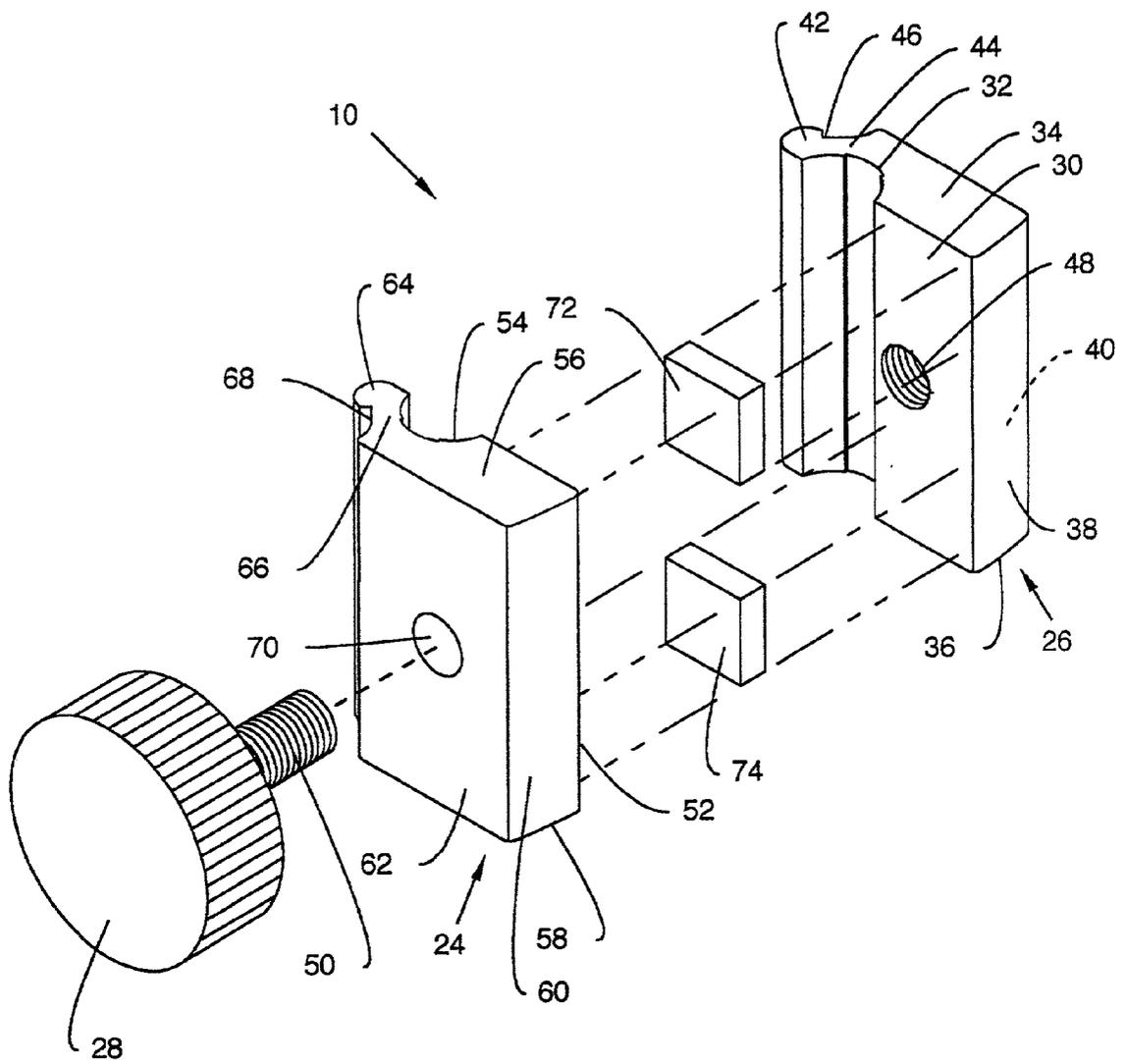


FIG. 3

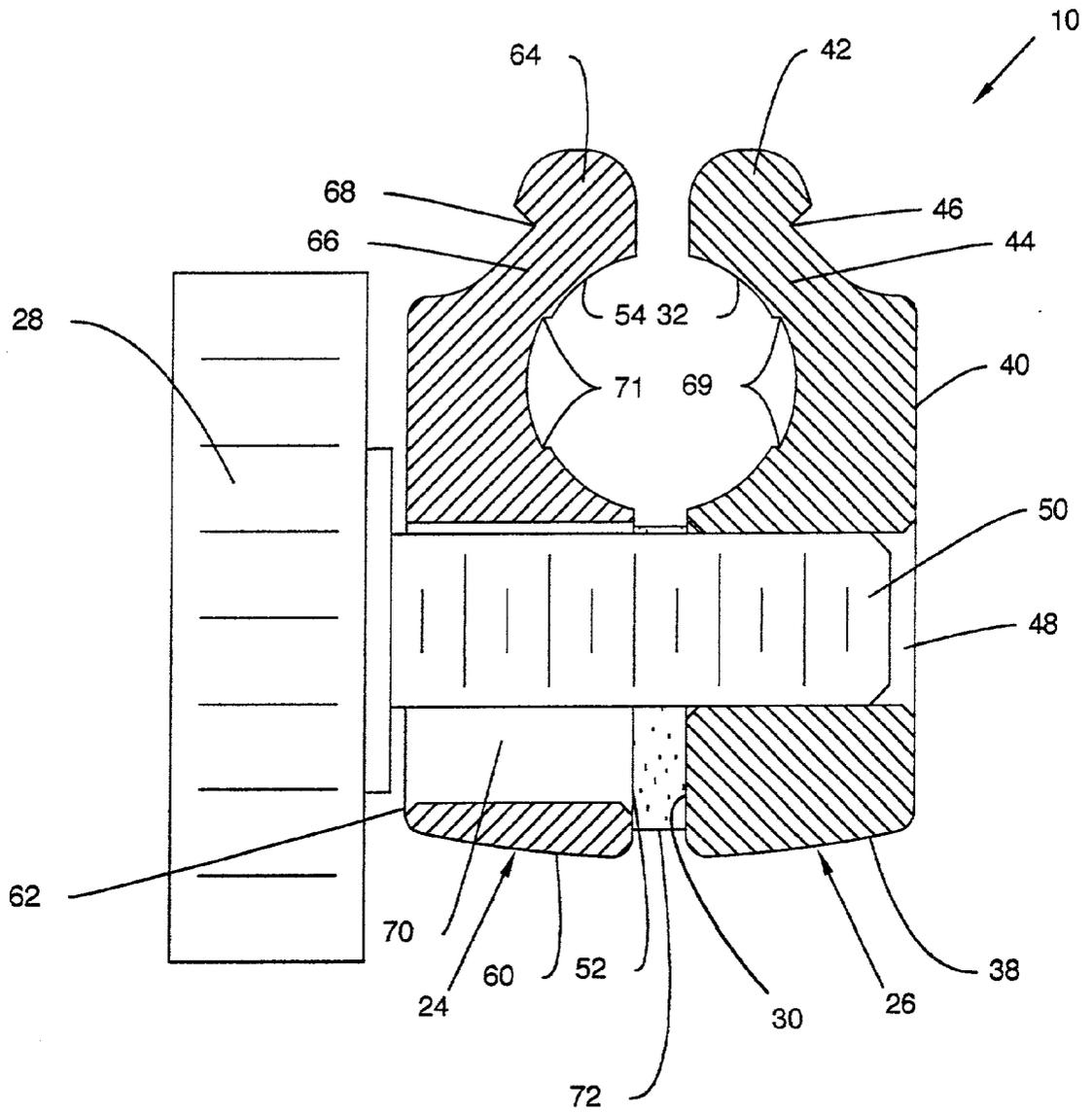


FIG. 4

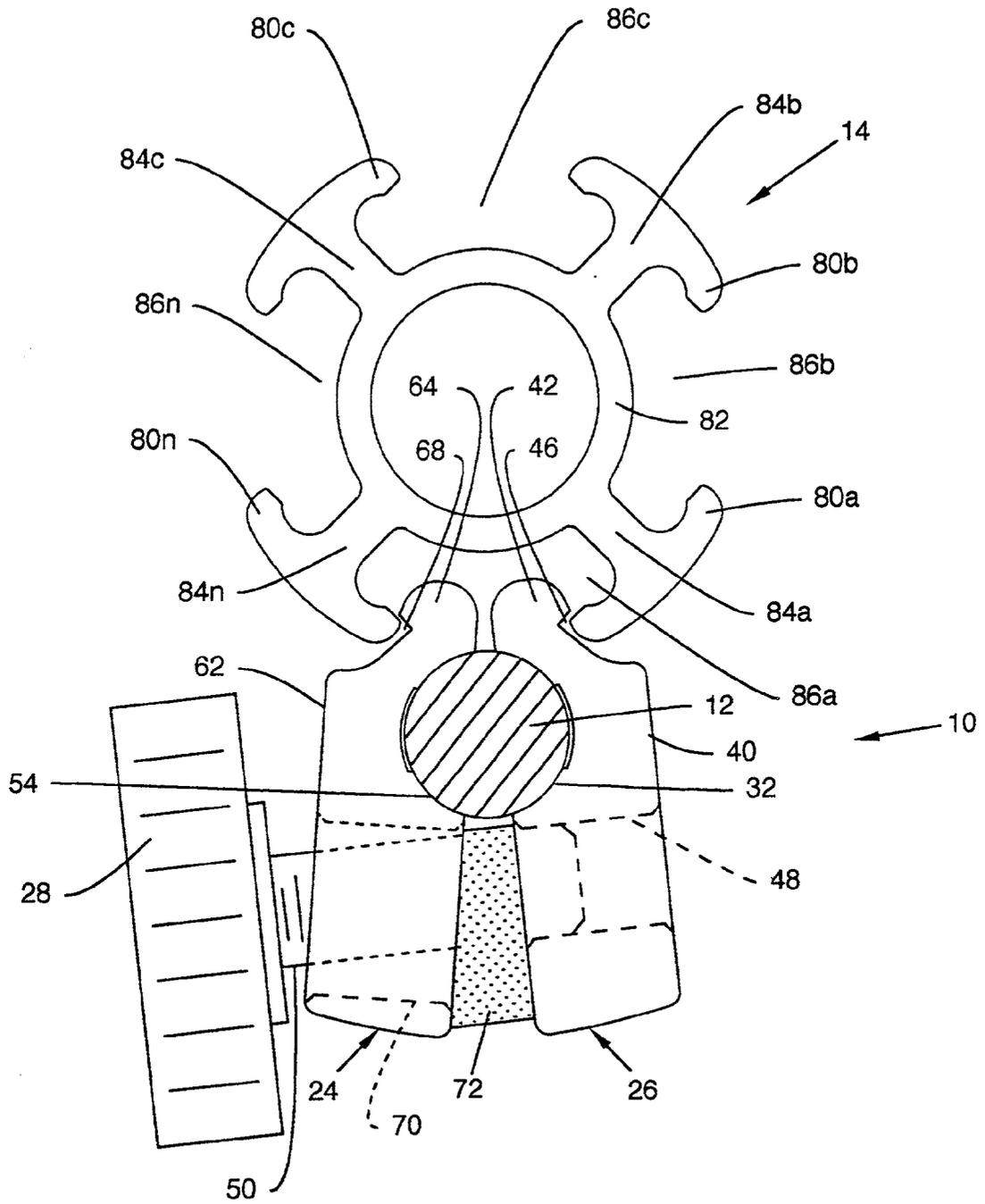


FIG. 5

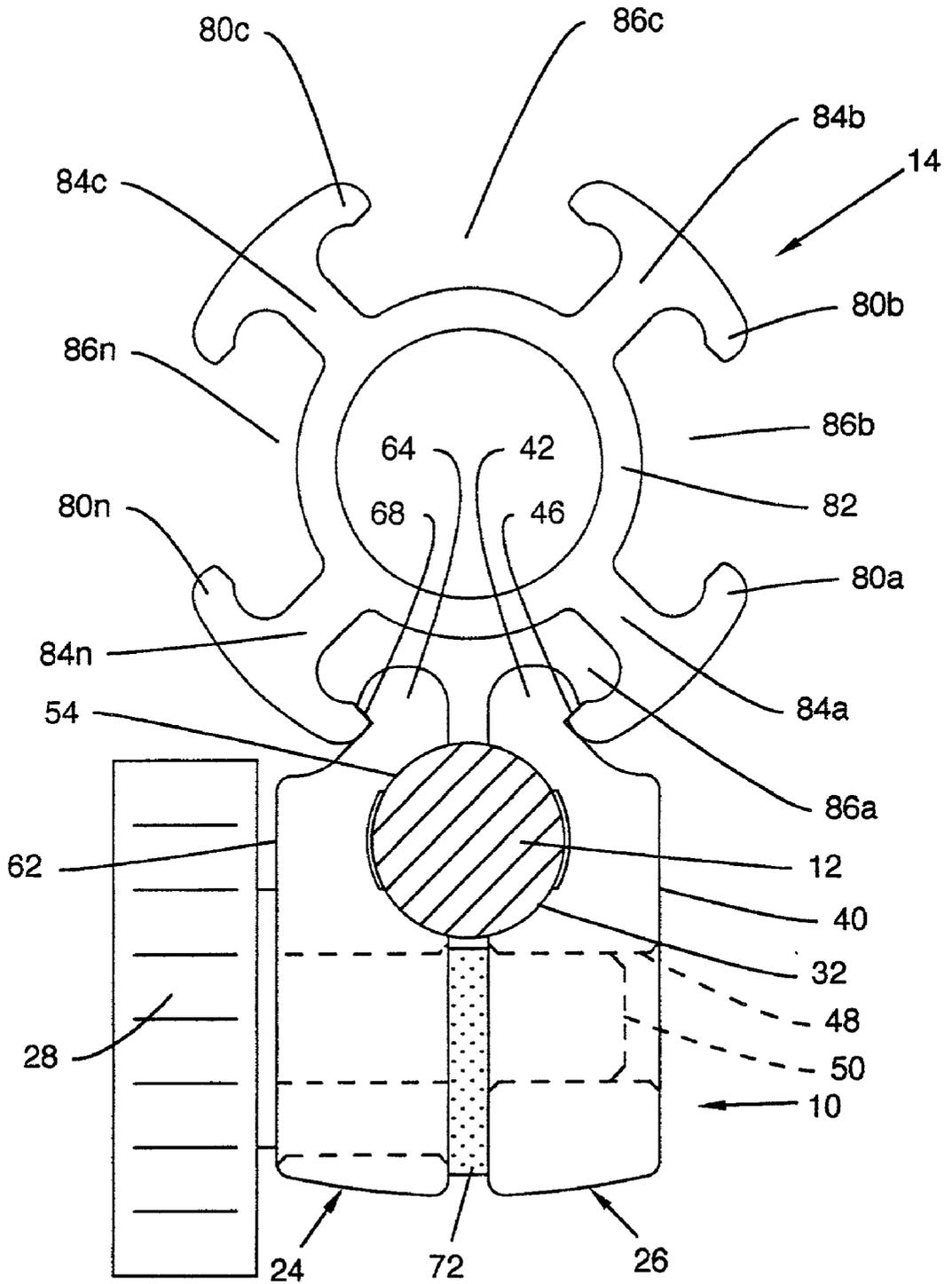


FIG. 6

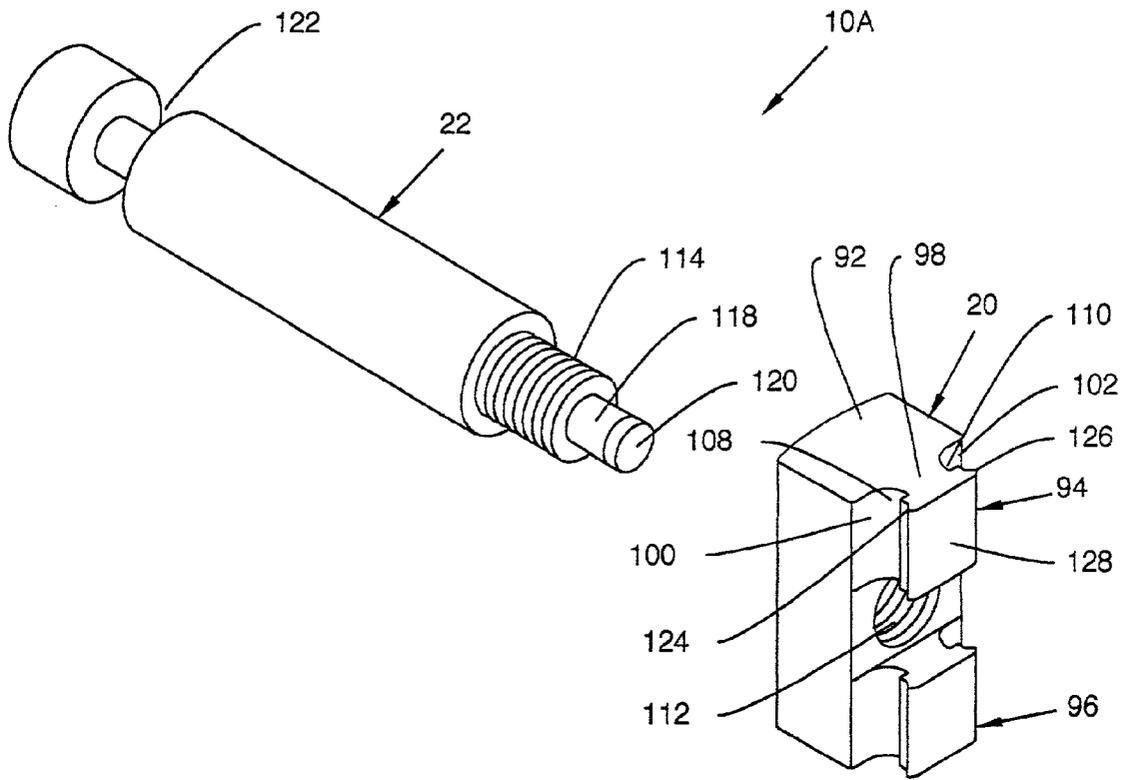


FIG. 7

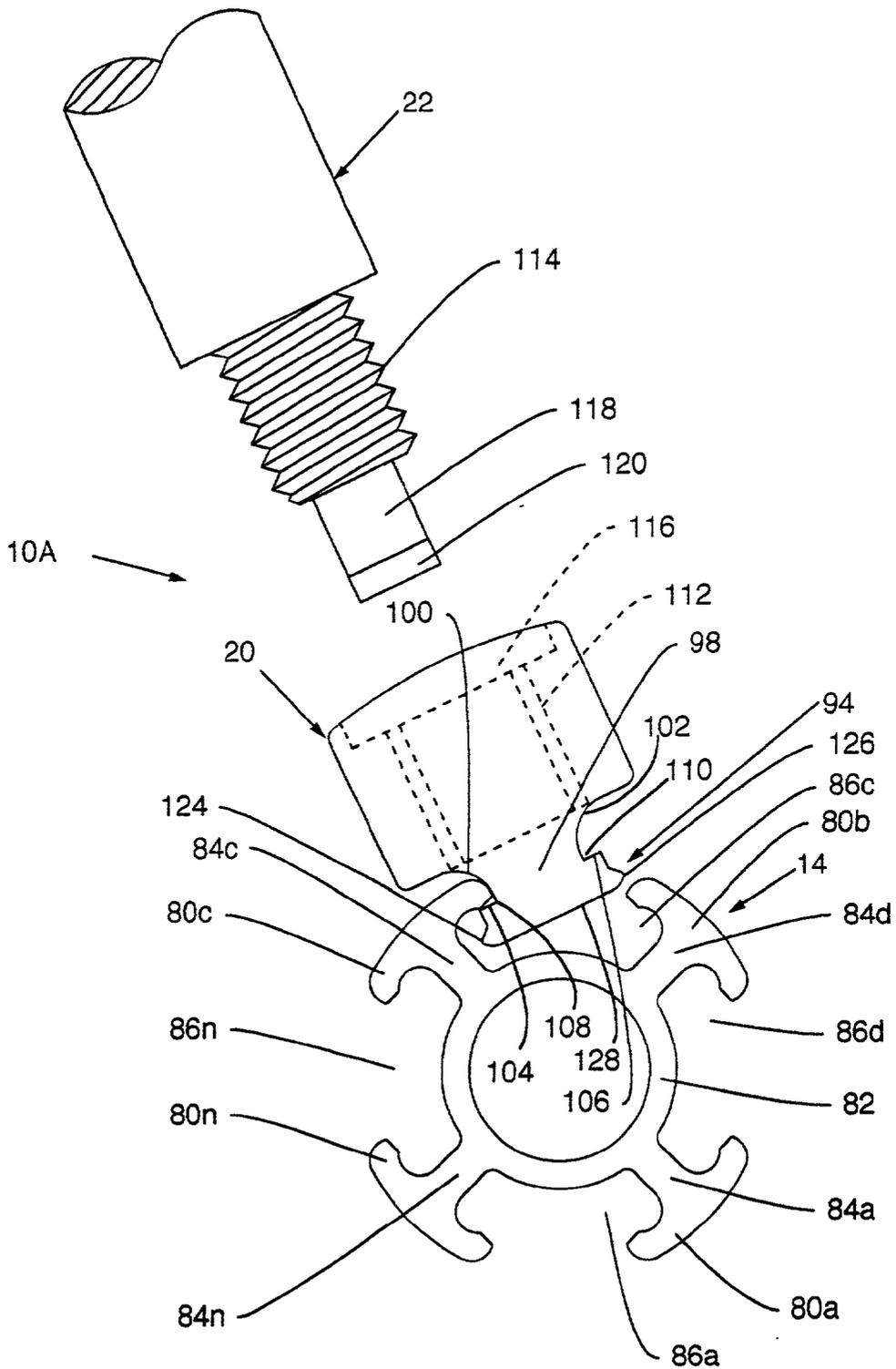


FIG. 8

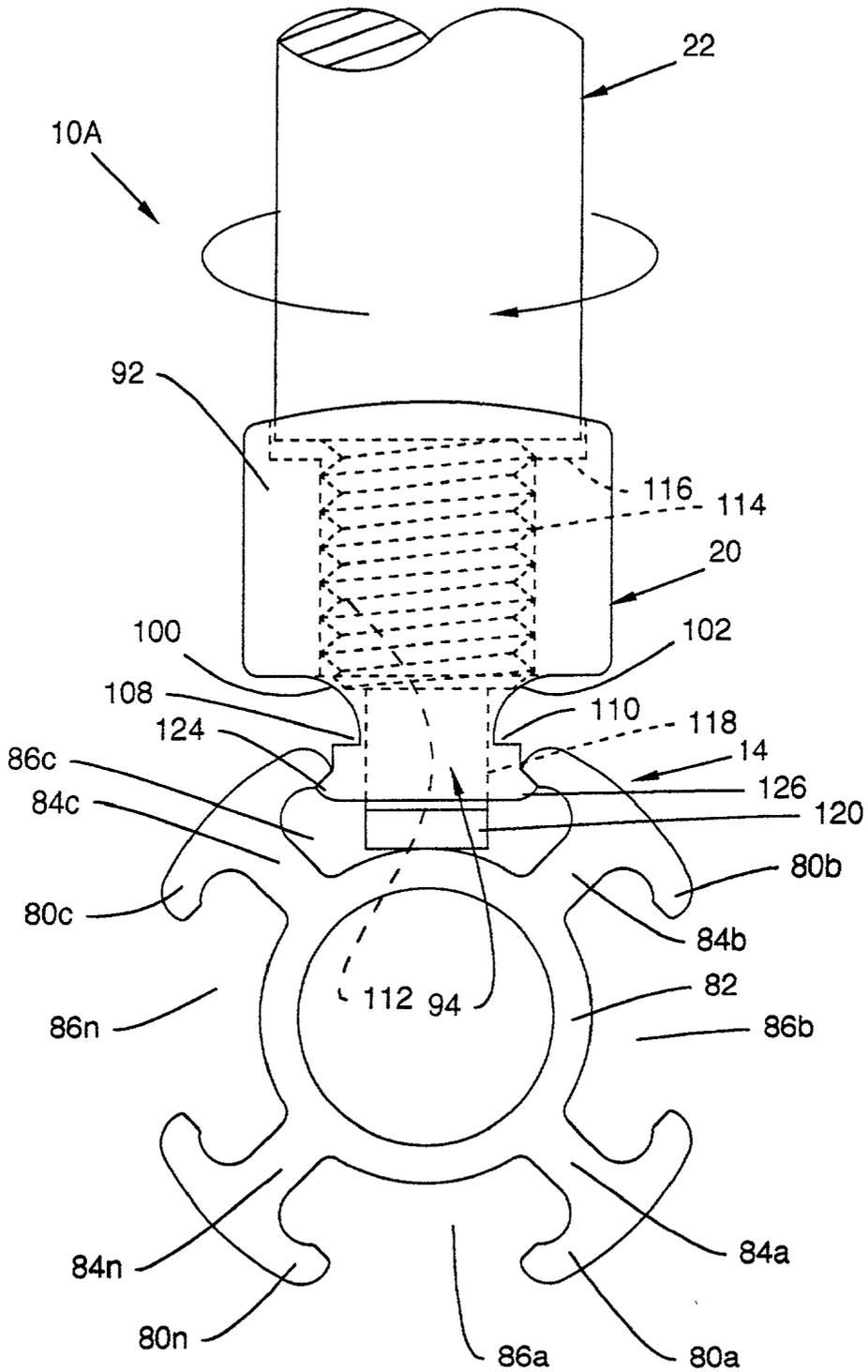


FIG. 9

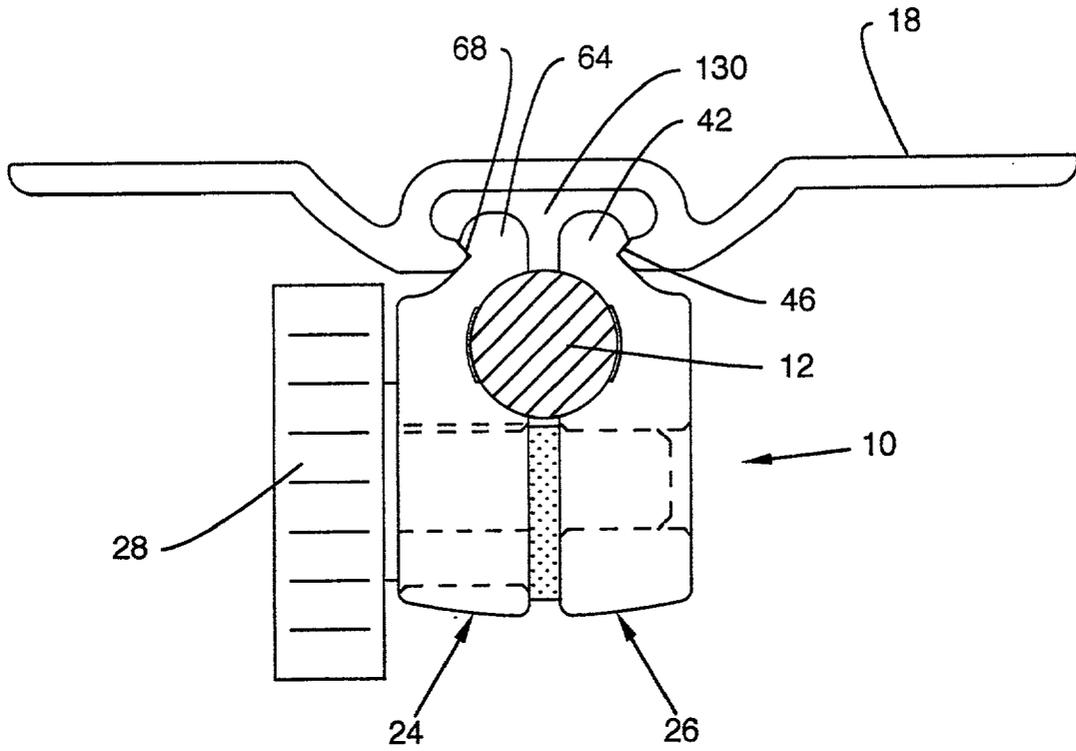


FIG. 10

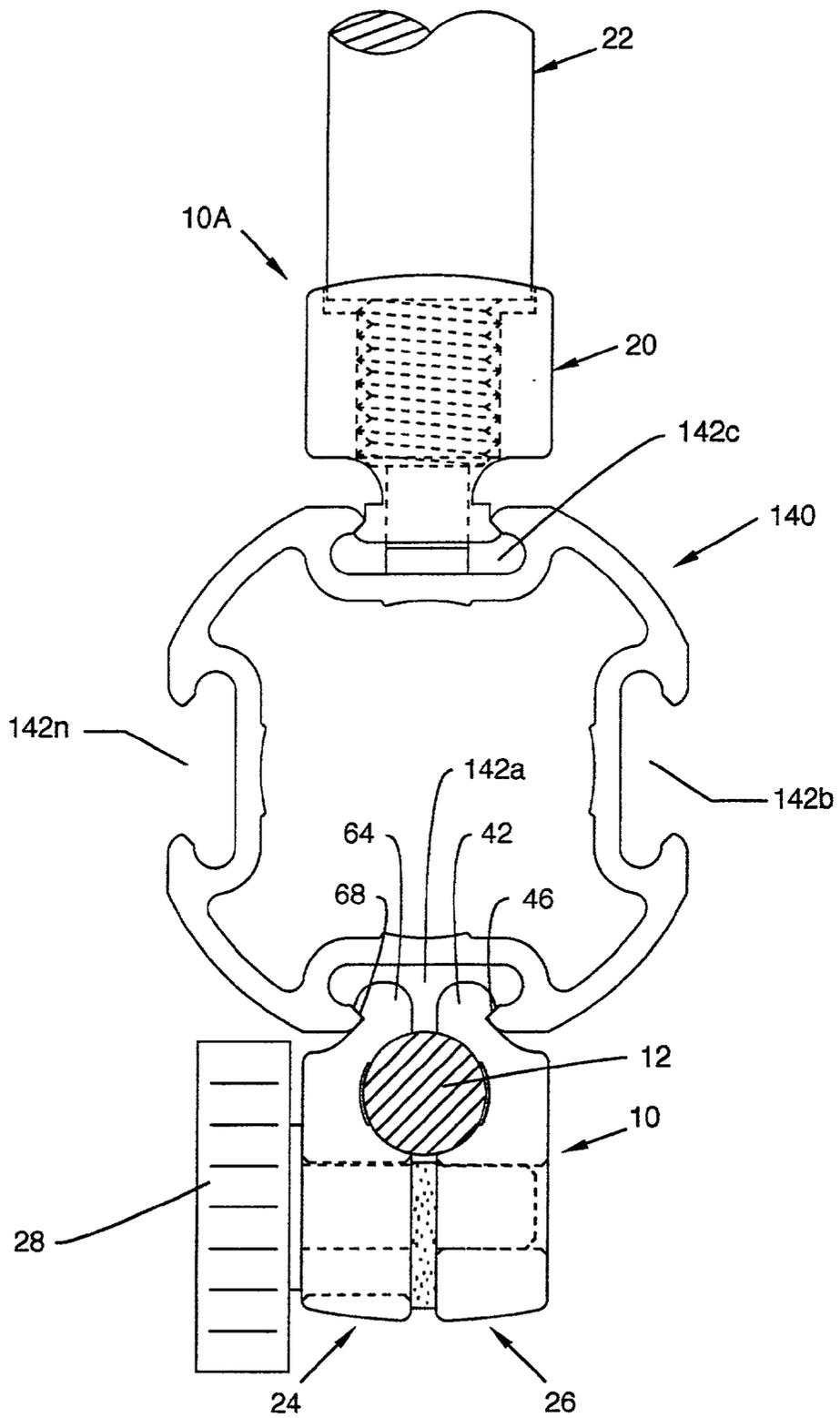


FIG. 11

CLAMP ASSEMBLY

CROSS REFERENCES TO CO-PENDING APPLICATIONS

[0001] None.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention is for a clamp assembly, and more particularly, pertains to a clamp assembly which can be readily and easily mounted to a slot on a host structure and can receive a rod. Clamp assemblies can support a rod which fits into the clamp assembly and the rod can support any type of structure, as required.

[0004] 2. Description of the Prior Art

[0005] Clamp assemblies used in prior art display systems have usually been dedicated to a single purpose and have lacked adjustability, and were not readily and easily installed into a slotted structure on a host structure. In other words, prior art clamp assembly displays or other systems were intended for a single use which were not easily or readily installed, and allowed little, if any, adjustability.

[0006] The present invention overcomes the disadvantages of the prior art by providing a clamp assembly which is versatile, and readily adjustable and installable by utilizing opposing adjustable jaws in clamp assemblies which can secure at a location anywhere along a slot in a host structure such as in a configured geometrical tube.

SUMMARY OF THE INVENTION

[0007] The general purpose of the present invention is a clamp assembly which can be installed at any slot position, as well as at the top or bottom of the slot and which is versatile, adjustable and located on and about a host structure having a slotted surface such as, but not limited to, a configured geometrical tube. The host structure, such as a configured tube, is based on receiving opposing jaws extending from outward members of the clamp assembly.

[0008] According to one embodiment of the present invention, there is provided a clamp assembly secured to a slot in a configured geometrical host tube with at least a pair of opposing jaws supported on outwardly extending slot members from the host tube for engaging the jaws of a clamp assembly. The clamp assembly, which includes opposing mirror jaw images, includes opposing semi-arcular channels oriented vertically along the inner faces for accepting and frictionally engaging a rod which is secured into position when a thumbscrew rotationally forces the two opposing inner faces together about the rod, which acts as a fulcrum, causing the jaws to expand away from each other to frictionally engage the host slot.

[0009] Significant aspects and features of the present invention include a clamp assembly featuring mid-slot installability, adjustability, versatility, and which is not limited to one particular geometrical orientation. That is, the geometrical configured host tube or other host which supports the devices, such as the clamp assembly and rod, can either be vertical, horizontal, or at an angle, and at any length, as there is no limit as to the length of an extrusion in theory. The rod which is supported by the clamp assembly

can take any type of geometrical configuration, can support any object, and can have any type of geometrical structure secured to the rod.

[0010] Another significant aspect and feature of the present invention is that once a geometrically configured host tube is positioned, such as on a base, vertically or horizontally, the clamp assembly can be engaged and disengaged easily and affectively at any time.

[0011] Yet another significant aspect and feature of the present invention is a clamp assembly opposing having jaws operated about a pivot or fulcrum rod where the outward ends of which are forced apart to engage a slot.

[0012] Still another significant aspect and feature of the present invention is a clamp assembly having jaw ends which are rounded to promote jaw self-positioning during the initial installation step.

[0013] A further significant aspect and feature of the present invention is a clamp assembly constructed of two jaws which are held together, in part, by one or more spring-like sponge rubber pads.

[0014] Having thus described embodiments and significant aspects and features of the present invention, it is one principal object of the present invention to provide a clamp assembly with teeth of a clamp which engage jaws of a slot.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] Other objects of the present invention and many of the attendant advantages of the present invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings, in which like reference numerals designate like parts throughout the figures thereof and wherein:

[0016] FIG. 1 illustrates an isometric view of a clamp assembly, the present invention, incorporated to secure a rod to a host structure;

[0017] FIG. 2 illustrates an isometric view of the clamp assembly;

[0018] FIG. 3 illustrates an exploded view of the clamp assembly;

[0019] FIG. 4 illustrates a cross sectional top view of the clamp assembly;

[0020] FIG. 5 illustrates a top view of the first step of fastening the clamp assembly and securing a rod to a host structure;

[0021] FIG. 6 illustrates a top view of the final step of fastening the clamp assembly and rod to the host structure;

[0022] FIG. 7, an alternate embodiment, illustrates an isometric view of a one-piece clamp;

[0023] FIG. 8 illustrates a top view of the first step in securing the one-piece clamp to a slot;

[0024] FIG. 9 illustrates a top view of the final step of fastening a one-piece clamp to a slot;

[0025] FIG. 10 illustrates a top view of the clamp assembly securing a post to a planar structure; and,

[0026] FIG. 11 illustrates a top view of a plurality of connector devices consistent with the teachings of the invention secured to a host structure.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0027] FIG. 1 illustrates an isometric view of a clamp assembly 10, the present invention, incorporated to secure a rod 12 to a host structure, in this case and for purposes of example and illustration, which is a geometrically configured tube 14. The geometrically configured tube 14 includes, as do other host structures, one or more slots for accommodation of and frictional engagement of one or more clamp assemblies which, in turn, support a rod. The geometrically configured tube 14 slidably secures over and about a post 16 extending vertically from a base 17. The rod 12, being secured to the host structure, such as tube 14, can assume various geometrical attributes or shapes to accommodate yet other devices, such as another clamp assembly 10a, being similar to clamp assembly 10, which secures to the horizontal portion of the rod 12. The clamp assembly 10a supports another substantially planar structure 18 having slots located therein which replicate the essential geometry and shape of the slots in a host structure such as, but not limited to, those slots in the tube 14. An alternate single body clamp 20, including a rod 22 extending therefrom, the subject of an alternative embodiment, is also shown engaging a slot in the tube 14.

[0028] FIG. 2 illustrates an isometric view of the clamp assembly 10, where all numerals correspond to those elements previously and otherwise described. The clamp assembly 10 includes opposing left and right jaws 24 and 26, respectively, substantially being mirror images of each other. A knurled knob 28, including a threaded shaft 50 (FIG. 3), extends through the left and right jaws 24 and 26, respectively, to draw together and mutually position the left jaw 24 with respect to the right jaw 26 to secure the clamp assembly 10 to a rod, such as rod 12, and to secure the clamp assembly 10 to the slot of a host structure.

[0029] FIG. 3 illustrates an exploded view of the clamp assembly 10, where all numerals correspond to those elements previously or otherwise described. The right jaw 26, substantially a mirror image of the left jaw 24, is now described. The right jaw 26, which can be an extrusion preferably of steel, aluminum, hard plastic or any other such suitable material, includes an inner planar surface 30 having a semi-arcular channel 32, which is less than a 180° arc, oriented vertically thereupon extending between a top planar surface 34 and a bottom planar surface 36. The right jaw 26 also includes a planar outwardly facing end surface 38 and an exterior planar surface 40, best shown in FIG. 4. An inwardly located and vertically oriented tooth 42 having a rounded profile juxtaposes the semi-arcular surface 30. The tooth 42 is supported by a strut 44 which comprises one side of the semi-arcular surface 32. A groove 46 which engages a slot member is located between the tooth 42 and the strut 44. A threaded hole 48 extends through the inner planar surface 30 and into the body of the right jaw 26 to accommodate the threaded shaft 50 which extends from the actuating knob 28. With reference to FIGS. 3 and 4 and other figures herein, the opposing left jaw 24 is similarly configured to include an inner planar surface 52, a semi-circular channel 54, a top planar surface 56, a bottom planar surface

58, a planar outwardly facing end surface 60, an exterior planar surface 62, a tooth 64, a strut 66, a groove 68, and a body hole 70 through which the threaded shaft 50 passes. Optional sponge rubber pads 72 and 74 are held with adhesive to the inner planar surface 30 of the right jaw 26 at a location outward from the semi-arcular channel 32 and to a corresponding position on the inner planar surface 52 of the left jaw 24. The sponge rubber pads 72 and 74 function to (1) secure the left jaw 24 to the right jaw 26 to keep the jaws mutually attached to each other so that the person operating the clamp assembly does not end up with a handful of loose parts, and (2) provide a spring bias action to force the teeth 42 and 64 together during placement of the clamp assembly 10 in a slot.

[0030] FIG. 4 illustrates a cross sectional top view of the clamp assembly 10, where all numerals correspond to those elements previously or otherwise described. Illustrated in particular is the separated alignment of the left jaw 24 to the right jaw 26. Attention is also called to the semi-arcular channels 32 and 54 in that the arcs described by each are less than 180°, and are of an appropriate radius to accommodate and to contact a greater portion of the circumference of the rod 12 on a partial circumference basis, thus allowing spaces to be maintained between the teeth 42 and 64, and more importantly, between the inner planar surfaces 30 and 52. Undercuts of slightly larger radius are also provided on the semi-arcular channels 32 and 54 to provide one or more gripping edges 69 and 71 for enhanced frictional engagement of the jaws 26 and 24 to the rod 12.

MODE OF OPERATION

[0031] FIG. 5 illustrates a top view of the first step of fastening the clamp assembly 10 and securing a rod 12 to a host structure geometrically configured tube 14. The host structure, in this case the geometrically configured tube 14, includes segmented arcular portions 80a-80n secured to a central cylindrical structure 82 by struts 84a-84n. Slot 86a is formed, in general and for example, between the ends of segmented arc portions 80a and 80n, by struts 84a and 84n, and the portion of the cylindrical structure 82 therebetween. In the example, the slots 86a-86n assume an arc-like profile, and any suitably-shaped slot can be used against which and into which the teeth 42 and 64 and corresponding grooves 46 and 66 are inserted, engaged and secured against. The insertion is initiated by loosely inserting the rod 12 in the semi-arcular channels 32 and 54 in the jaws 26 and 24 while the actuating knob 28 is rotated to back out the threaded shaft 50 to allow angular flexing of the jaws 26 and 24 with respect to one another about the rod 12 which acts as a fulcrum or pivot. The teeth 42 and 64, each having a round-like profile are inserted into the slot 86a to a position as illustrated. The round-like profile presented by the teeth 42 and 64 can, if not already touchingly positioned, impinge the outwardly located ends of the corresponding segmented arcular portions 80a and 80n to maneuver the teeth 42 and 64 into close mutual proximity or even into intimate contact to provide a minimum profile so that passage of the teeth 42 and 64 into the slot 86a can be readily and easily accomplished. The body hole 70 in the left jaw 24 is sized to allow sufficient rotation of the left jaw 24 about the rod 12 without interference of the threaded shaft 50.

[0032] FIG. 6 illustrates a top view of the final step of fastening the clamp assembly 10 and rod 12 to the host

structure geometrically configured tube 14. The actuating knob 28 is turned to opposing reposition the left jaw 24 and right jaw 26 about the rod 12 which acts as a pivot and as a fulcrum. The actuating knob 28 is brought to bear against the exterior planar surface 62 of the left jaw 24, thus imparting a counterclockwise movement of the left jaw 24 about the rod 12, thereby positioning the groove 68 against one end of the segmented arcular portion 80*n* of the geometrically configured tube 14. At the same time, the rotation of the threaded shaft 50 repositions the right jaw 26 in a clockwise direction about the rod 12, thereby positioning the groove 46 against one end of the segmented arcular portion 80*a* of the geometrically configured tube 14. Further tightening of the knob 28 ensures positive engagement of the jaws 24 and 26 with the slot 86*a* and also increases pressure across the jaws 24 and 26 to ensure suitable frictional engagement of the jaws 24 and 26 to the rod 12 therebetween.

ALTERNATIVE EMBODIMENT

[0033] FIG. 7, an alternative embodiment, illustrates an isometric view of a one-piece clamp 20 which also includes a rod 90. The one-piece clamp 20 includes a body 92 having mirror-like similarly configured upper and lower engagement tabs 94 and 96 extending outwardly therefrom. The rod 90 and one-piece clamp 20 can be fashioned of aluminum, steel, hard plastic or the like. The upper and lower tabs 94 and 96 are fashioned to engage a slot, such as slot 86*c* or other such slot of the present invention. The upper engagement tab 94, being similar in design and function to the lower engagement tab 96, is supported by a strut 98 extending outwardly from the body 92. The strut 98 includes opposing curved sides 100 and 102 which intersect opposing flat surfaces 104 and 106, respectively, of the engagement tab 94 (FIG. 8) to subsequently form angular access grooves 108 and 110 which are instrumental during the initial engagement portion of the engagement tabs 94 and 96 to a slot. Opposing angled tabs 124 and 126 located at the edges of the engagement tabs planar surface 128 are utilized to contact the ends of segmented arcular portions, such as the ends of segmented arcular portions 80*b* and 80*c*, as illustrated in FIG. 9. The structure of the lower engagement tab 96 is not described for purposes of brevity. A horizontally aligned threaded hole 112 extends partially through the body 92 to accommodate threads 114 located at one end of the rod 90. A recess 116 (FIG. 8) aligns concentrically to the threads 114 to accommodate the largest radius of the rod 90. A small radius protrusion 118, having an optional plastic end 120, extends from the region of the threads 114. A groove 122 is provided at the outward end of the rod 90 to accommodate the external fixture attachment.

[0034] FIG. 8 illustrates a top view of the first step in securing the one-piece clamp 20 to a slot such as slot 86*c* of the geometrically configured tube 14. The rod 90 is not shown as being engaged with the threaded hole 112 during the initial engagement, but may be so engaged, if desired, for initial insertion. The one-piece clamp 20 is first positioned canted off center, as illustrated. One of the access grooves,

such as access groove 108, is positioned at an angle into the slot 86*c* and then brought to bear against the near end of the adjacent segmented arcular portion 80*c*. This allows the geometry, which at this time is canted, of the engagement tab 94 full subsequent access to the interior of slot 86*c*. Once the engagement tab 94 is positioned thusly, the one-piece clamp 20 can be rotated fully into direct alignment within the slot 86*c*, as shown in FIG. 9.

[0035] FIG. 9 illustrates a top view of the final step of fastening the one-piece clamp 20 to a slot 86*c* of the geometrically configured tube 14. After repositioning the one-piece clamp 20 into full and direct alignment in the slot 86*c*, the rod 90 is turned to advance the plastic tip 120 (rod end) into engagement with the cylindrical structure 82. This action forces the one-piece clamp body 92 outwardly from the center and along the threads 114 to outwardly position the angled tabs 124 and 126 of engagement tab(s) 94 and 96 against the appropriate ends of the segmented arcular portions 80*b* and 80*c*. The engagement tab(s) 94 and 96 are thusly positioned in frictional engagement to lock the one-piece clamp 20, including the rod 90 to a slot structure.

[0036] FIG. 10 illustrates a top view of the clamp assembly 10, the present invention, securing a post 12 to a planar structure 18, having a slot 130 having attributes which allow attachment of the clamp assembly 10, as well as the one-piece clamp 20 thereto.

[0037] FIG. 11 illustrates a top view of a plurality and mixture of connector devices, including the clamp assembly 10 and the one-piece clamp 20 being secured, according to the teachings of the invention, to a slotted structure 140 having a plurality of slots 142*a*-142*n* distributed thereabout. The present invention can be incorporated in attachment to any suitable slot on any structure.

[0038] Various modifications can be made to the present invention without departing from the apparent scope hereof.

It is claimed:

1. A clamp assembly comprising:
 - a. a geometrically configured member with two opposing jaws; and,
 - b. a geometrically configured member means for supporting a device, including two opposing members which engage said opposing jaws.
2. The assembly of claim 1, wherein said means includes opposing faces.
3. A clamp assembly comprising:
 - a. a slot with two opposing jaws;
 - b. a clamp of two mirror image members with two opposing teeth on each end of said clamp;
 - c. a rod extending through said clamp behind said teeth; and,
 - d. a screw means extending through said clamp behind said rod for engaging said teeth against said jaws.

* * * * *