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(54) **THIN PROFILE CABLE ATTACHMENT FOR A RECLINER LINK**

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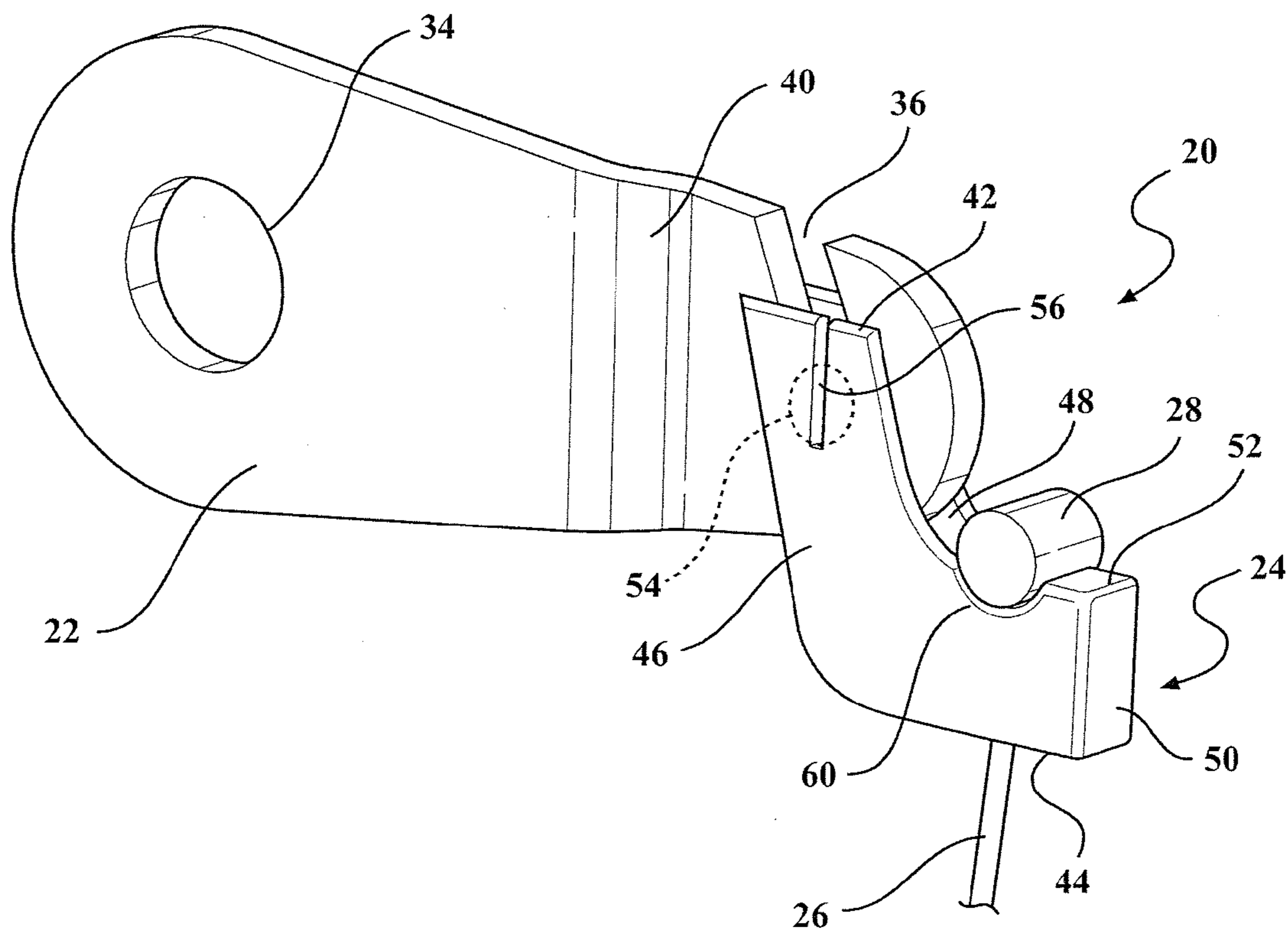
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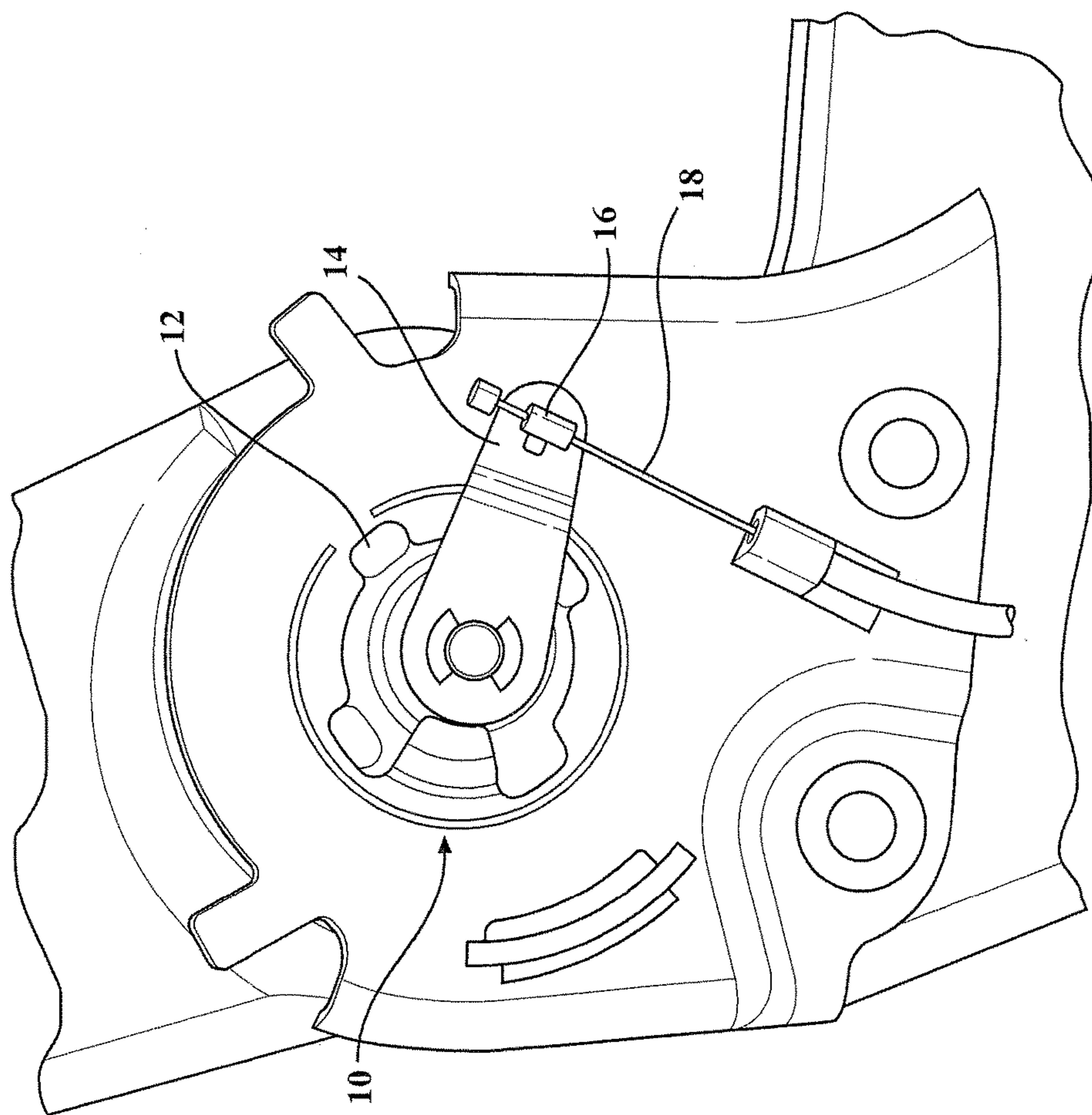
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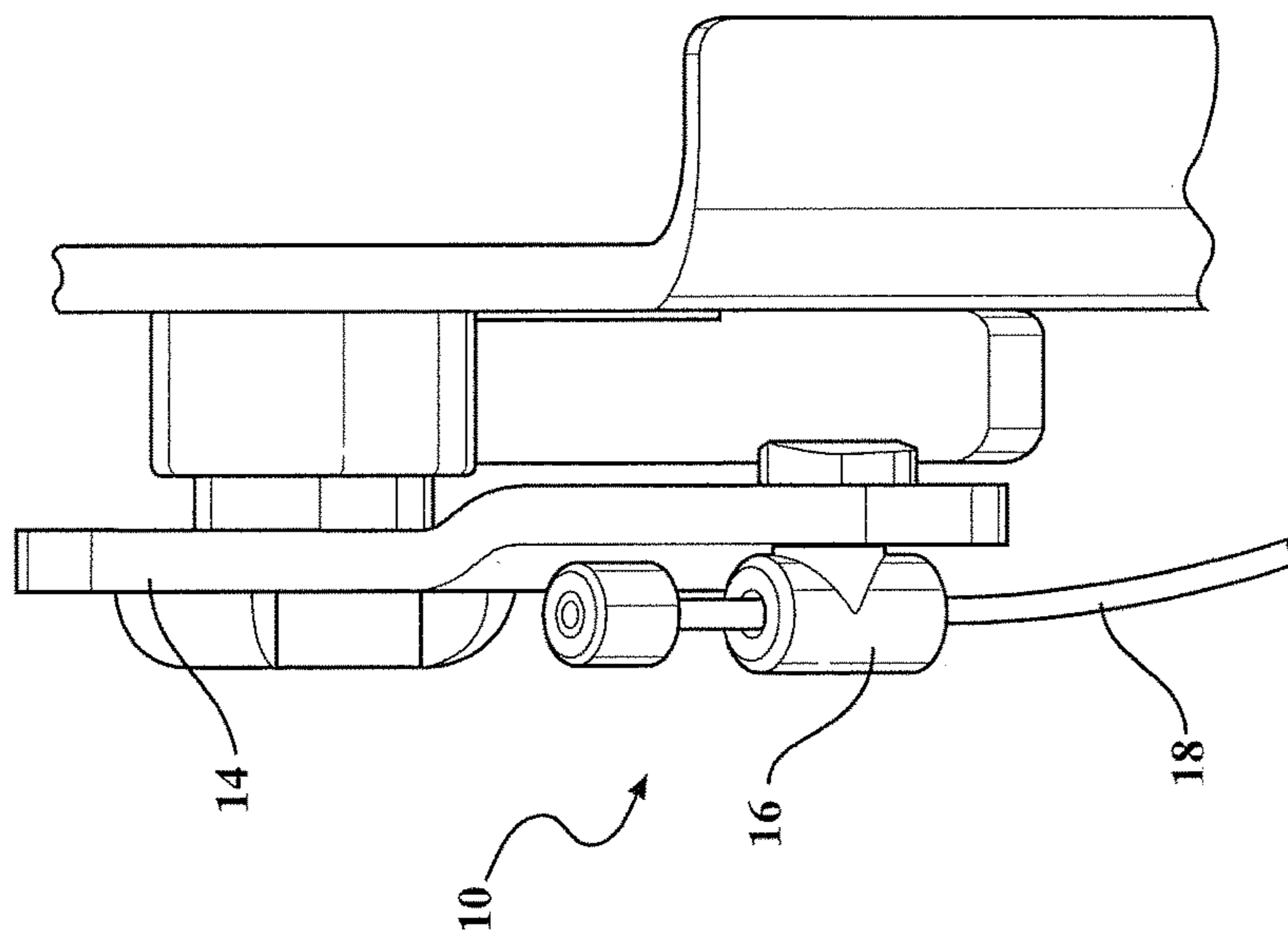
(57) **ABSTRACT**

A cable assembly has a link, a cable connector and a cable. The link has a slot near a distal end of the link. The cable connector comprises a shaft near a proximal end of the cable connector and an opening near a distal end of the cable connector. The shaft is engaged with the slot of the link. The cable has a stopper at an end of the cable. The cable extends through the opening, and the stopper extends above the opening.

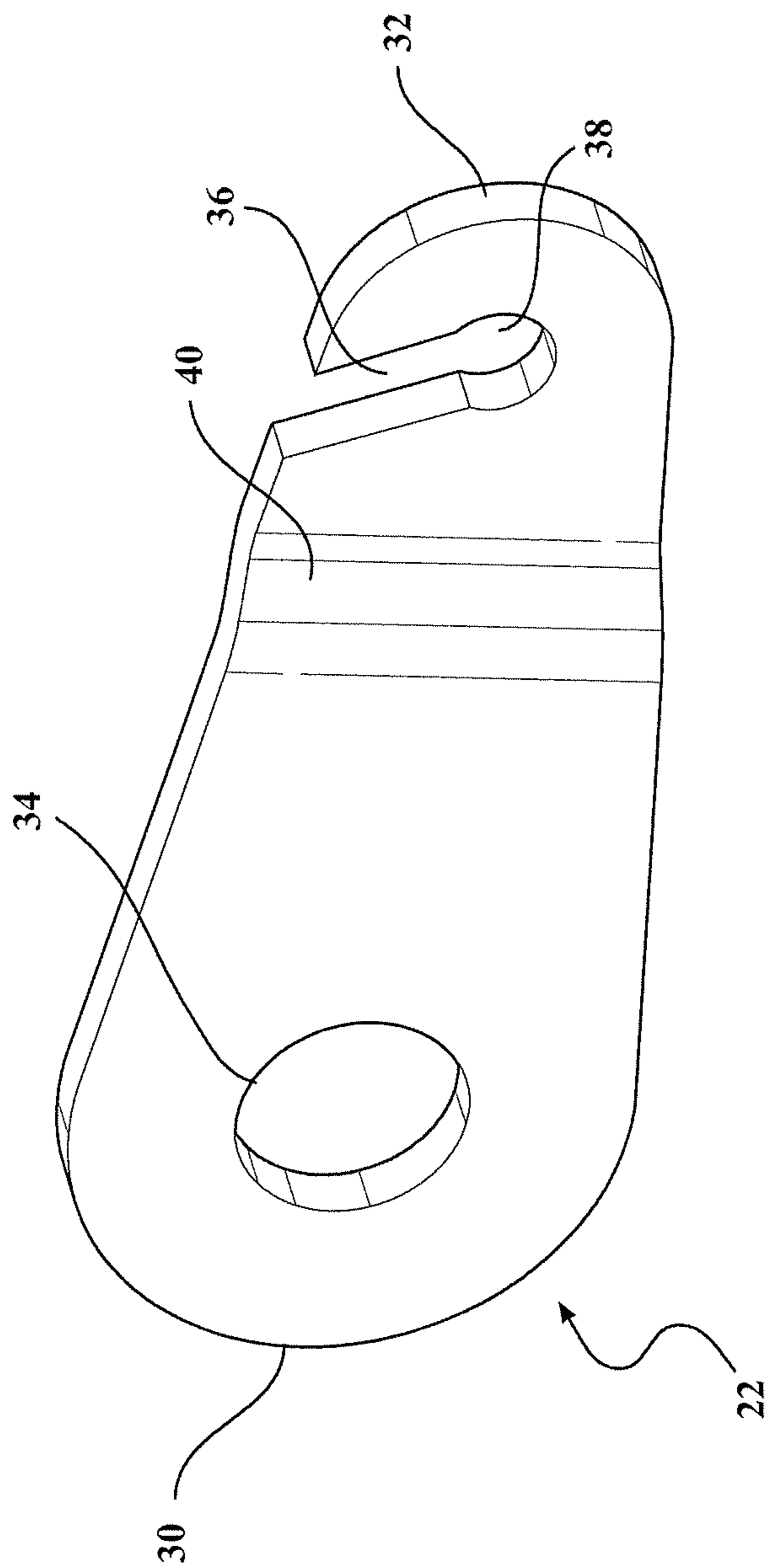




**FIG. 1**  
PRIOR ART



**FIG. 2**  
PRIOR ART



**FIG. 3**

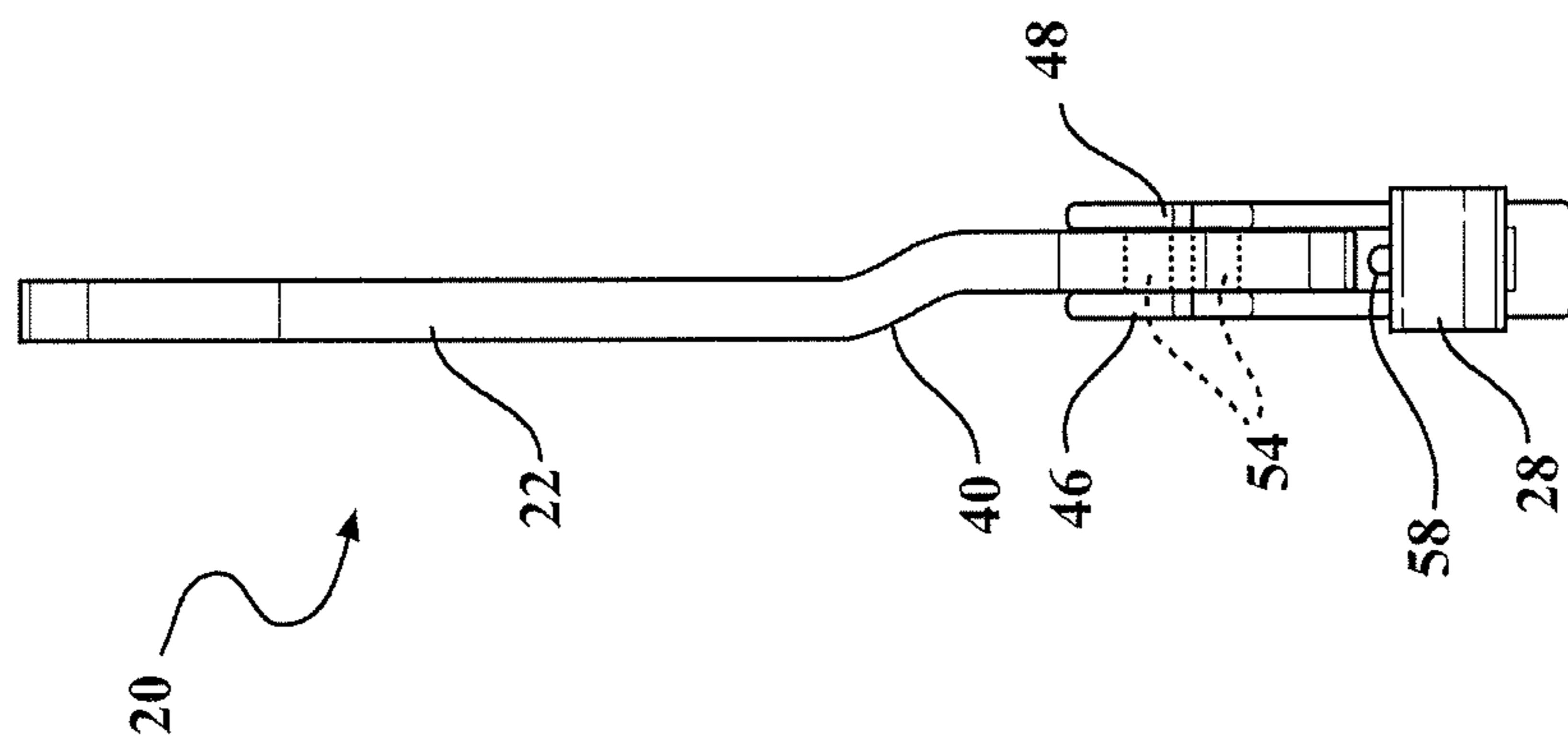


FIG. 5

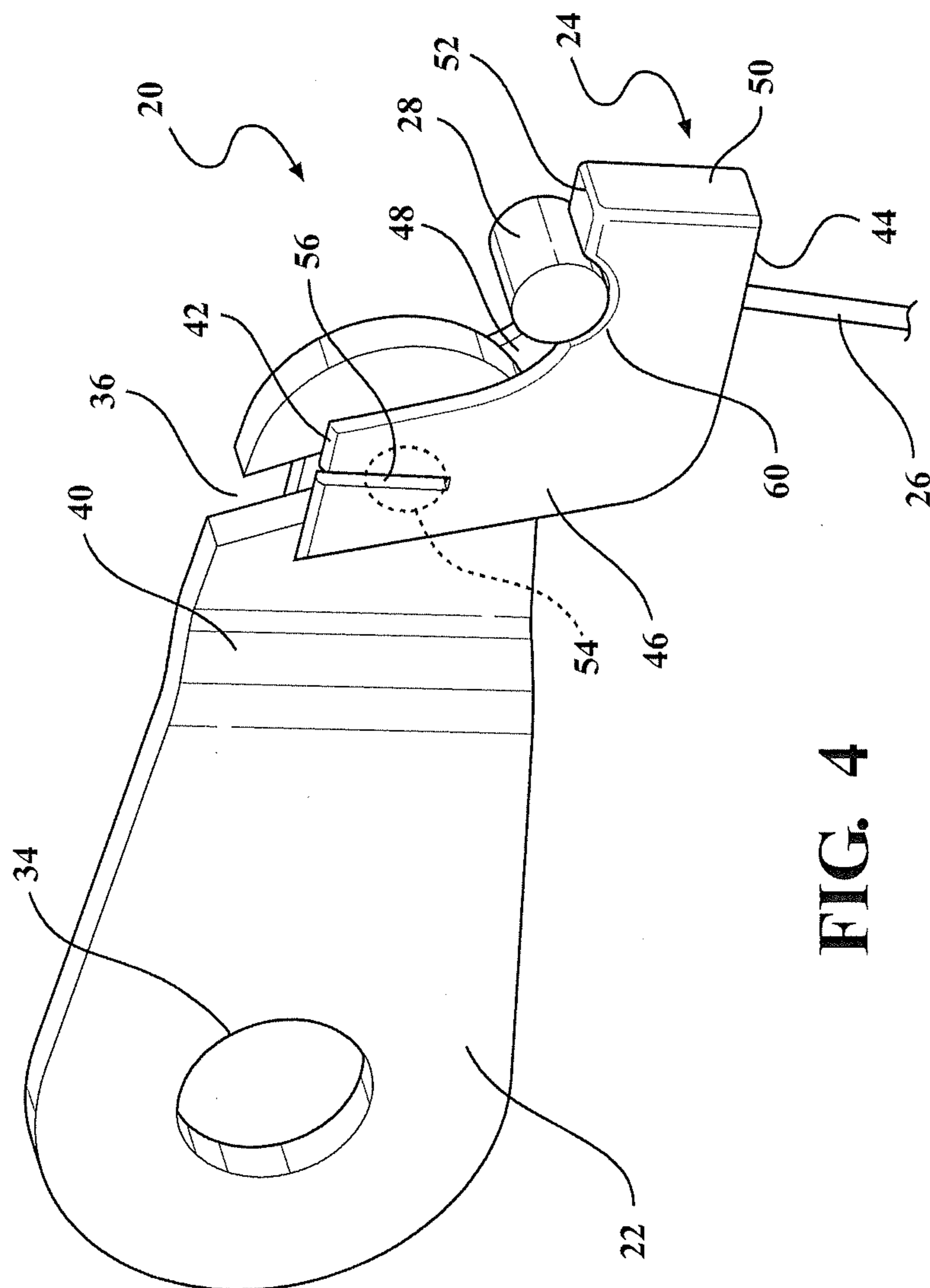


FIG. 4

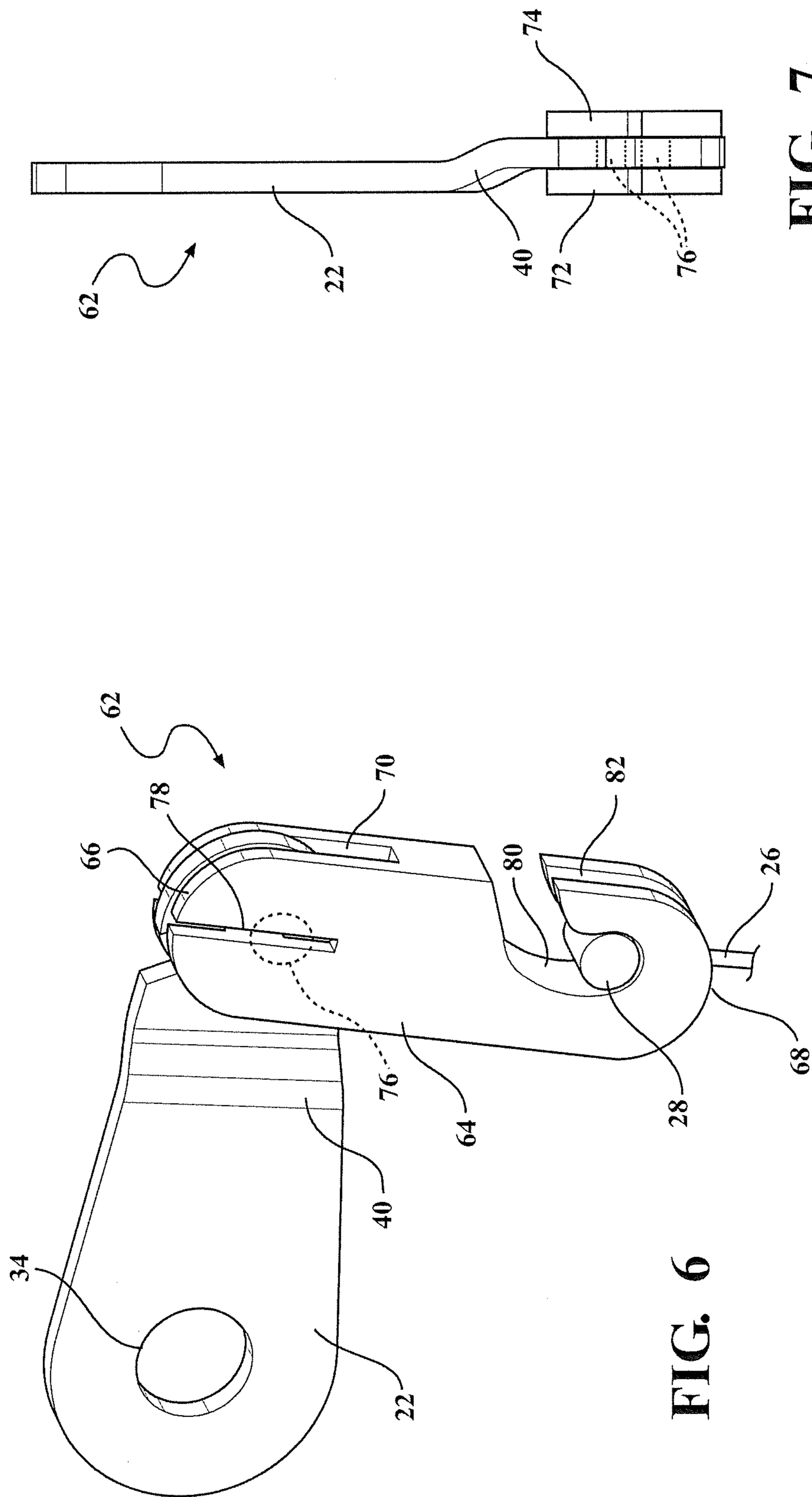


FIG. 6

FIG. 7



## THIN PROFILE CABLE ATTACHMENT FOR A RECLINER LINK

### CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to U.S. provisional patent application No. 62/660,559, filed Apr. 20, 2018, which is incorporated herein by reference.

### FIELD OF THE INVENTION

[0002] The present invention relates to thin profile cable attachments that reduce the overall connection width, reduce buzz, squeak, and rattle, and are easy to manufacture and assemble.

### BACKGROUND OF THE INVENTION

[0003] Cable assemblies consisting of a link, a cable connector and a Bowden-style cable are well known in the art. For example, FIGS. 1 and 2 illustrate a cable assembly 10 for use on a recliner 12 in an automotive vehicle in accordance with the prior art. The cable assembly 10 includes a recliner link 14, a cable connector 16 and a cable 18. The cable connector 16 is attached to the side of the recliner link 14, and thus is in an offset or cantilevered position. These cable connectors are bulky, difficult to package and are not very durable.

### SUMMARY OF THE INVENTION

[0004] According to one embodiment, there is provided a cable assembly comprising a link, a cable connector and a cable. The link has a slot near a distal end of the link. The cable connector comprises a shaft near a proximal end of the cable connector and an opening near a distal end of the cable connector. The shaft is engaged with the slot of the link. The cable has a stopper at an end of the cable. The cable extends through the opening, and the stopper extends above the opening.

[0005] According to another embodiment, there is provided a cable connector for coupling a cable to a link comprising a shaft near a proximal end of the cable connector and an opening near a distal end of the cable connector. The shaft is rotatably coupled to the link. The cable extends through the opening.

[0006] According to another embodiment, there is provided a cable connector for coupling a cable to a link comprising an opening near a distal end of the cable connector. The cable extends through the opening. The cable connector is rotatably coupled to the link.

### BRIEF DESCRIPTION OF THE DRAWINGS

[0007] 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 wherein:

[0008] FIG. 1 is a side view of a seat assembly with a cable assembly in accordance with the prior art;

[0009] FIG. 2 is a front view of the seat assembly and cable assembly of FIG. 1;

[0010] FIG. 3 is a perspective view of a recliner link in accordance with one embodiment of the present invention;

[0011] FIG. 4 is a perspective view of a cable assembly in accordance with one embodiment of the present invention;

[0012] FIG. 5 is a top view of the cable assembly of FIG. 4;

[0013] FIG. 6 is a perspective view of a cable assembly in accordance with a second embodiment of the present invention; and

[0014] FIG. 7 is a top view of the cable assembly of FIG. 6.

### DETAILED DESCRIPTION OF EXAMPLE EMBODIMENTS

[0015] FIGS. 4-5 illustrate one embodiment of a cable assembly 20 in accordance with the present invention. Although described for use on a recliner in an automotive vehicle, the cable assembly 20 may be used for other applications and in other industries, without varying from the scope of the invention. The cable assembly 20 includes a recliner link 22, a cable connector 24, and a cable 26. The cable 26 includes a stopper 28 at the top, or distal end, of the cable 26.

[0016] Referring to FIGS. 3-5, the recliner link 22 extends longitudinally between a proximal end 30 and a distal end 32. The recliner link 22 includes an opening 34 near the proximal end 30 for attachment to the recliner (not shown) to actuate the recliner between locked and unlocked conditions as is commonly known. The recliner link 22 also includes an elongated slot 36 near the distal end 32. The slot 36 includes a circular opening 38 at the inner end of the slot 36. The diameter of the circular opening 38 is greater than the width of the slot 36. The recliner link 22 includes an offset 40 to align with the recliner assembly, and minimize the lateral dimensions, or overall width, of the cable assembly 20.

[0017] The cable connector 24 extends longitudinally between a proximal end 42 and a distal end 44. The cable connector includes two spaced apart and parallel sidewalls 46, 48, a front wall 50 interconnecting the sidewalls 46, 48, and an upper lip 52. A shaft 54 (shown with hidden lines in FIG. 4) extends between the sidewalls 46, 48 near the proximal end 42 of the cable connector 24. The cable connector 24 also includes a transverse slot 56 at its proximal end 42 that extends through each sidewall 46, 48 and through the shaft 54 and divides the shaft 54 into two pieces, or halves. The diameter of the shaft 54 is greater than the width of the slot 36. By dividing the shaft 54 into two pieces, the shaft 54 may be compressed, during assembly to insert it into the slot 36 of the recliner link 22 until it reaches the circular opening 38 at the inner end of the slot 36. The expansion of the shaft 54 once it reaches the circular opening 38 locks the shaft 54 into the circular opening 38 of the slot 36. When the shaft 54 is in the circular opening 38 of the slot 36, the cable connector 24 is rotatably, or pivotally, coupled to the recliner link 22.

[0018] The cable connector 24 also includes an opening 58 at the distal end 44 thereof formed by the two spaced apart sidewalls 46, 48 and the front wall 50. The cable 26 extends through the opening 58 in the cable connector 24. The cable connector 24 also includes a groove 60 formed by recessed cutouts in the sidewalls 46, 48 for cradling the stopper 28.

[0019] FIGS. 6-7 illustrate another embodiment of a cable assembly 62 in accordance with the present invention. The cable assembly 62 includes a recliner link 22 (described above), a cable connector 64, and a cable 26.



[0020] The cable connector **64** is an oblong shaped structure that extends longitudinally between a proximal end **66** and a distal end **68**. The cable connector **64** includes a slot **70** that forms two spaced apart and parallel sidewalls **72, 74** at the proximal end **66** of the cable connector **64**. A shaft **76** (shown with hidden lines in FIG. **6**) extends between the sidewalls **72, 74** near the proximal end **66** of the cable connector **64**. The cable connector **64** also includes a transverse slot **78** at the proximal end **66** that extends through each sidewall **72, 74** and through the shaft **76** and divides the shaft **76** into two pieces, or halves. The diameter of the shaft **76** is greater than the width of the slot **36** in the link **22**. By dividing the shaft **76** into two pieces, the shaft **76** may be compressed during assembly to insert it into the slot **36** of the recliner link **22** until it reaches the circular opening **38** at the inner end of the slot **36**. The expansion of the shaft **76** once it reaches the circular opening **38** locks the shaft **76** into the circular opening **38** of the slot **36**. When the shaft **76** is in the circular opening **38** of the slot **36**, the cable connector **64** is rotatably, or pivotally, coupled to the recliner link **22**.

[0021] The cable connector **64** also includes a groove **80** near the distal end **68**, and a slot **82** in a distal end of the groove **80**. The cable **26** extends through the slot **82**, and the stopper **28** rests in the groove **80** of the cable connector **64**.

[0022] The cable assemblies **20, 62** in accordance with the present invention provide many benefits over prior art cable assemblies. As depicted in FIGS. **4** and **6**, the cable connectors **24, 64** can position the cable **26** beyond the distal end **32** of the recliner link **22** and in the same plane as the recliner link **22**, which can provide additional leverage, and thus require less effort, for actuating the recliner link **22**. As depicted in FIGS. **5** and **7**, the cable connectors **24, 64** also reduce the lateral width of the cable assemblies **20, 62**. The lateral width reduction can improve the durability of the cable assemblies **20, 62** and improve clearances to other seat components, such as covers and shields. The cable connectors **24, 64** are easy to manufacture, assemble and replace. Also, the cable connectors **24, 64** only constrain the cable **26** in one direction, so a loss motion connection is provided between the cable **26** and the cable connector **24, 64** as is well known in the art to accommodate slack in the cable **26** during operation.

[0023] The invention has been described in an illustrative manner, and it is to be understood that the terminology, which has been used, is intended to be in the nature of words of description rather than of limitation. Many modifications and variations of the present invention are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims, the invention may be practiced other than as specifically described.

1. A cable assembly comprising:  
a link having a slot near a distal end of the link;  
a cable connector comprising:  
a shaft near a proximal end of the cable connector,  
wherein the shaft is engaged with the slot of the link;  
and  
an opening near a distal end of the cable connector; and  
a cable having a stopper at an end of the cable, wherein  
the cable extends through the opening and the stopper  
extends above the opening.
2. The cable assembly of claim **1** wherein the cable  
connector includes a groove adjacent the opening to engage  
the stopper.
3. The cable assembly of claim **1** wherein the link includes  
a circular opening at an inner end of the slot wherein a  
diameter of the circular opening is greater than a width of the  
slot.
4. The cable assembly of claim **3** wherein the shaft has an  
adjustable diameter.
5. The cable assembly of claim **1** wherein the cable  
connector is rotatably coupled to the link at the shaft.
6. The cable assembly of claim **1** wherein the cable is  
coupled to the cable connector with a loss motion connec-  
tion.
7. The cable assembly of claim **1** wherein the cable  
connector couples the cable to a reclining mechanism of a  
vehicle seat.
8. A cable connector for coupling a cable to a link  
comprising:  
a shaft near a proximal end of the cable connector  
rotatably coupled to the link; and  
an opening near a distal end of the cable connector,  
wherein the cable extends through the opening.
9. The cable connector of claim **8** further comprising a  
groove adjacent the opening to engage a stopper at an end of  
the cable.
10. The cable connector of claim **8** wherein the shaft has  
an adjustable diameter.
11. The cable connector of claim **8** wherein the cable is  
coupled to the cable connector with a loss motion connec-  
tion.
12. A cable connector for coupling a cable to a link  
comprising:  
an opening near a distal end of the cable connector,  
wherein the cable extends through the opening, and  
wherein the cable connector is rotatably coupled to the  
link.
13. The cable connector of claim **12** further comprising a  
groove adjacent the opening to engage a stopper at an end of  
the cable.
14. The cable connector of claim **12** wherein the cable is  
coupled to the cable connector with a loss motion connec-  
tion.

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