



(22) **Date de dépôt/Filing Date:** 2016/05/19

(41) **Mise à la disp. pub./Open to Public Insp.:** 2017/01/29

(30) **Priorité/Priority:** 2015/07/29 (US14/812,603)

(51) **Cl.Int./Int.Cl.** *F16L 37/08* (2006.01),
B23K 9/32 (2006.01), *H05B 6/14* (2006.01)

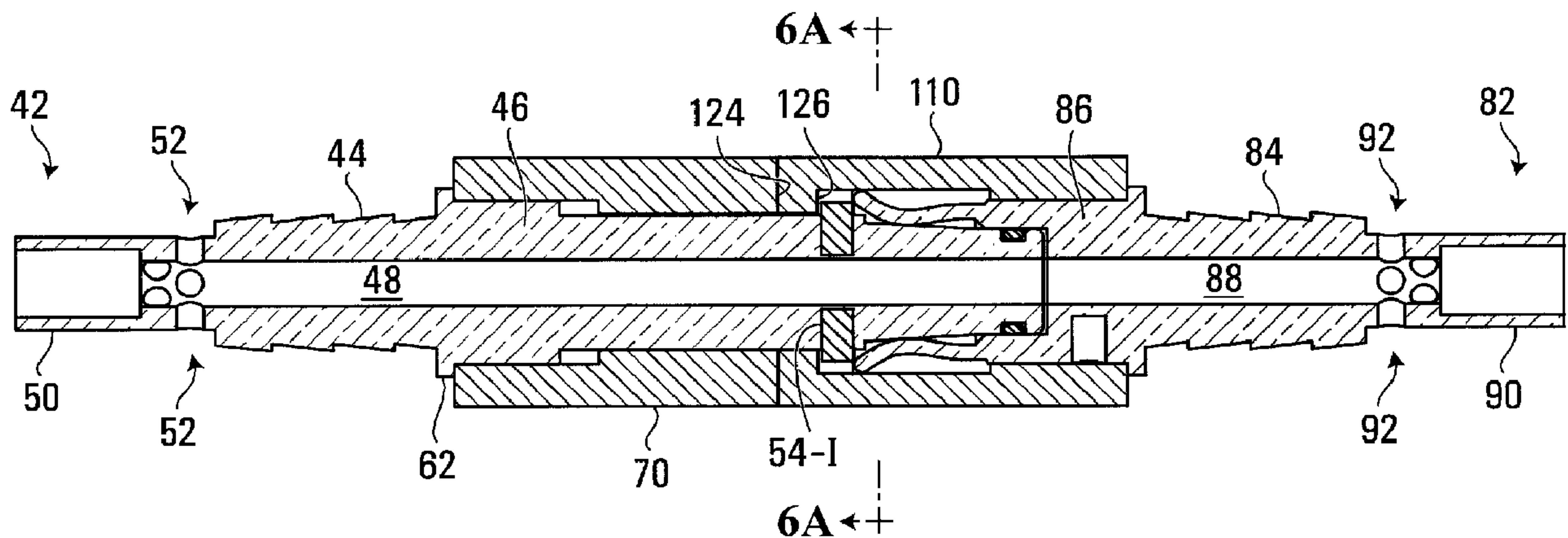
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(54) **Title: QUICK CONNECTOR**



(57) **Abrégé/Abstract:**

A quick connector has a tubular male member with an interior lumen, an outbound end configured to allow connection to a hose and to a current conductor, and a pair of opposed radially outwardly projecting protuberances. A tubular female member has an interior lumen, an outbound end configured to allow connection to a hose and to a current conductor, and an inbound end sized to receive an inbound end of the male tubular member. The female member has a sleeve with an undercut lip at an inbound end with opposed slots sized to receive the opposed protuberances of the tubular male member.



ABSTRACT

A quick connector has a tubular male member with an interior lumen, an outbound end configured to allow connection to a hose and to a current conductor, and a pair of opposed radially outwardly projecting protuberances. A tubular female member has an interior lumen, an outbound end configured to allow connection to a hose and to a current conductor, and an inbound end sized to receive an inbound end of the male tubular member. The female member has a sleeve with an undercut lip at an inbound end with opposed slots sized to receive the opposed protuberances of the tubular male member.

QUICK CONNECTOR

BACKGROUND

[0001] This invention relates to a quick connector which may be used with a heater.

[0002] In the welding industry, when welding a section of thick large diameter pipe it is typical to first pre-heat the pipe section to reduce stress on the pipe. The pipe section may be rapidly heated by an induction heater wherein an electrical cable is wrapped around the pipe section and alternating current is applied to the cable. To avoid overheating the cable, it may be cooled. However, with known arrangements, it can be time consuming to mount and demount the cable and cooling system about the pipe.

SUMMARY

[0003] A quick connector has a tubular male member with an interior lumen, an outbound end configured to allow connection to a hose and to a current conductor, and a pair of opposed radially outwardly projecting protuberances. A tubular female member has an interior lumen, an outbound end configured to allow connection to a hose and to a current conductor, and an inbound end to receive an inbound end of the male tubular member. The female member has a sleeve with an undercut lip at an inbound end with opposed slots sized to receive the opposed protuberances of the tubular male member. The male member is joined to the female member by inserting the inbound end of the male member with the protuberances in registration with the slots in the sleeve until the protuberances of the male member are received through the slots and subsequently rotating the male member relative to the female member to deregister the protuberances and slots.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] In the figures which illustrate an example embodiment,

[0005] **FIG. 1** is a perspective view of a weld pre-heater and a pipe section to be heated;

[0006] **FIG. 2** is a side view of a portion of **FIG. 1**,

[0007] **FIG. 3** is a perspective view of a coupled connector for use in the weld pre-heater of **FIG.1**,

[0008] **FIG. 4** is a perspective view of a decoupled connector for use in the weld pre-heater of **FIG.1**,

[0009] **FIG. 5** is an exploded view of the connector of **FIG. 3**,

[0010] **FIG. 6** is a cross-sectional view of the connector of **FIG. 3**,

[0011] **FIG. 6A** is a schematic cross-sectional view of the connector along the lines **6A-6A** of **FIG. 6**, and

[0012] **FIG. 7** is a perspective view of the female half of the connector of **FIG. 3**.

DETAILED DESCRIPTION

[0013] Turning to **FIG. 1**, an induction heater **10** has an electrical and cooling fluid supply **12** for supplying alternating current and cooling fluid to conduit loop **14**. The conduit loop wraps around a workpiece, namely, pipe section **16**. The conduit loop **14** has quick connectors **20a**, **20b** which allow a workpiece side **22** of the conduit loop **14** to be selectively connected to a supply side **24** of the conduit loop. With the

workpiece side **22** of the conduit loop **14** separated from the supply side **24**, the workpiece side of the conduit loop can be readily wrapped around the pipe **16**, or removed from the pipe.

[0014] FIG. 2 illustrates a portion of conduit loop **14** at connector **20**, which connector may be either connector **20a** or **20b**. Turning to FIG. 2, conduit **14** has an outer hose **28** surrounding an inner electrical conductor **30**. The inner electrical conductor **30** at the supply side **24** of the conduit is crimped to the outbound end **42** of a male member **40** of the connector **20** and end of the outer hose **28** is pressed over the hose barbs **44** of the male member **40**. Similarly, the inner electrical conductor **30'** of the workpiece side **22** of the conduit is crimped to the outbound end **82** of a female member **80** of the connector **20** and end of the outer hose **28'** of the workpiece side of the conduit is pressed over the hose barbs **84** of the female member.

[0015] Referencing FIGS. 3 to 6, the male member has a current conducting tubular body **46** with an end-to-end inner lumen **48**. The outbound end **42** of the male tubular body terminates in a tubular stub **50** which, as is apparent from FIG. 6, has a thinner wall than the balance of the male tubular member **46**. This facilitates crimping the electrical conductor to the outbound end **42** of the male member. The male tubular body has a number of radial ports **52** extending about the circumference of the male tubular member through the tubular member from the interior lumen **48**. These ports are located between hose barbs **44** and the tubular stub **50** of the male tubular member **46**.

[0016] The male tubular body **46** supports a pair of opposed radially outwardly projecting cylindrical pins **54-I**, **54-II** toward the inbound end **56** of the male tubular member. A groove **58** in the male tubular member proximate inbound end **56** supports an O-ring **60**. The male tubular member has an outbound shoulder **62** and an inbound shoulder **64**. A pentagonal sleeve **70** abuts outbound shoulder **62** and is

fixed to the male tubular member **46** by a pin **66** that extends through a radial opening **68** in the sleeve and into a blind opening **72** in the male tubular member. The inbound end of the sleeve **70** has an axially projecting flange **74**.

[0017] The female member **80** has a current conducting tubular body **86** with an end-to-end inner lumen **88**. The outbound end **82** of the female tubular body terminates in a tubular stub **90** which, as is apparent from **FIG. 6**, has a thinner wall than the balance of the female tubular member **86**. This facilitates crimping the electrical conductor to the outbound end **82** of the female member. The female tubular body has a number of radial ports **92** extending about the circumference of the female tubular member through the tubular member from the interior lumen **88**. These ports are located between hose barbs **84** and the tubular stub **90** of the female tubular member **86**.

[0018] The female tubular member **86** terminates in a tulip connector **98** at its inbound end **96**. The female tubular member has a medial shoulder **102**. A pentagonal sleeve **110** abuts medial shoulder **102** and is fixed to the female tubular member **86** by a pin **106** that extends through a radial opening **108** in the sleeve and into a blind opening **122** in the female tubular member.

[0019] As seen in **FIG. 6**, the inbound end of pentagonal sleeve **110** has an inwardly directed lip **124** forming an undercut **126**. Turning to **FIG. 7**, there are two radially opposite slots **130-I**, **130-II** in lip **124**. Also, the inbound end of the sleeve **110** has an axially projecting flange **114**.

[0020] The male member **40** may be joined to the female member **80** by inserting the inbound end **56** of the male member into the tulip connector **98** of the female member with the pins **54-I**, **54-II** in registration with the slots **130-I**, **130-II** in the sleeve **110** of the female member. A user may readily judge approximate alignment by orienting the connector halves so the inbound face of flange **74** of sleeve **70** and the

inbound face of flange **114** of sleeve **110** will not abut when the male member is inserted. Precise alignment may be indicated by a side edge **75a** of flange **74** sliding along a side edge **115a** of flange **114**. The slots are sized to allow the pins to pass. Once the pins pass lip **124** of sleeve **110** the male member is rotated relative to the female member to deregister the pins and slots. The male member can be rotated about one-quarter turn until the other side edge **75b** of flange **74** abuts the other side edge **115b** of flange **114**. **FIG. 6A** illustrates the connector with the male member rotated one-quarter turn. In this state, the pins **54-I**, **54-II** are angularly spaced from the slots **130-I**, **130-II** about central axis, **A**, of the connector by about 90°. The pentagonal sleeves **70**, **110** allow a user to readily grip the male and female members to push them together and to twist the male member relative to the female member.

[0021] When the male member is pushed into the female member, the ends of the tulip connector of the female connector are deflected slightly outwardly which provides a frictional engagement between the male and female members and a good electrical connection between the male and female members. With the male member coupled to the female member, the O-ring **60** of the male member seals against the inside wall of the female member outbound of the tulip connector **98**.

[0022] With the male member coupled to the female member, any attempt to withdraw the male member will result in the pins **54-I**, **54-II** abutting the undercut **126** at the inbound side of lip **124**. Figs. **3** and **6** illustrate the connector **20** in coupled relation.

[0023] To decouple the male and female members, the male member is rotated relative to the female member until the pins **54-I**, **54-II** are again in registration with slots **130-I**, **130-II**. The male member cannot be rotated past this point as the side edge **74a** of flange **74** stops against the side edge **115a** of flange **114**. Once the pins are again registered with the slots, the male member can be pulled from the female member.

[0024] In operation, with the connectors **20a**, **20b** decoupled, the workpiece end of conduit **14** may be wrapped around pipe section **16**. The male and female members of connectors **20a**, **20b** may then be coupled as described. Next cooling fluid may be circulated through the hose **28**, **28'** of conduit **14**. If the connectors are oriented so that the male member is upstream of the female member, the cooling fluid, when it reaches a connector **20**, will pass from hose **28** through ports **52** in the male member and then along the interior lumen **48** of the male member and into the lumen **88** of the female member. The O-ring **60** between the male and female members seals these members together against leaks as the cooling fluid passes into the lumen **88** of the female member. The cooling fluid then exits ports **92** in the female member to the hose **28'** of the workpiece side **22** of the conduit **14**. Additionally, alternating current may be supplied to the conductor. This current flows through the current path provided by conductor **30**, the male tubular body **46**, the female tubular body **86**, and conductor **30'**. The alternating current in the conductor **30**, **30'** will rapidly heat the pipe section **16** and the cooling fluid in the hose **28**, **28'** will keep the conductor cool.

[0025] Once the electricity is turned off and the cooling fluid is no longer circulating, the connectors may be decoupled and the workpiece side **22** of the conductor **14** removed from the pipe.

[0026] If the sleeves **70**, **110** are conducting, a non-conducting envelope **140** (FIG. 2) may be placed around the sleeves so that a user can safely grip the connector when conductor **30**, **30'** is energised.

[0027] The described connector allows for a quick coupling and decoupling of the workpiece end of the conduit to the supply end so that the conduit can be quickly installed on, and removed from, a workpiece.

[0028] The cooling fluid may be water.

[0029] In an alternate embodiment, the undercut lip could progressively thicken with circumferential distance from one side of each of the slots **130-I**, **130-II** such that rotation of the male member relative to the female member in one direction draws the inbound end of said male member progressively further into the tulip connector of the female member.

[0030] While the workpiece has been described as a pipe, the workpiece could have other configurations.

[0031] The described connector could be used in other heating applications, such as for metal stress relieving, vessel heating, and weld pre or post-heating, where both electricity and fluid pass through a connector.

[0032] Other modifications will be apparent to one of skill in the art and, therefore, the invention is defined in the claims.

WHAT IS CLAIMED IS:

1. A quick connector comprising:
 - a tubular male member having:
 - an interior lumen;
 - an outbound end configured to allow connection to a hose and to a current conductor;
 - a pair of opposed radially outwardly projecting protuberances;
 - a tubular female member having:
 - an interior lumen;
 - an outbound end configured to allow connection to a hose and to a current conductor;
 - an inbound end sized to receive an inbound end of said male tubular member;
 - a female member sleeve, said female member sleeve having an undercut lip at an inbound end, said undercut lip having opposed slots sized to receive said opposed protuberances of said tubular male member,
 - said male member being joined to said female member by inserting said inbound end of said male member into said female member with said protuberances in registration with said slots in said female member sleeve until said protuberances of said male member are received through said slots and subsequently rotating said male member relative to said female member sleeve to deregister said protuberances and said slots.
2. The connector of claim 1 wherein said inbound end of said female connector comprises a tulip connector sized to deflect during insertion of said inbound end of said male member and frictionally engage said inbound end of said male member.
3. The connector of claim 2 wherein said female member sleeve is multi-sided.

4. The connector of claim 2 wherein said male member outbound end has male member external hose barbs.
5. The connector of claim 4 wherein said male member outbound end terminates in a male member tubular stub with walls that are thin relative to walls of an inbound portion of said male member such that said male member tubular stub may be crimped to a conductor.
6. The connector of claim 5 wherein said male member external hose barbs are inbound of said male member tubular stub.
7. The connector of claim 6 further comprising radial ports extending from said interior lumen of said male member, said ports axially extending between said male member hose barbs and said male member tubular stub.
8. The connector of claim 7 wherein said female member outbound end has female member external hose barbs.
9. The connector of claim 8 wherein said outbound end of said female member terminates in a female member tubular stub with walls that are thin relative to walls of an inbound portion of said female member such that said female member tubular stub may be crimped to a conductor.
10. The connector of claim 9 wherein said female member external hose barbs are inbound of said female member tubular stub.
11. The connector of claim 10 further comprising radial ports extending from said interior lumen of said female member, said ports of said female member axially extending between said female member hose barbs member and said female member tubular stub.

12. The connector of claim 1 further comprising a male member sleeve fixed to said male member.
13. The connector of claim 12 wherein said male member sleeve is multi-sided.
14. The connector of claim 12 wherein an inbound end of said male member sleeve has an axially projecting male member flange extending about a portion of a circumference of said male member sleeve and wherein an inbound end of said female member sleeve has an axially projecting female member flange extending about a portion of a circumference of said female member sleeve.
15. The connector of claim 14 wherein said female member flange is spaced from said slots in a circumferential direction.
16. The connector of claim 15 wherein said male member flange is spaced from said protuberances in a circumferential direction so that when one side of said male member flange abuts one side of said female member flange, said protuberances are aligned with said slots.
17. The connector of claim 16 wherein said male member flange is spaced from said protuberances in a circumferential direction so that that when another side of said male member flange abuts another side of said female member flange, said protuberances are deregistered with said slots.
18. The connector of claim 16 wherein said male member flange is spaced from said protuberances in a circumferential direction so that that when another side of said male member flange abuts another side of said female member flange, said protuberances are angularly spaced from said slots about a central axis of said conductor by about ninety degrees.

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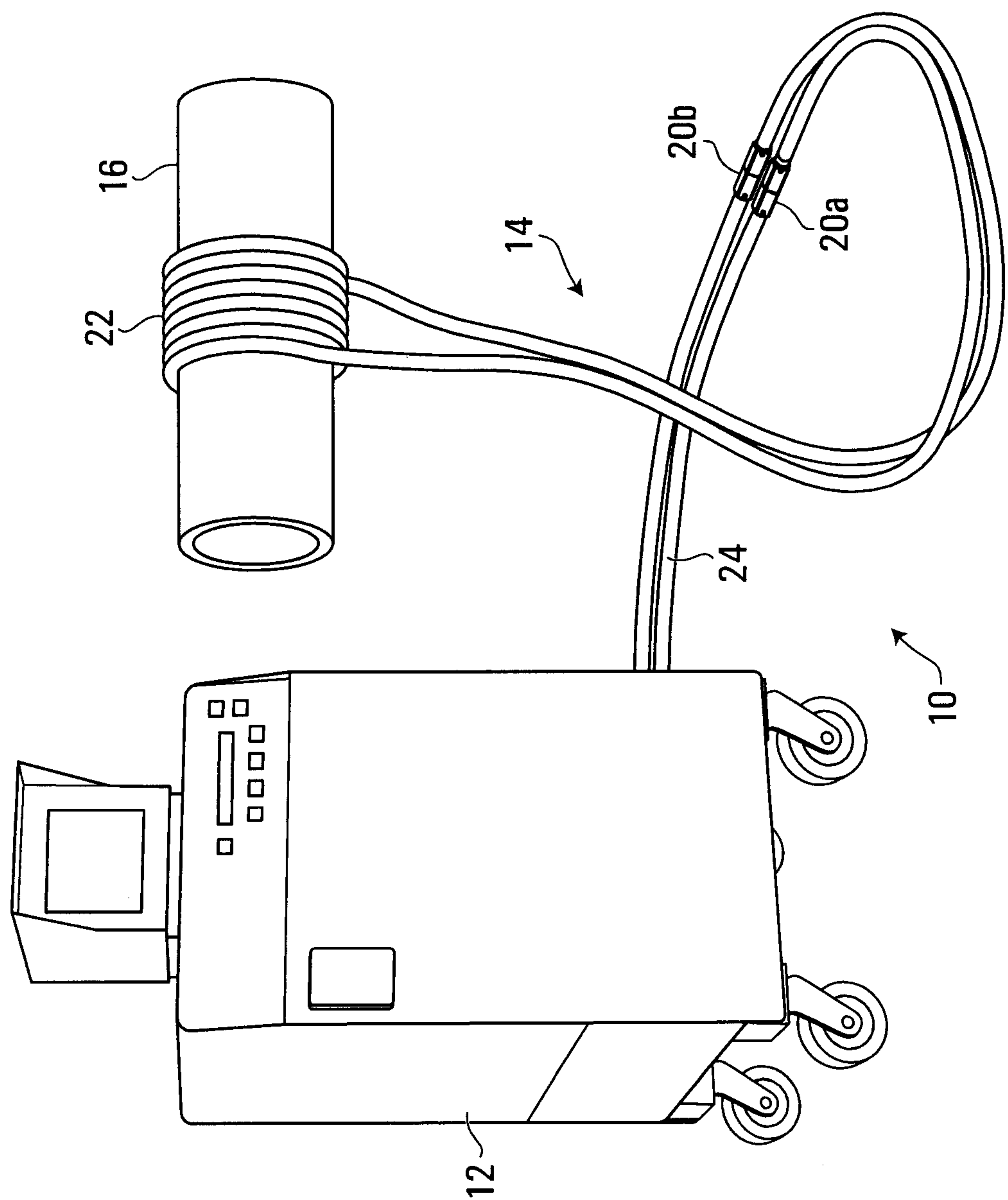


FIG. 1

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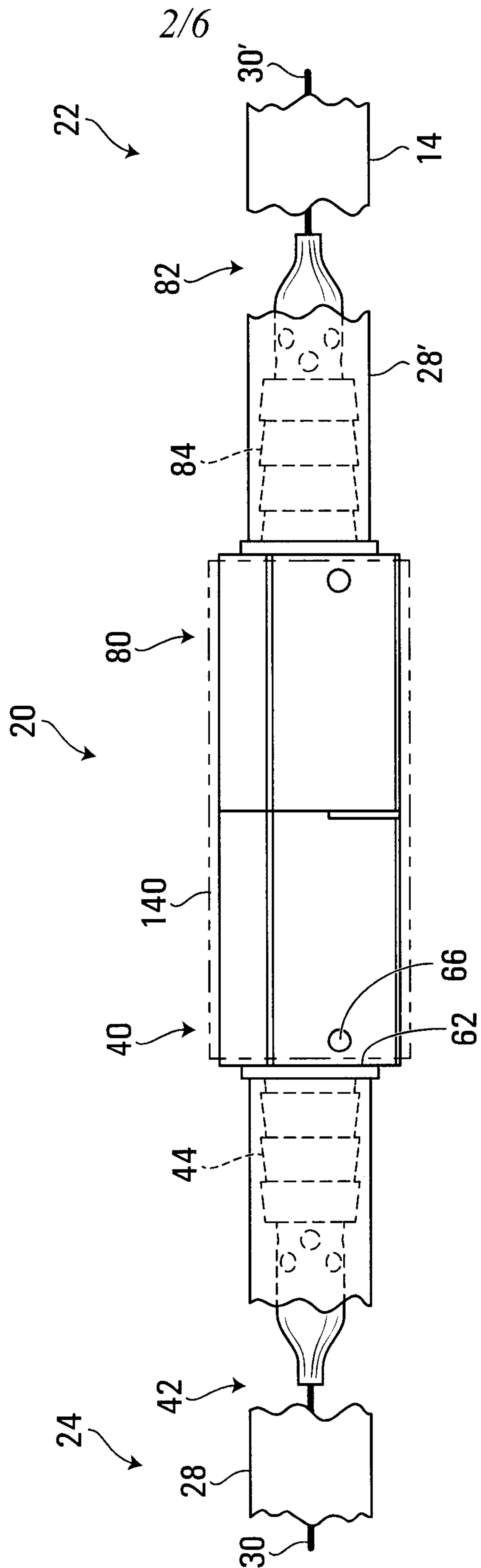


FIG. 2

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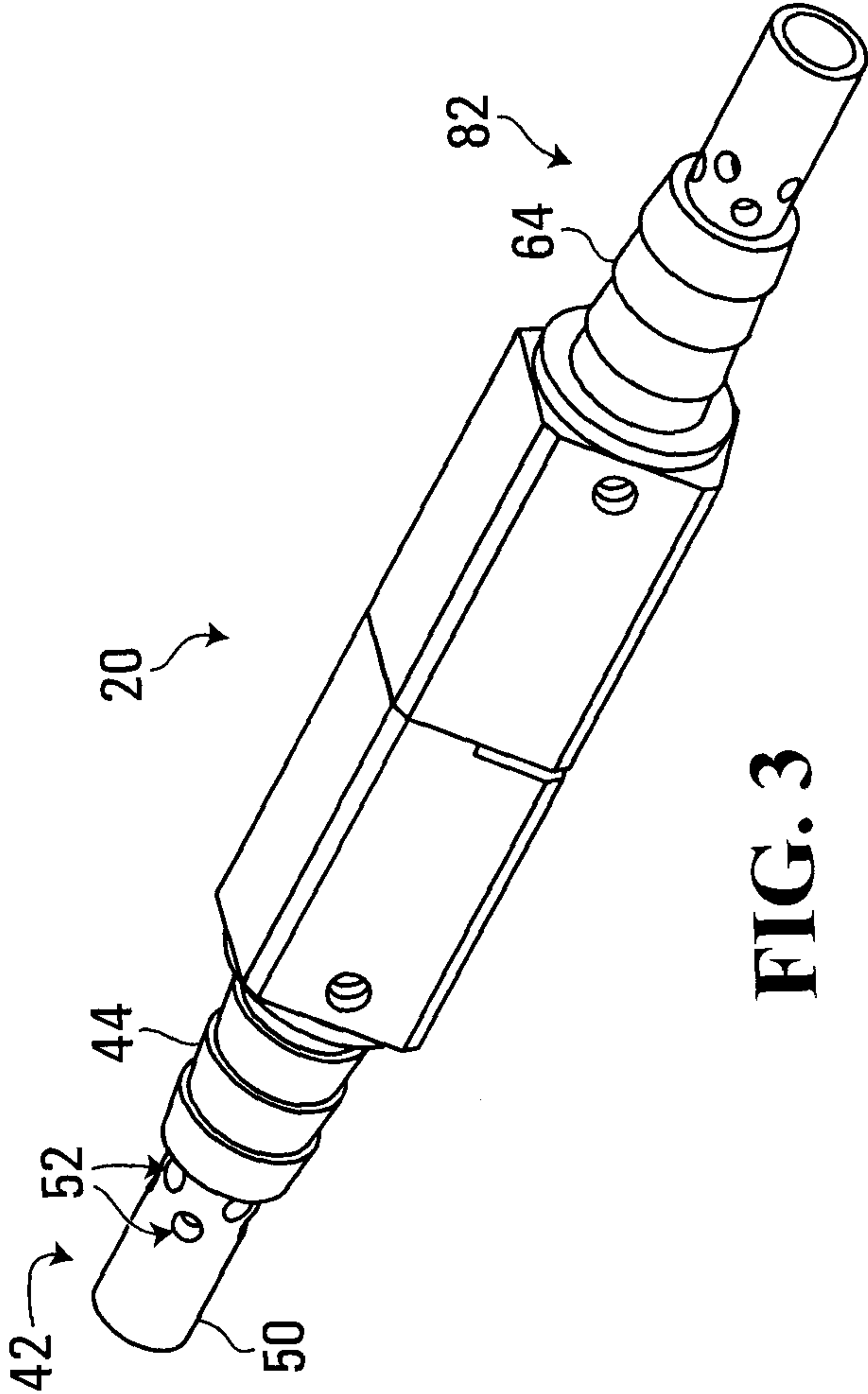


FIG. 3

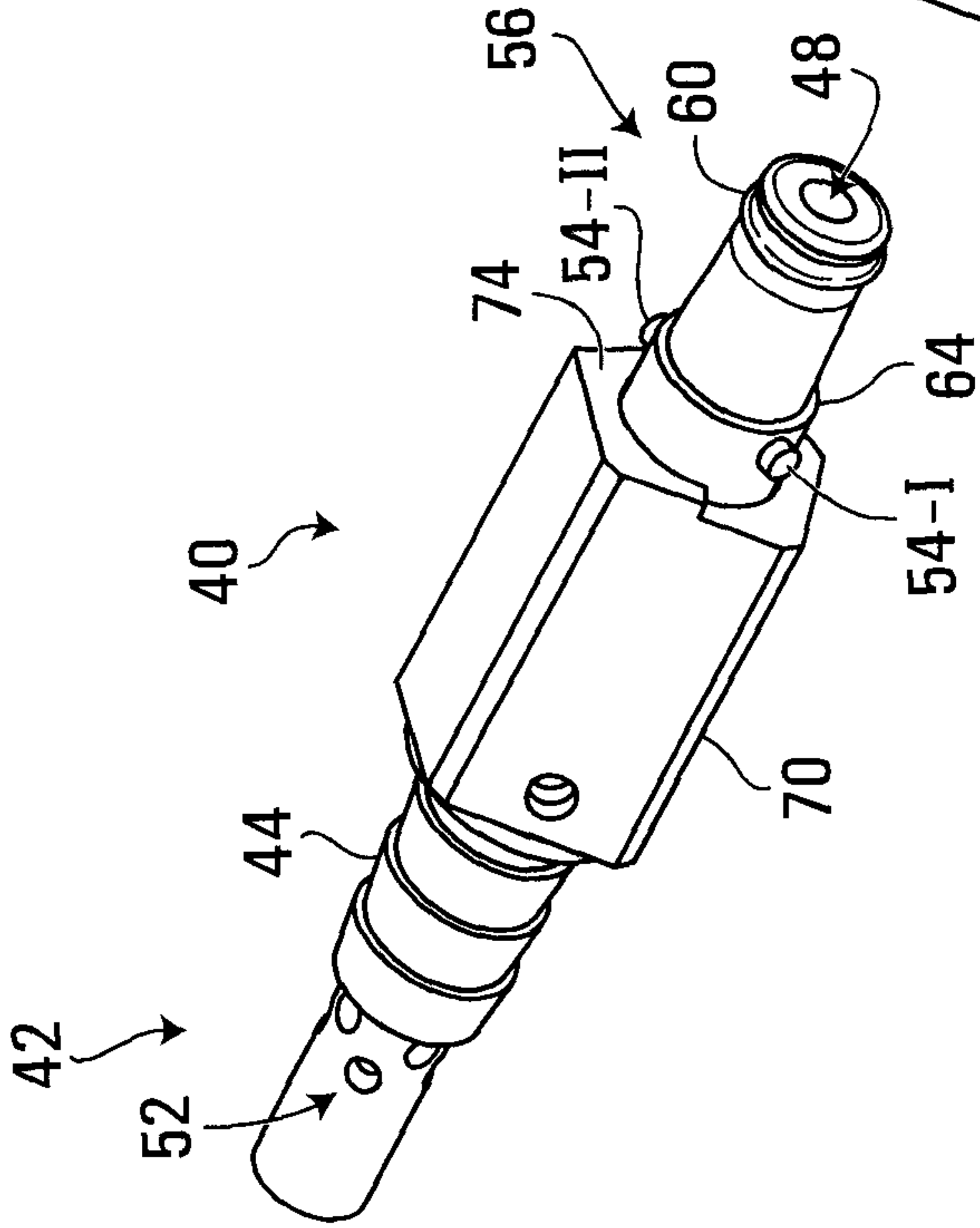
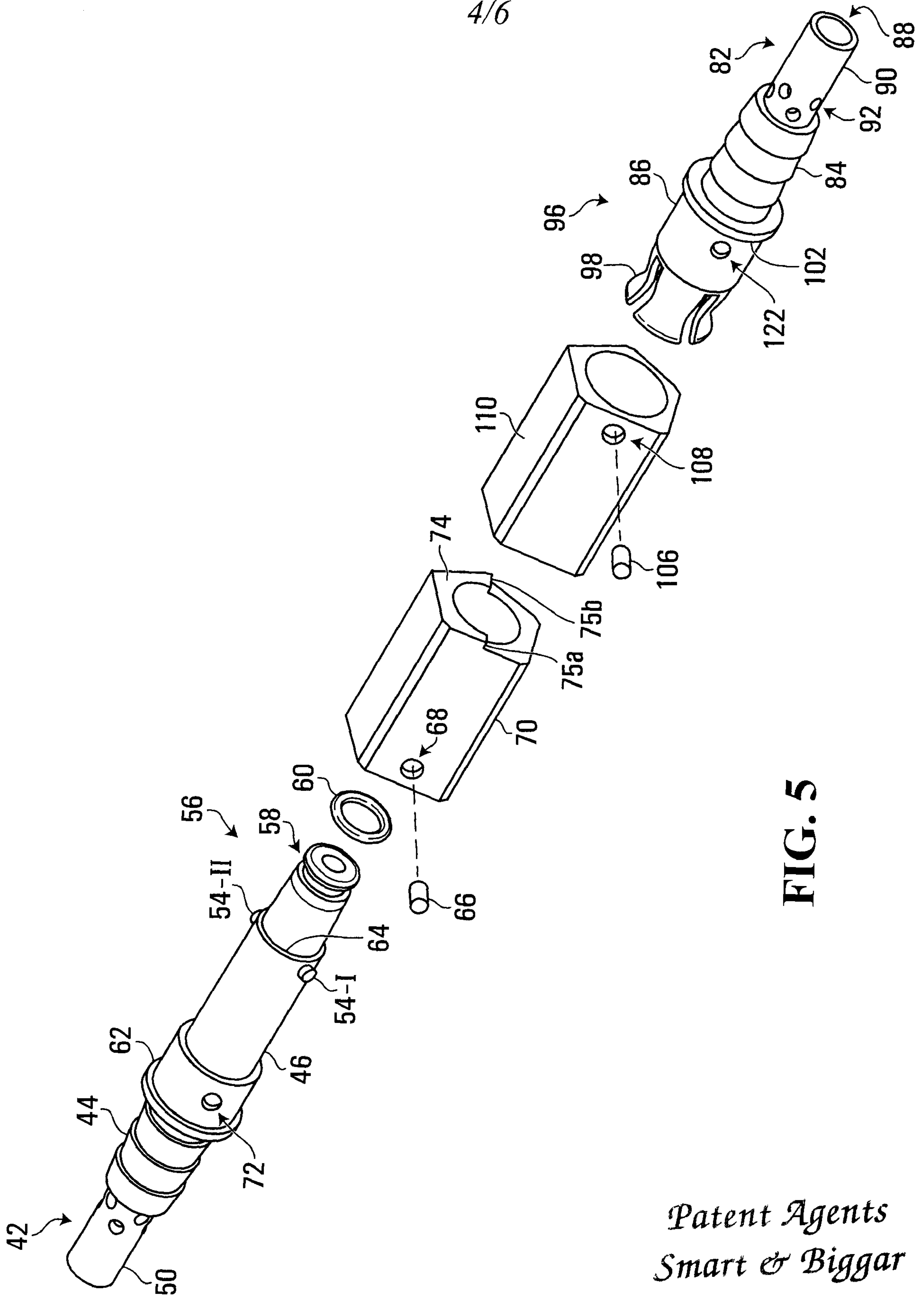


FIG. 4

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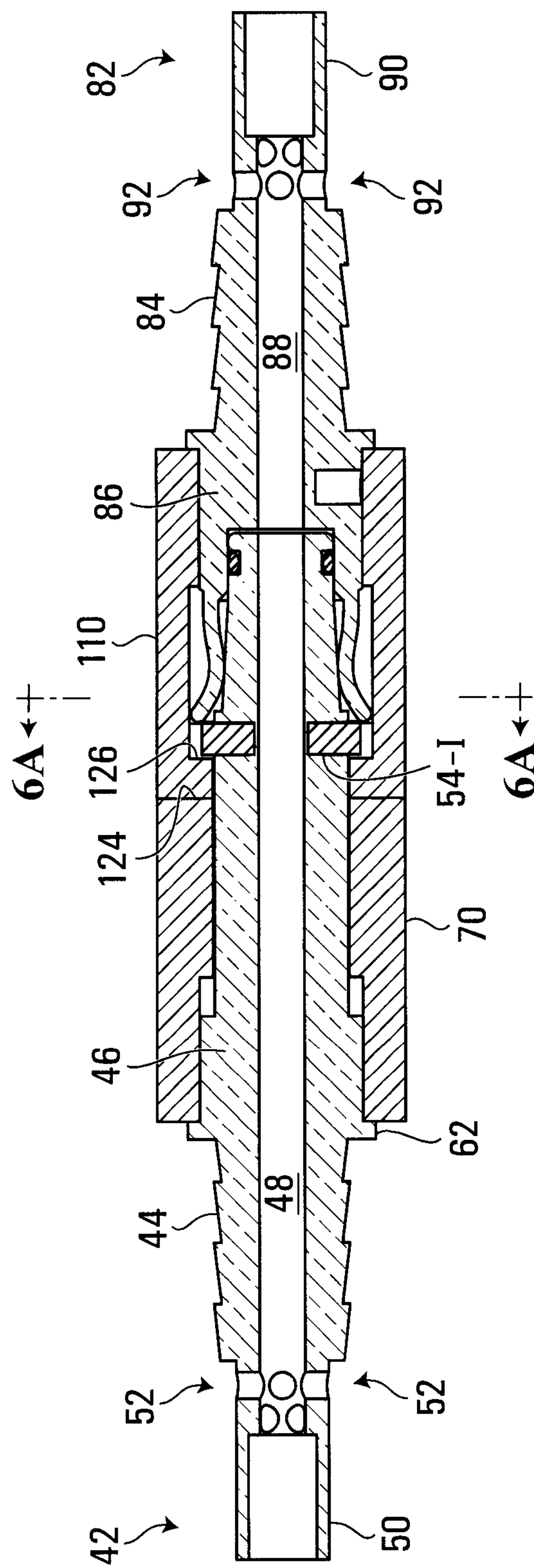


FIG. 6

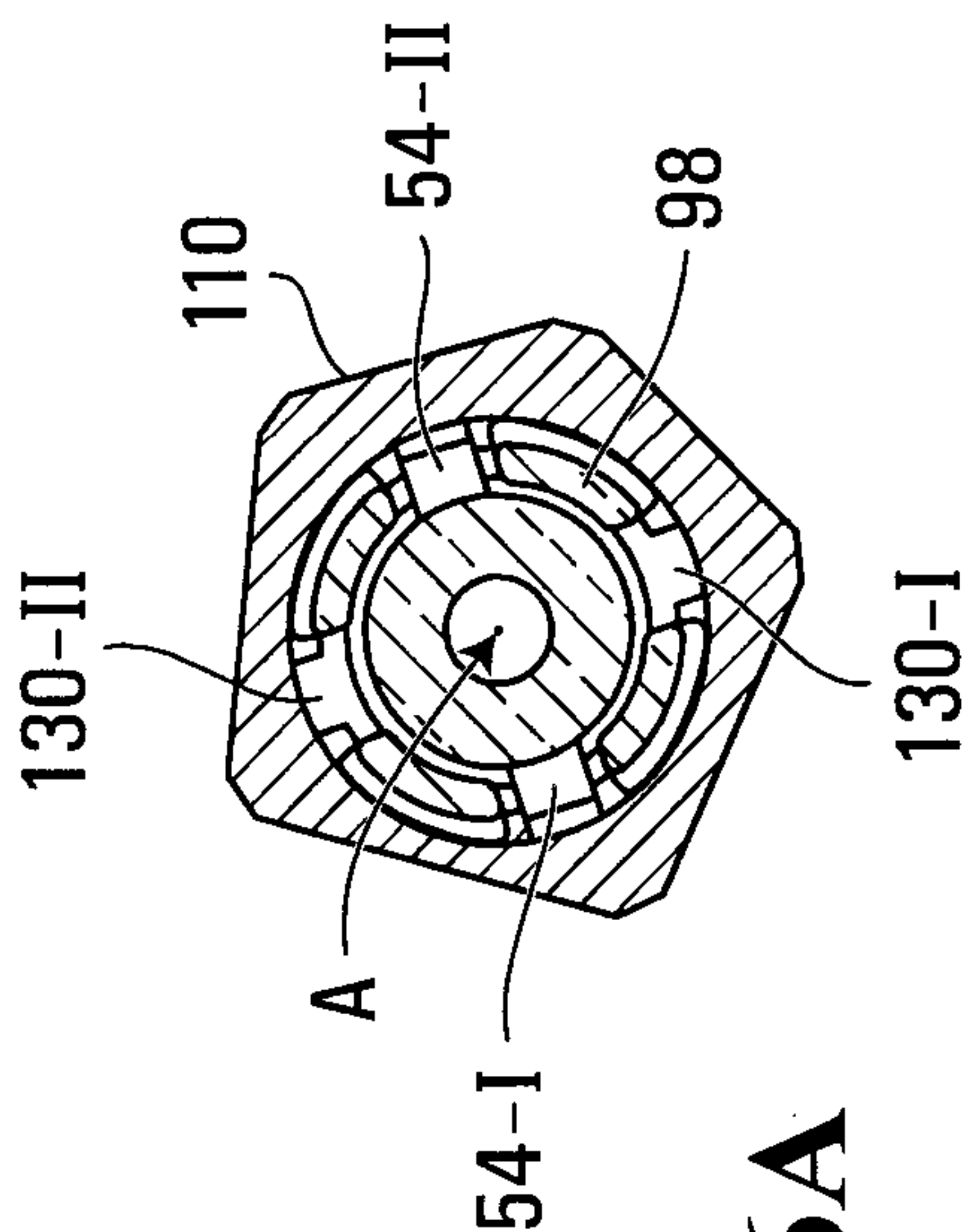
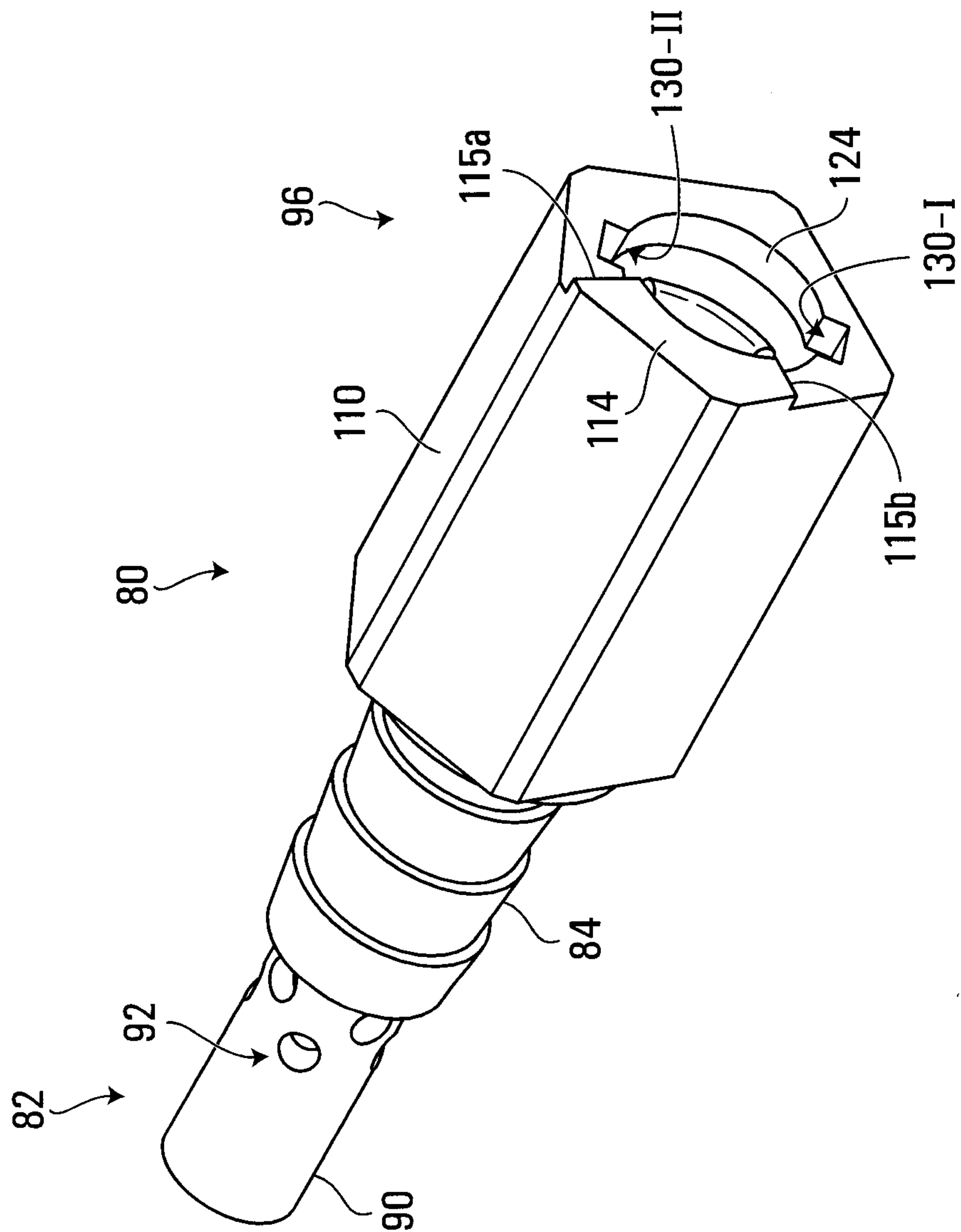


FIG. 6A

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**FIG. 7**

