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CareFusion 303, Inc.

UNITED STATES DISTRICT COURT

SOUTHERN DISTRICT OF CALIFORNIA

CareFusion 303, Inc.,

Plaintiff,

v.

Sigma International,

Defendant.

'10 CV 0442 DMS WMc

Case No. _____

PLAINTIFF CAREFUSION 303, INC.'S COMPLAINT FOR PATENT INFRINGEMENT

DEMAND FOR JURY TRIAL

Plaintiff CareFusion 303, Inc. ("CareFusion 303") complains and alleges as follows against Defendant Sigma International ("Sigma"):

THE PARTIES AND THE NATURE OF THIS ACTION

1. This is a Complaint for patent infringement.

2. CareFusion 303, Inc. ("CareFusion 303") is a wholly owned subsidiary of CareFusion Corporation. CareFusion Corporation is a public Delaware corporation with its headquarters at 3750 Torrey View Court, San Diego, CA 92130. CareFusion 303 also has its principal place of business at 3750 Torrey View Court, San Diego, CA 92130. In 2009, CareFusion Corporation was created as a spin off of Cardinal Health, Inc.'s clinical and medical

products businesses.

3. CareFusion Corporation delivers clinically proven products and services that help measurably improve patient care in the medical field. Its family of products and services are used in more than 120 countries.

4. With fiscal 2009 pro forma revenue of $3.7 billion, CareFusion Corporation is the largest medical-technology company focused on helping the global healthcare industry solve its most challenging patient safety issues.

5. CareFusion 303 is informed and believes, and thereon alleges, that Defendant Sigma International ("Sigma") is a private company with its principal place of business at 711 Park Avenue, Medina, New York 14103.

6. CareFusion 303 and Sigma are competitors in the medical device industry and, in particular, the infusion pump field.

7. CareFusion 303 is informed and believes, and thereon alleges, that in 2009, Baxter International Inc. acquired an exclusive distribution right for the Spectrum smart infusion pump and its derivatives.

8. CareFusion 303 is informed and believes, and thereon alleges, that Sigma's main product is the Spectrum smart infusion pump. CareFusion 303 is informed and believes, and thereon alleges, that Sigma transacts business directly and/or through third parties in this judicial district by at least selling and/or offering to sell its infringing products, such as the Spectrum, and/or by conducting other business in this judicial district. CareFusion 303 is headquartered in this judicial district, sells competing infusion pumps in this district, and has been harmed by Sigma's conduct, business transactions and sales here.

9. As alleged below, Sigma uses CareFusion 303's patented technology in its products, including, but not limited to, the Spectrum. Because Sigma is not in any way licensed to CareFusion 303's intellectual property, Sigma is infringing CareFusion 303's intellectual property rights. In particular, Sigma has infringed, is infringing, and will continue to infringe United States Patent No. 6,347,553 ("the '553 patent") of which CareFusion 303 is the assignee. CareFusion 303 is entitled to compensation from Sigma for its infringement of the '553 patent

and to an injunction against Sigma to halt its continued infringement.

JURISDICTION

10. This Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338 since this is a civil action arising under the laws of the United States, specifically, the Patent and Trademark Act, 35 U.S.C. § 1 *et seq.*

11. The Court has personal jurisdiction over Sigma because, on information and belief, Sigma transacts business within the State of California and the Southern District of California.

VENUE

12. Venue is proper in this district pursuant to 28 U.S.C. §§ 1391 and 1400 because a substantial part of the events or omissions giving rise to CareFusion 303's claims occurred in this district, Sigma has committed acts of infringement to the harm of CareFusion 303 in this district and Sigma is subject to personal jurisdiction at the time of commencement of this action.

THE PATENT

13. On February 19, 2002, United States Patent No. 6,347,553 (the '553 patent"), entitled "Force Sensor Assembly For An Infusion Pump," was duly and legally issued by the United States Patent and Trademark Office to Matthew Gerald Morris and Donald Frederic Schwartz. CareFusion 303 is the owner of the entire right, title and interest in and to the '553 patent. A true and correct copy of the '553 patent is attached hereto as Exhibit A.

FIRST CLAIM FOR RELIEF
(Infringement of the '553 Patent)

14. CareFusion 303 incorporates and realleges paragraphs 1-13 as if fully set forth here.

15. Sigma is infringing the '553 patent by making, using, offering for sale, and/or selling with the United States devices that embody the inventions disclosed and claimed in the '553 patent, and/or by importing into the United States devices that embody the inventions disclosed and claimed in the '553 patent. At least Sigma's Spectrum directly infringes the claims of the '553 patent.

16. By way of example and not limitation, Sigma's Spectrum practices each of

the limitations of independent claims 1 and 22 of the '553 patent. The Spectrum is sold by Sigma in the United States without authorization from CareFusion 303. Therefore, the Spectrum infringes said claims. One or more dependent claims are also infringed by the Spectrum.

17. In addition to direct infringement, CareFusion 303 is informed and believes, and on that basis alleges, that Sigma has induced and contributed to infringement by others of the '553 patent. By way of example and not limitation, Sigma offers to sell and/or sells within the United States to its customers or imports into the United States components of patented devices knowing the same to be especially made or especially adapted for use in an infringement of the '553 patent. Such components are not staple articles or commodities of commerce suitable for substantial noninfringing use. Sigma also actively induces infringement of the '553 patent by its customers and/or others.

18. CareFusion 303 has been irreparably harmed by Sigma's acts of infringement, and will continue to be harmed unless and until Sigma's acts of infringement are enjoined and restrained by order of this Court. CareFusion 303 has no adequate remedy at law and is entitled to a preliminary and permanent injunction against Sigma and its infringing products.

19. As a result of Sigma's acts of infringement, CareFusion 303 has suffered and will continue to suffer damages in an amount to be proven at trial.

20. This case is an "exceptional" case within the meaning of 35 U.S.C. § 285 and CareFusion 303 is entitled to an award of attorneys' fees.

PRAYER FOR RELIEF

WHEREFORE: CareFusion 303 prays for judgment against Sigma as follows:

1. A judgment that Sigma has infringed, induced others to infringe, and/or committed acts of contributory infringement with respect to the claims of the '553 patent;

2. An order preliminarily and permanently enjoining Sigma and its subsidiaries, officers, agents, servants, employees, licensees and all other persons acting or attempting to act in active concert or participation with it or acting on its behalf, from further infringement, inducement of infringement, or contributory infringement of the '553 patent;

3. An order directing Sigma to account for and pay to CareFusion 303 all damages

caused to CareFusion 303 by reason of Sigma's patent infringement, pursuant to 35 U.S.C. § 284, including increased damages under 35 U.S.C. § 284;

4. As award of pre-judgment and post-judgment interest on the damages caused to CareFusion 303 by Sigma;

5. An order directing Sigma to pay CareFusion 303's costs, expenses and reasonable attorneys' fees pursuant to 35 U.S.C. § 285; and

6. Any other legal and/or equitable relief as the Court deems just and proper.

DEMAND FOR JURY TRIAL

CareFusion 303 demands a trial by jury for all issues so triable pursuant to Federal Rule of Civil Procedure 38(b).

Dated: February 26, 2010

DLA PIPER LLP (US)

By _____

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John D. Kinton (Bar No. 203250)
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EXHIBIT A

US006347553B1

(12) **United States Patent**
Morris et al.

(10) **Patent No.: US 6,347,553 B1**
(45) **Date of Patent: Feb. 19, 2002**

(54) **FORCE SENSOR ASSEMBLY FOR AN INFUSION PUMP**

(75) Inventors: **Matthew Gerald Morris; Donald Frederic Schwartz**, both of San Diego, CA (US)

(73) Assignee: **Alaris Medical Systems, Inc.**, San Diego, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/514,532**

(22) Filed: **Feb. 28, 2000**

(51) **Int. Cl.**[7] **G01B 7/16**
(52) **U.S. Cl.** **73/781**; 73/760
(58) **Field of Search** 73/763, 768, 774, 73/781, 818, 760

(56) **References Cited**

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5,661,245	A	8/1997	Svoboda et al.	73/726
5,760,313	A	6/1998	Guentner et al.	73/862.584

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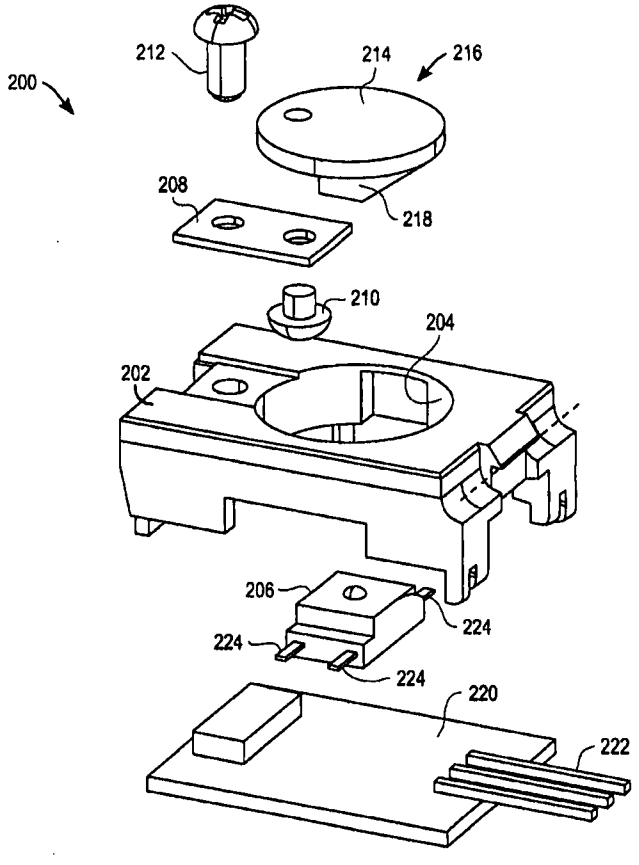
Primary Examiner—Max Noori
(74) *Attorney, Agent, or Firm*—Pennie & Edmonds LLP

(57) **ABSTRACT**

A force sensor assembly for use in peristaltic pumps includes a housing and a load cell at least partially disposed within the housing. A plunger, pivotable about an axis, has an upper surface and an underside surface distal from the upper surface. The underside surface cooperates with the load cell. The force sensor further includes a mechanism to reduce the load cell's sensitivity to the positioning of an applied force on the upper surface.

24 Claims, 7 Drawing Sheets



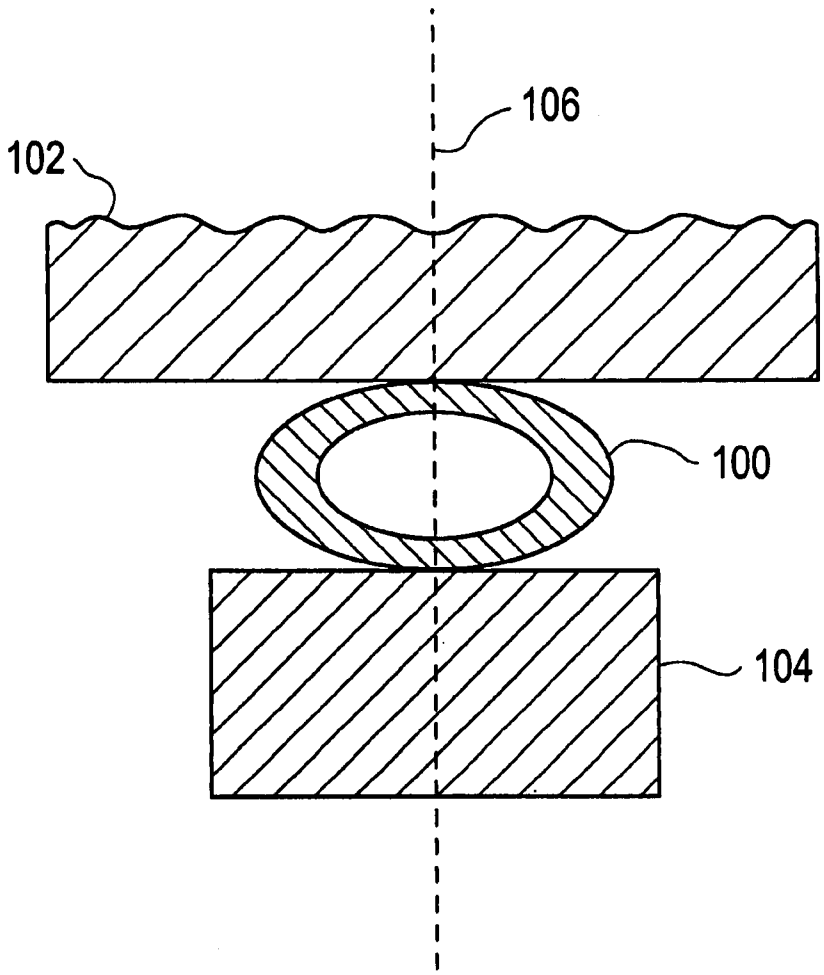


FIG. 1

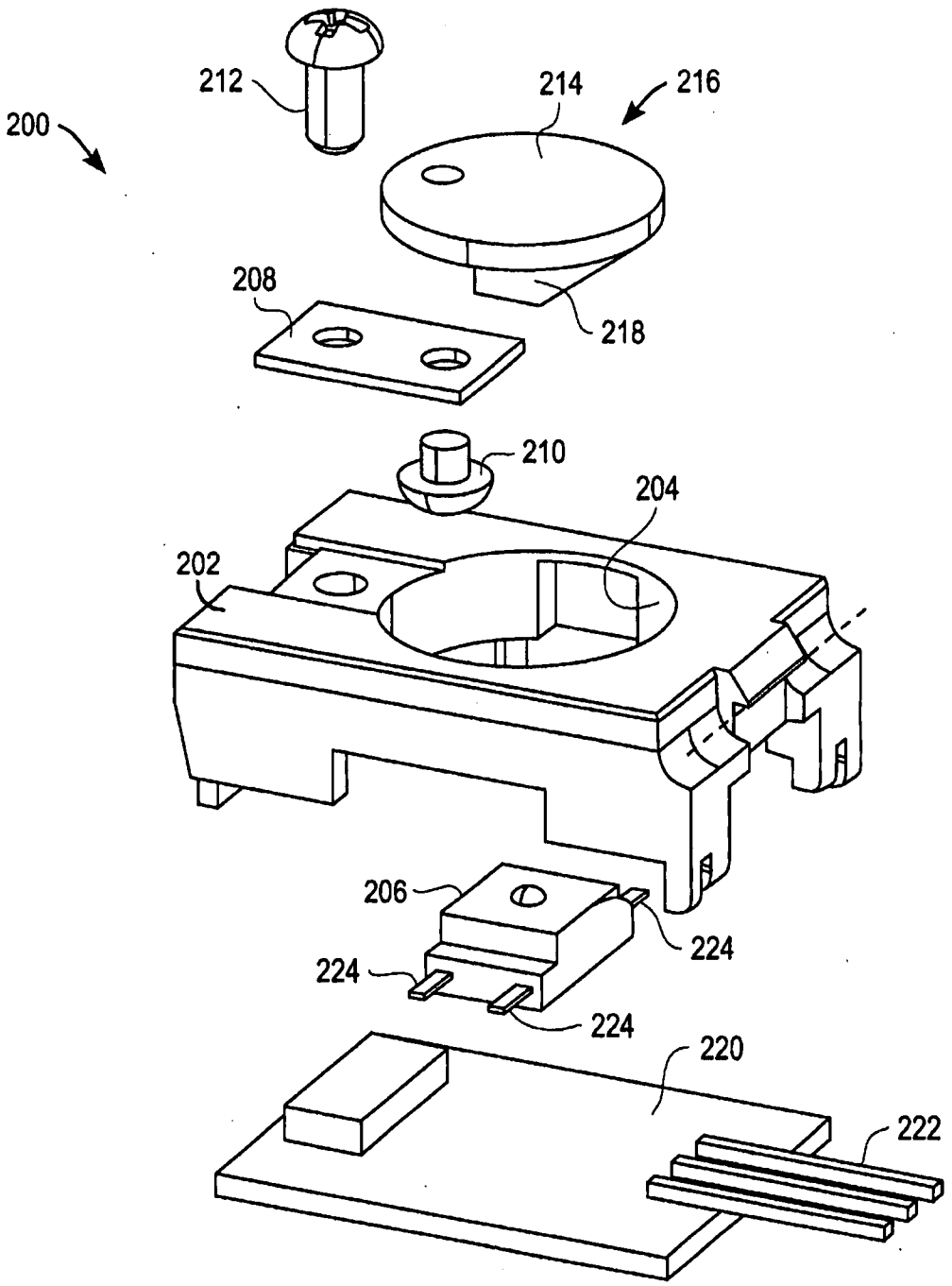


FIG. 2

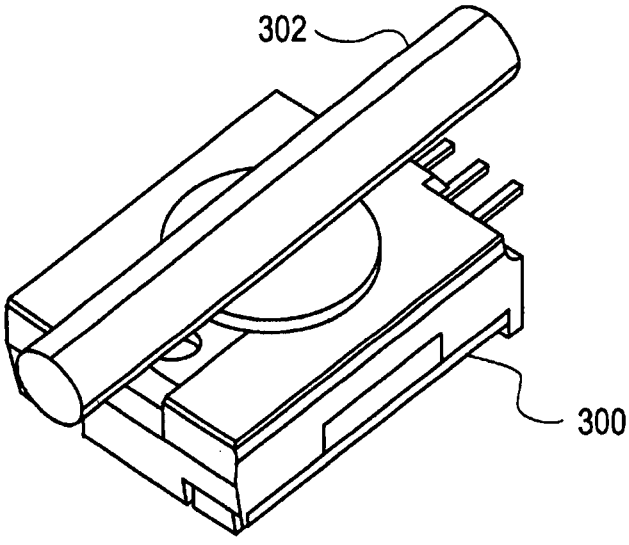


FIG. 3

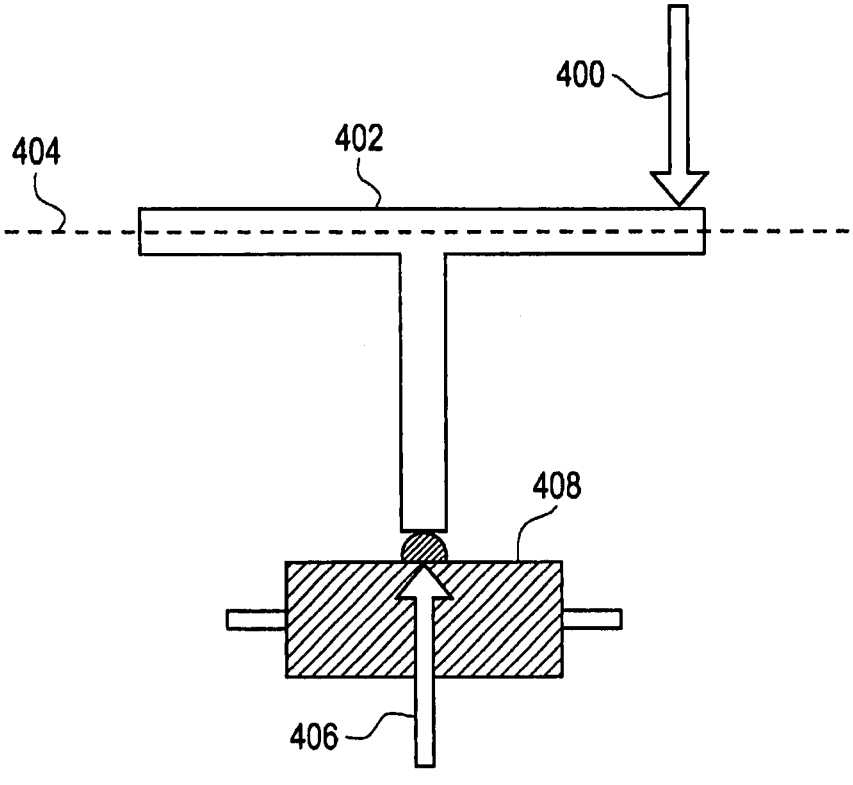


FIG. 4

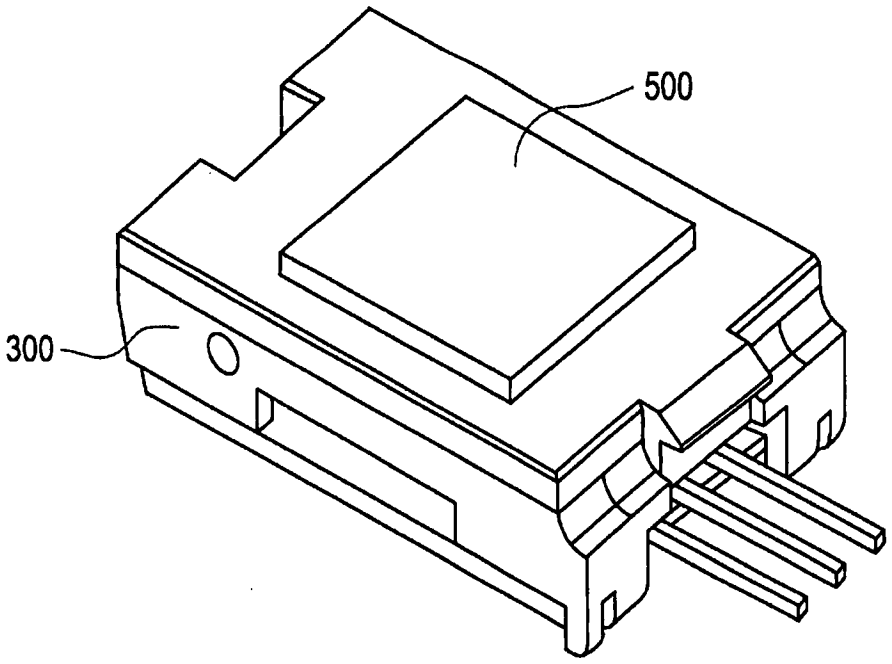


FIG. 5

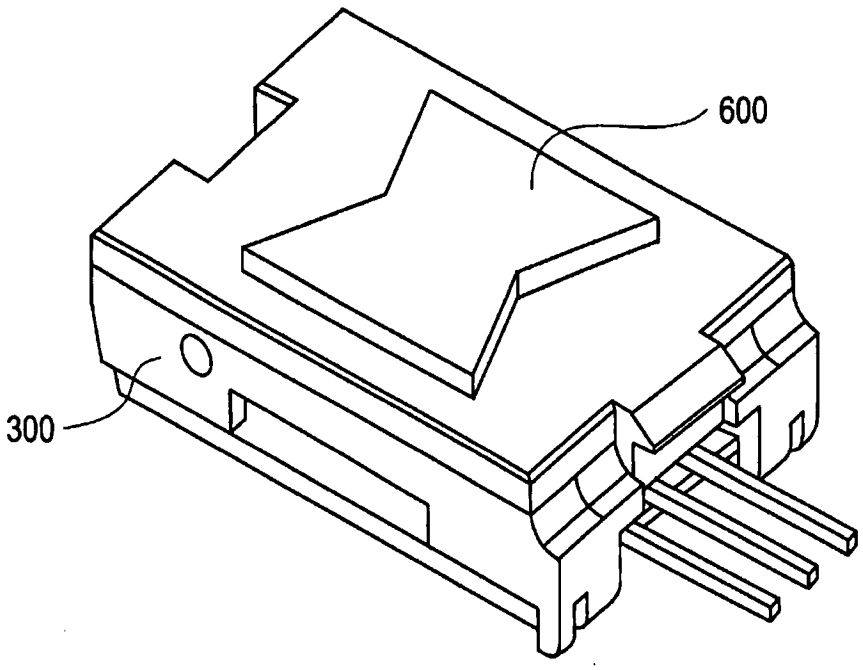


FIG. 6

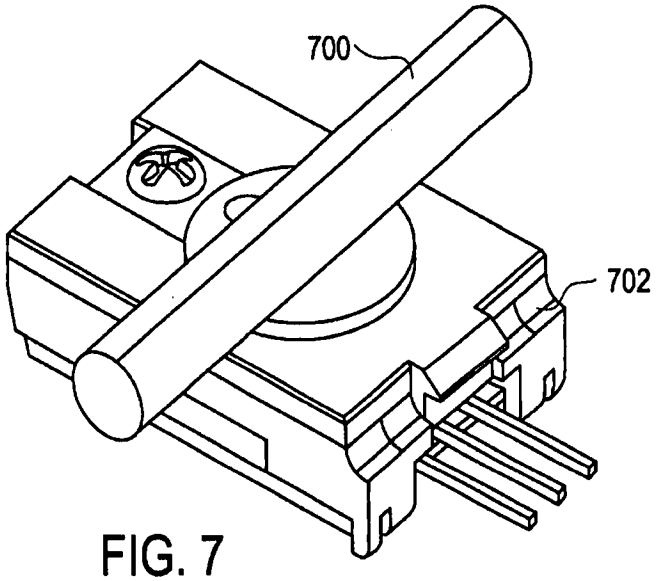


FIG. 7

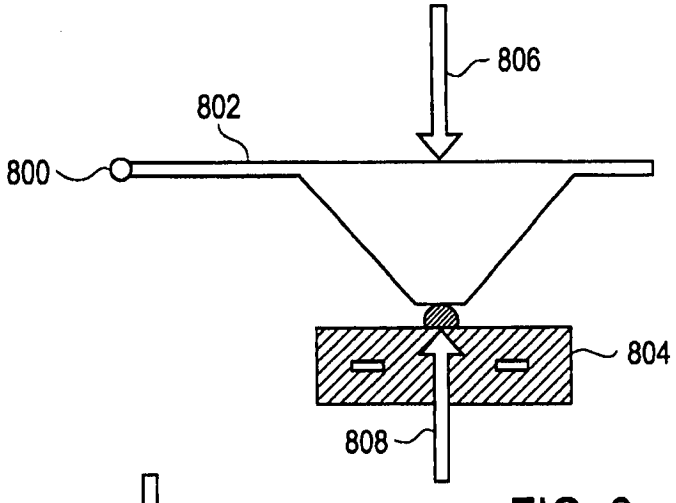


FIG. 8

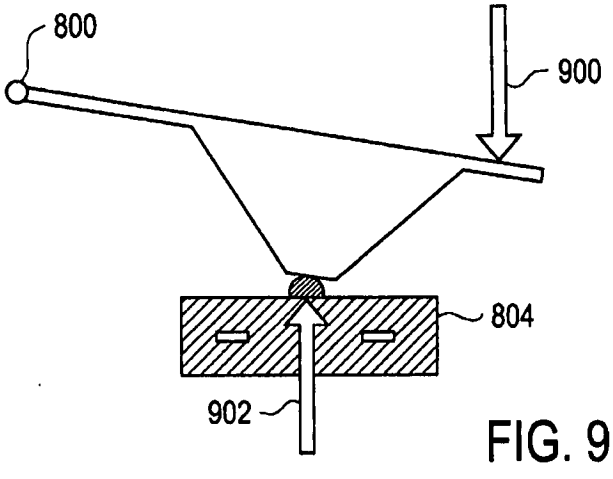


FIG. 9

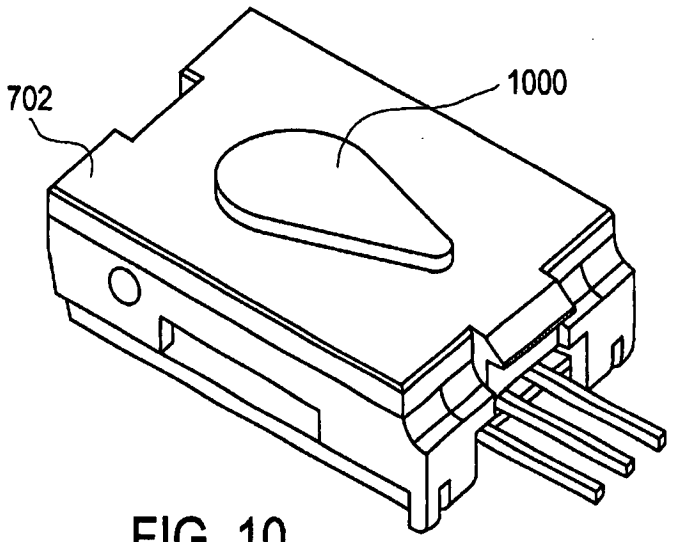


FIG. 10

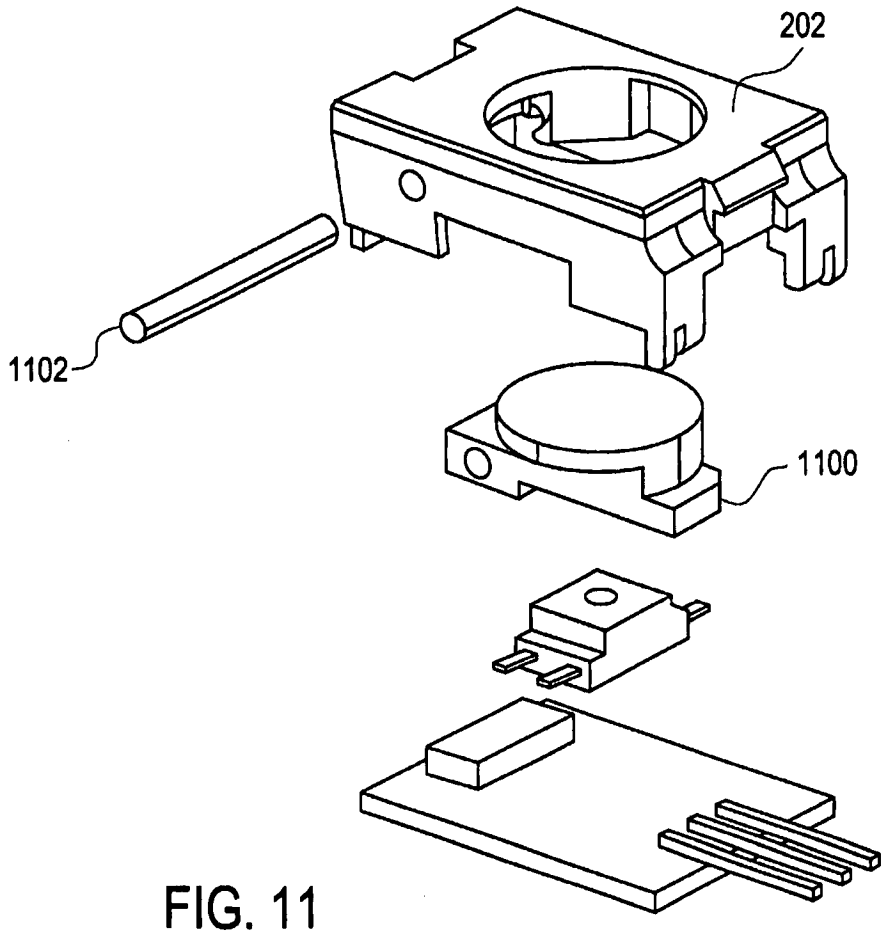


FIG. 11

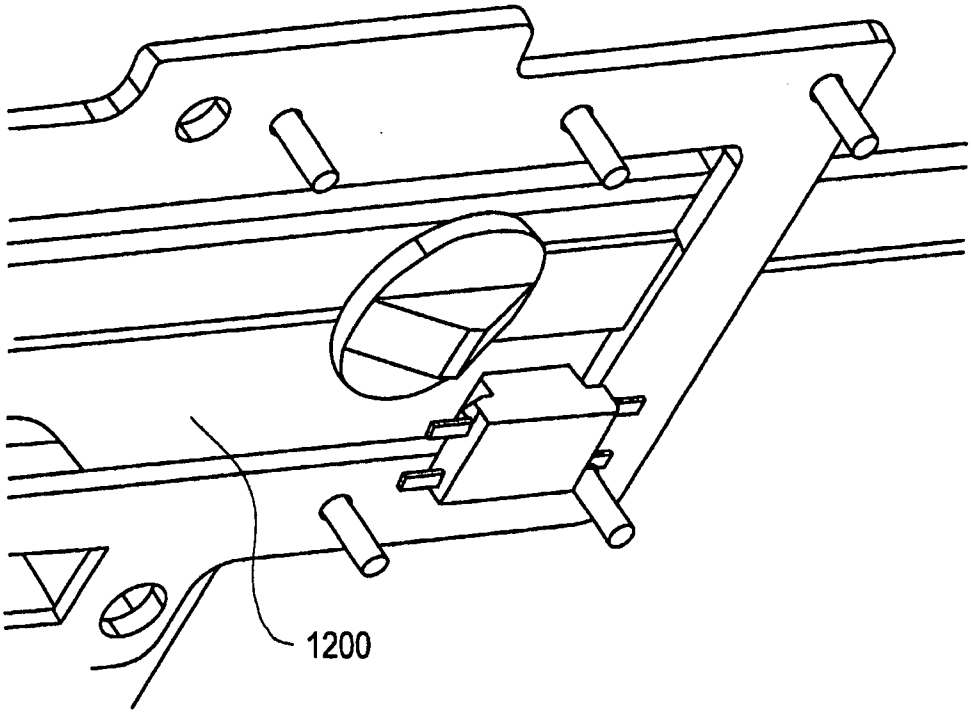


FIG. 12

FORCE SENSOR ASSEMBLY FOR AN INFUSION PUMP

TECHNICAL FIELD

The present invention relates generally to a force sensor assembly for use in infusion pumps. More particularly, the present invention relates to an assembly that reduces a load cell's sensitivity to the placement of an intravenous tube on the force sensor assembly in an infusion pump.

BACKGROUND OF THE INVENTION

Various devices have been developed to administer intravenous (IV) fluids to patients. One such device, a peristaltic infusion pump, operates a series of fingers or rollers which deform and occlude a resiliently deformable IV drip tube at multiple points sequentially along the tube's length. These occlusions form a wave like motion which forces the IV fluid under positive pressure along the tube. After each successive occlusion, the tube resiliently rebounds to its original diameter. The repetitive deformation of the tube may, however, ultimately weaken the resilience of the tube material. After prolonged use, a tube may not fully rebound to its former shape, thereby partly or fully occluding the tube at a point along its path. In addition, IV drip sets often contain clamps, which can be inadvertently be left closed, thus partly or fully occluding the tube.

In order to effectively control IV fluid delivery, it is essential that the infusion system constantly determine whether fluid is in fact being delivered to the patient. Interruptions of the fluid flow may occur for number of reasons, such as for example, occlusion of the tube or a blocked catheter. If the pump mechanism does not stop when the tube is occluded, either the pump will stall, the pump will continue to run with no fluid delivered, or the fluid pressure in the tube will increase until the obstruction catastrophically clears, possibly injuring the patient.

Accordingly, many infusion pump systems include a force or pressure sensor to determine whether there is an increase or loss of pressure within the tube. The sensor determines whether the fluid flow in the tube has been interrupted, and the pumping mechanism may be stopped and/or medical personnel notified. Because of the potentially harmful consequences of such interruptions, it is important that these sensors be as accurate and reliable as possible. Also, due to an infusion pump's portability and arduous operating conditions, it is desirable for these sensors to be small and rugged.

Force or pressure sensors used in infusion pumps typically contain a plunger that is either constrained in some way, such as with a pin in a hole, or of a free floating type. A constrained plunger type force sensor assembly could be comprised of an actuation plunger connected to a pin positioned and guided within a hole in a sensor housing. A transducer or load cell is positioned along the central axis of the plunger, remote from an IV drip tube. When the IV drip tube is positioned directly over the central axis of the plunger, a force created by the internal pressure of the IV drip tube is applied via the plunger and pin to the load cell, which measures the applied force. In this scenario, the measured force would be comparatively accurate as there is typically only a small loss of transferred force due to friction. However, when the IV drip tube is positioned off-center to the plunger's central axis, the plunger tends to rotate causing side loading on the plunger pin by the sensor housing which may bind the plunger pin in the hole. This side loading creates a friction force between the plunger pin and the sensor housing which results in a loss of force being applied to the load cell. This friction force ultimately leads to inaccurate and unreliable force measurement results. The above scenario may occur for example where an IV tube is misplaced on the force sensor assembly or where the tube drifts along the plunger surface during use.

A free floating plunger type force sensor could be comprised of an actuation plunger positioned within a hole in a sensor housing providing clearance allowing the plunger to float freely. The plunger is positioned over a well of force transmitting gel. The plunger transfers force applied by the IV tubing to the gel, which in turn transfers the force to a transducer or load cell situated within the gel. An example of a gel-type sensor is disclosed in U.S. Pat. No. 5,661,245. The plunger is typically allowed to angulate when a force is applied by the IV tubing to the plunger along an off-center axis. The angled plunger transfers force to the gel with less efficiency, which in turn transfers less force to the transducer or load cell situated within the gel. This reduced force ultimately leads to inaccuracies in the force measurement results. Additional inaccuracies may also be experienced due to frictional reaction forces between the plunger edges and the sensor housing.

Accordingly, there is a need for a small and inexpensive force sensor assembly which provides accurate and reliable results regardless of the placement of the IV tubing on the force sensor assembly.

SUMMARY OF THE INVENTION

According to the invention there is provided a force sensor assembly which is adapted to reduce a load cell's sensitivity to the positioning of an IV tube on the load cell's actuation plunger. The force sensor assembly comprises a housing, a load cell at least partially disposed within the housing and a plunger, which is pivotable about an axis. The plunger may be hinged to the housing or to another fixed point proximate to the housing, and may for example be a living hinge or a small pin pivot hinge. The plunger further comprises an upper surface which may be shaped to compensate for variations in measured force-caused by possible misalignment of the IV tubing on the plunger's upper surface. The plunger also comprises an underside surface distal from the upper surface.

In use an IV tube is placed on the plunger's upper surface, pressure within the IV tube applies a force to the upper surface of the plunger, causing the plunger to pivot about the axis. The pivoting plunger's underside makes contact with the load cell and thereby wholly transfers the applied force to the sensor for measurement.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the nature and objects of the invention, reference should be made to the following detailed description taken in conjunction with the accompanying drawings, in which:

FIG. **1** is a cross sectional diagrammatic view of an IV tube enclosed within an infusion pump;

FIG. **2** is an exploded isometric view of an embodiment of the present invention;

FIG. **3** is an isometric view of the present invention with an IV tube in a first orientation,

FIG. **4** is a diagrammatic side view of the sensor assembly of FIG. **3**;

FIG. **5** is an isometric view of an alternative embodiment of the invention;

FIG. **6** is an isometric view of yet another alternative embodiment of the invention;

FIG. **7** is an isometric view of an embodiment of the present invention with an IV tube in a second orientation;

FIG. **8** is a diagrammatic side view of the sensor assembly of FIG. **7**;

FIG. **9** is a diagrammatic side view similar to that of FIG. **8**;

FIG. **10** is an isometric view of an alternative embodiment of the present invention;

FIG; **11** is an exploded isometric view of a further alternative embodiment of the present invention;

FIG. **12** is an isometric view of yet another alternative embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

FIG. **1** illustrates a cross sectional view of an IV tube enclosed within an infusion pump, at the load cell. The IV tube **100** is compressed between a clamping member **102** and a force sensor assembly **104**. Ideally the IV tube **100** is positioned directly over the force sensor assembly **104**, centered on centerline **106**, such that the measured force at the force sensor assembly and a force created by the internal pressure of the IV tube **100** lie along the same plane. While this ideal condition ensures high force measurement accuracy, it is often difficult to guarantee under normal operating conditions.

FIG. **2** shows an exploded isometric view of an embodiment of the present invention. The sensor assembly **200** comprises a housing structure **202** defining a hole therethrough **204**. A pressure or load cell **206** is disposed within the housing **202**. The load cell **206** is preferably located directly under the aforementioned hole **204** and is of any typical construction (i.e. gel or oil filled with micromachined silicon die, direct die contact, strain gage etc.). The load cell is selected to have a particular construction that provides little or no mechanical friction in its force transfer mechanism (not shown) to its sensing element (not shown) and is also relatively insensitive to the location of the measured applied force. A suitable sensor may be similar to the sensor disclosed in U.S. Pat. No. 5,760,313 which is hereby incorporated by reference. An actuation plunger **216** is fastened, by means of a screw **210** or the like, to a low mechanical friction hinge **208** that provides support in all directions, but allows rotation in an actuation direction. Such a hinge may, for example, be a living hinge or a small pin pivot hinge as depicted by reference numeral **1102** in FIG. **11**. The living hinge may for example be a resilient metal or plastic strip, as is known in the art. Hinge **208** is in turn fastened to the housing **202** by means of another screw **212**. It should be appreciated that one could use other fastening means instead of screws **210** and **212**, such as for example glue or rivets. Both the shape of the plunger's upper surface **214** and the shape of the plunger's underside **218**, may be varied to provide optimum results. This embodiment utilizes a circular shaped upper surface **214** and a chamfered underside **218**. The underside **218** of the hinged plunger **216** is shaped so that it preferably contacts with the load cell **206** at a single contact point. Other shapes, such as for example a semicircular shaped underside, may also be utilized. A base **220** seals the housing **202** on the side distal from the hole **204**. The base **220** furthermore fastens the sensor **206** in the housing **202** and includes contacts **222** disposed thereon, which connect outputs **224** from the sensor **206** to other measurement circuitry (not shown).

FIG. **3** shows an isometric view of the present invention with an IV tube in a first orientation. In this preferred embodiment, an IV drip tube **302** is placed across the sensor assembly **300**, perpendicular to the hinge axis. This orientation is preferred as the force sensor assembly **300** is not subject to a moment arm effect discussed infra. FIG. **4** illustrates a diagrammatic side view of the sensor assembly of FIG. **3**. If the IV tubing crosses the plunger **402** off-center applying a force **400** to the plunger **402**, the hinge, rotatable about hinge axis **404**, provides a reaction force minimizing or preventing angulation of the plunger **402**. This embodiment of the sensor assembly thus gives a more accurate reading irrespective of whether or not the tube is centered above the load cell **408** or not. Therefore, little or no reduction in force is transmitted to the load cell through the plunger from the IV tube if it is positioned off-center to the load cell.

FIG. **5** shows an isometric view of an embodiment of the invention. Sensor assembly **300** includes a modified upper surface **500** of the plunger. Square upper surface **500** is preferably utilized in conjunction with the embodiment described in relation to FIGS. **3** and **4**, where the tube is oriented perpendicular to the hinge axis. The square shaped upper surface **500** maintains a constant area along the hinge axis.

FIG. **6** shows an isometric view of another embodiment of upper surface **600**. The upper surface of the plunger may be shaped so that the tubing contact area changes with the distance of the IV tubing from the location of the center of the load cell. A change in the tubing contact area produces a change in the force transmitted to the plunger due to tubing internal pressure, and therefore a change in the force relationship with the load cell. Hourglass shaped upper surface **600** is also preferably utilized in conjunction with the embodiment described in relation to FIGS. **3** and **4**. The hourglass shape, when implemented in the appropriate orientation to the hinge axis, can provide an increase in tubing contact area with an increase in the distance from the centerline of the load cell. This can counteract any loss in force to the load cell due to side loading of the hinge components, thus minimizing any effects of the IV tubing being off center.

FIG. **7** shows an isometric view of an alternative embodiment of the invention with an IV tube in a second orientation. In this embodiment, IV drip tube **700** is placed across the sensor assembly **702**, parallel to the hinge axis.

FIG. **8** illustrates a diagrammatic side view of the sensor assembly shown in FIG. **7**. A plunger **802** is pivotably hinged about a line **800**, allowing the plunger to make single point contact with a load cell **804**. When a force **806**, caused by pressure within the IV tube is applied directly above the load cell **804**, the load cell measures a reaction force **808** which is substantially the same as the applied force **806**. However, as illustrated in FIG. **9**, when a force **900** is applied off-center to the load cell **804**, reaction force **902** measured at load cell **804** will be larger than the applied force **900**, due to a moment arm effect. As there is no way to accurately determine the distance of the applied force **900** from hinge line **800**, this orientation of the IV tube on the sensor assembly is not preferred. To overcome this problem, the shape of the upper surface of the plunger may once again be varied to compensate for the misalignment of the IV tube. Instead of a round upper surface of the plunger as shown in FIGS. **2**, **3** and **7**, or an hourglass shaped upper surface as shown in FIG. **6**, the upper surface of the plunger may be shaped so that the tubing contact area changes with the distance of the IV tubing from the location the hinge axis **800**. A change in the tubing contact area produces a change in transmitted force due to the tubing internal pressure and thus a change in the force relationship with the load cell. Variations in measured force caused by the misplacement of the tube on the upper surface of the plunger may therefore be counteracted by tailoring the shape of the upper surface of the plunger. As shown in FIG. **10**, a triangular or tear drop shaped upper surface **1000**, narrowing away from the hinge axis may preferably be utilized in conjunction with the embodiment described above in relation to FIGS. **7–9**, where the tube is oriented parallel to the hinge axis.

FIG. **11** illustrates an exploded isometric view of another embodiment of the present invention. The living hinge **208**

of FIG. 2 has been replaced with a plunger **1100** that is itself hinged to the housing **202** by means of a small hinge pin **1102**. The separately hinged actuation plunger **1100** provides stability and low mechanical friction, resulting in low sensitivity to the positioning of an off-centered IV tube.

Other embodiments of the present invention may include a force assembly where the hinge and actuation plunger are formed integral with the hinge support housing (i.e. all molded together as one piece) instead of separate parts. FIG. **12** shows an embodiment of the present invention with a plastic living hinge **1200** integrated into the housing of the IV mechanism. The actuation plunger may also be held by flexible supports at several points around its circumference to minimize moment arm changes with tubing off-center positioning. Furthermore, the hinge could be attached to some other structure of the IV pump proximate to the sensor assembly housing.

The foregoing descriptions of specific embodiments of the present invention are presented for purposes of illustration and description only. They are not intended to be exhaustive or to limit the invention to the precise forms disclosed, obviously many modifications and variations are possible in view of the above teachings. The embodiments were chosen and described in order to best explain the principles of the invention and its practical applications, to thereby enable others skilled in the art to best utilize the invention and various embodiments with various modifications as are suited to the particular use contemplated. It is intended that the scope of the invention be defined by the following claims and their equivalents.

What is claimed is:

1. A force sensor assembly for use in peristaltic pumps, comprising:

a housing;

a load cell at least partially disposed within said housing;

a plunger, pivotable about an axis, where said plunger comprises:

an upper surface; and

an underside surface distal from said upper surface where said underside surface cooperates with said load cell; and

a means for reducing said load cell's sensitivity to the positioning of an applied force on said upper surface.

2. A force sensor assembly according to claim **1**, wherein said means for reducing said load cell's sensitivity, comprises an upper surface for receiving an intravenous tube perpendicular to said axis.

3. A force sensor assembly according to claim **2**, wherein said upper surface is shaped to compensate for variations in measured force caused by the misalignment of said applied force.

4. A force sensor assembly according to claim **3**, wherein said upper surface shape is selected from a group consisting of the following shapes:

circular, square or hourglass.

5. A force sensor assembly according to claim **1**, wherein said means for reducing said load cell's sensitivity, comprises an upper surface for receiving an intravenous tube parallel to said axis.

6. A force sensor assembly according to claim **5**, wherein said upper surface is shaped to compensate for variations in measured force caused by the misalignment of said applied force.

7. A force sensor assembly according to claim **6**, wherein said upper surface shape is selected from a group consisting of the following shapes:

circular, teardrop or triangular.

8. A force sensor assembly according to claim **1**, wherein said plunger further comprises:

a free end; and

a pivot end located at said axis.

9. A force sensor assembly according to claim **8**, wherein said pivot end is rotatably coupled to said housing.

10. A force sensor assembly according to claim **8**, wherein said pivot end is rotatably coupled to a body proximate said housing.

11. A force sensor assembly according to claim **8**, wherein said pivot end is rotatably coupled to said housing by means of a hinge.

12. A force sensor assembly according to claim **11**, wherein said is hinge is a living hinge.

13. A force sensor assembly according to claim **12**, wherein said living hinge is a resilient metal strip.

14. A force sensor assembly according to claim **12**, wherein said living hinge is a resilient plastic strip.

15. A force sensor assembly according to claim **11**, wherein said hinge is a small pin pivot hinge.

16. A force sensor assembly according to claim **15**, wherein said hinge has low mechanical friction.

17. A force sensor assembly according to claim **1**, wherein said load cell is a pressure transducer.

18. A force sensor assembly according to claim **1**, wherein said load cell has low internal mechanical friction.

19. A force sensor assembly according to claim **1**, wherein said load cell itself has a reduced sensitivity to the positioning of the applied force on said upper surface.

20. A force sensor assembly according to claim **1**, wherein said underside of said plunger is shaped to contact with said load cell at a single point.

21. A force sensor assembly according to claim **1**, wherein said plunger is biased away from said load cell.

22. A force sensor assembly adapted to reduce a load cell's sensitivity to the positioning of an applied force, comprising:

a housing;

a load cell at least partially disposed within said housing; and

a plunger rotatably coupled to said housing by means of a hinge said plunger further comprising:

an upper surface which is shaped to compensate for variations in measured force caused by the misalignment of said applied force; and

an underside surface distal from said upper surface,

such that in use a force applied to said upper surface of said plunger is transferred to said load cell by said underside of said plunger pivoting into contact with said load cell.

23. A force sensor assembly according to claim **22**, wherein said hinge is a living hinge.

24. A force sensor assembly according to claim **23**, wherein said hinge is a small pin pivot hinge.

* * * * *

JS 44 (Rev. 12/07)

CIVIL COVER SHEET

The JS 44 civil cover sheet and the information contained h[illegible] neither replace nor supplement the filing and service of pl[illegible]gs or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. (SEE INSTRUCTIONS ON THE REVERSE OF THE FORM.)

I. (a) PLAINTIFFS
CAREFUSION 303, INC.

DEFENDANTS
SIGMA INTERNATIONAL

FILED
10 FEB 26 PM 2:45
CLERK, U.S. DISTRICT COURT
SOUTHERN DISTRICT OF CALIFORNIA
BY: DEPUTY

(b) County of Residence of First Listed Plaintiff San Diego
(EXCEPT IN U.S. PLAINTIFF CASES)

County of Residence of First Listed Defendant New York
(IN U.S. PLAINTIFF CASES ONLY)
NOTE: IN LAND CONDEMNATION CASES, USE THE LOCATION OF THE LAND INVOLVED.

(c) Attorney's (Firm Name, Address, and Telephone Number)
Vincent S. Lam
DLA PIPER LLP (US)
401 B Street, Suite 1700
San Diego, CA 92101-4297
(619) 699-2828

Attorneys (If Known)

'10 CV 0442 DMS WMc

II. BASIS OF JURISDICTION (Place an "X" in One Box Only)

- ☐ 1 U.S. Government Plaintiff
- ☒ 3 Federal Question (U.S. Government Not a Party)
- ☐ 2 U.S. Government Defendant
- ☐ 4 Diversity (Indicate Citizenship of Parties in Item III)

'10 CV 0442 DMS WMc

III. CITIZENSHIP OF PRINCIPAL PARTIES (Place an "X" in One Box for Plaintiff and One Box for Defendant)
(For Diversity Cases Only)

	PTF	DEF		PTF	DEF
Citizen of This State	☐ 1	☐ 1	Incorporated *or* Principal Place of Business In This State	☐ 4	☐ 4
Citizen of Another State	☐ 2	☐ 2	Incorporated *and* Principal Place of Business In Another State	☐ 5	☐ 5
Citizen or Subject of a Foreign Country	☐ 3	☐ 3	Foreign Nation	☐ 6	☐ 6

IV. NATURE OF SUIT (Place an "X" in One Box Only)

CONTRACT
- ☐ 110 Insurance
- ☐ 120 Marine
- ☐ 130 Miller Act
- ☐ 140 Negotiable Instrument
- ☐ 150 Recovery of Overpayment & Enforcement of Judgment
- ☐ 151 Medicare Act
- ☐ 152 Recovery of Defaulted Student Loans (Excl. Veterans)
- ☐ 153 Recovery of Overpayment of Veteran's Benefits
- ☐ 160 Stockholders' Suits
- ☐ 190 Other Contract
- ☐ 195 Contract Product Liability
- ☐ 196 Franchise

REAL PROPERTY
- ☐ 210 Land Condemnation
- ☐ 220 Foreclosure
- ☐ 230 Rent Lease & Ejectment
- ☐ 240 Torts to Land
- ☐ 245 Tort Product Liability
- ☐ 290 All Other Real Property

TORTS

PERSONAL INJURY
- ☐ 310 Airplane
- ☐ 315 Airplane Product Liability
- ☐ 320 Assault, Libel & Slander
- ☐ 330 Federal Employers' Liability
- ☐ 340 Marine
- ☐ 345 Marine Product Liability
- ☐ 350 Motor Vehicle
- ☐ 355 Motor Vehicle Product Liability
- ☐ 360 Other Personal Injury

PERSONAL INJURY
- ☐ 362 Personal Injury – Med. Malpractice
- ☐ 365 Personal Injury – Product Liability
- ☐ 368 Asbestos Personal Injury Product Liability

PERSONAL PROPERTY
- ☐ 370 Other Fraud
- ☐ 371 Truth in Lending
- ☐ 380 Other Personal Property Damage
- ☐ 385 Property Damage Product Liability

CIVIL RIGHTS
- ☐ 441 Voting
- ☐ 442 Employment
- ☐ 443 Housing/ Accommodations
- ☐ 444 Welfare
- ☐ 445 Amer. w/Disabilities - Employment
- ☐ 446 Amer. w/Disabilities – Other
- ☐ 440 Other Civil Rights

PRISONER PETITIONS
- ☐ 510 Motions to Vacate Sentence

Habeas Corpus:
- ☐ 530 General
- ☐ 535 Death Penalty
- ☐ 540 Mandamus & Other
- ☐ 550 Civil Rights
- ☐ 555 Prison Condition

FORFEITURE/PENALTY
- ☐ 610 Agriculture
- ☐ 620 Other Food & Drug
- ☐ 625 Drug Related Seizure of Property 21 USC 881
- ☐ 630 Liquor Laws
- ☐ 640 R.R. & Truck
- ☐ 650 Airline Regs.
- ☐ 660 Occupational Safety/Health
- ☐ 690 Other

LABOR
- ☐ 710 Fair Labor Standards Act
- ☐ 720 Labor/Mgmt. Relations
- ☐ 730 Labor/Mgmt.Reporting & Disclosure Act
- ☐ 740 Railway Labor Act
- ☐ 790 Other Labor Litigation
- ☐ 791 Empl. Ret. Inc. Security Act

IMMIGRATION
- ☐ 462 Naturalization Application
- ☐ 463 Habeas Corpus – Alien Detainee
- ☐ 465 Other Immigration Actions

BANKRUPTCY
- ☐ 422 Appeal 28 USC 158
- ☐ 423 Withdrawal 28 USC 157

PROPERTY RIGHTS
- ☐ 820 Copyrights
- ☒ 830 Patent
- ☐ 840 Trademark

SOCIAL SECURITY
- ☐ 861 HIA (1395ff)
- ☐ 862 Black Lung (923)
- ☐ 863 DIWC/DIWW (405(g))
- ☐ 864 SSID Title XVI
- ☐ 865 RSI (405(g))

FEDERAL TAX SUITS
- ☐ 870 Taxes (U.S. Plaintiff or Defendant)
- ☐ 871 IRS—Third Party 26 USC 7609

OTHER STATUTES
- ☐ 400 State Reapportionment
- ☐ 410 Antitrust
- ☐ 430 Banks and Banking
- ☐ 450 Commerce
- ☐ 460 Deportation
- ☐ 470 Racketeer Influenced and Corrupt Organizations
- ☐ 480 Consumer Credit
- ☐ 490 Cable/Sat TV
- ☐ 810 Selective Service
- ☐ 850 Securities/Commodities/ Exchange
- ☐ 875 Customer Challenge 12 USC 3410
- ☐ 890 Other Statutory Actions
- ☐ 891 Agricultural Acts
- ☐ 892 Economic Stabilization Act
- ☐ 893 Environmental Matters
- ☐ 894 Energy Allocation Act
- ☐ 895 Freedom of Information Act
- ☐ 900 Appeal of Fee Determination Under Equal Access to Justice
- ☐ 950 Constitutionality of State Statutes

V. ORIGIN (Place an "X" in One Box Only)
☒ 1 Original Proceeding ☐ 2 Removed from State Court ☐ 3 Remanded from Appellate Court ☐ 4 Reinstated or Reopened ☐ 5 Transferred from another district (specify) ☐ 6 Multidistrict Litigation ☐ 7 Appeal to District Judge from Magistrate Judgment

VI. CAUSE OF ACTION
Cite the U.S. Civil Statute under which you are filing **(Do not cite jurisdictional statutes unless diversity):**
35 U.S.C. Section 1[illegible]45[illegible] et seq.
Brief description of cause:
Patent infringement

VII. REQUESTED IN COMPLAINT:
☐ CHECK IF THIS IS A **CLASS ACTION** UNDER F.R.C.P. 23
DEMAND $
CHECK YES only if demanded in complaint:
JURY DEMAND: ☒ Yes ☐ No

VIII. RELATED CASE(S) IF ANY (See instructions):
JUDGE _____ DOCKET NUMBER _____

DATE
February 26, 2010

SIGNATURE OF ATTORNEY OF RECORD

FOR OFFICE USE ONLY
RECEIPT # 1062 AMOUNT $350 APPLYING IFP _____ JUDGE _____ MAG. JUDGE _____

AB 02-26-10

Court Name: USDC California Southern
Division: 3
Receipt Number: CAS010621
Cashier ID: mbain
Transaction Date: 02/26/2010
Payer Name: DLA PIPER

CIVIL FILING FEE
For: CAREFUSION 303 V SIGMA INTL
Case/Party: D-CAS-3-10-CV-000442-001
Amount: $350.00

CHECK
Check/Money Order Num: 869527
Amt Tendered: $350.00

Total Due: $350.00
Total Tendered: $350.00
Change Amt: $0.00

There will be a fee of $45.00
charged for any returned check.