Paper No. 1

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AURIS HEALTH, INC.,
Petitioner,

v.

INTUITIVE SURGICAL, INC.
Patent Owner.

IPR2019-01547

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 6,522,906

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I. PETITIONER'S MANDATORY NOTICES

A. Real Party in Interest (§42.8(b)(1))

Auris Health, Inc., is a real party in interest pursuant to § 42.8(b)(1). Auris Health, Inc., is a wholly owned subsidiary of Ethicon, Inc., which is a wholly owned subsidiary of Johnson & Johnson. Both Ethicon, Inc., and Johnson & Johnson also are real parties in interest.

B. Other Proceedings (§42.8(b)(2))

1. Patents and Applications

U.S. Patent No. 6,522,906 ("the '906 patent") is related to the following issued patents or pending applications:

- United Stated Patent No. 6,799,065.
- United States Patent No. 7,107,090;
- United States Patent No. 8,944,070;
- United States Patent No. 9,232,984;
- United States Patent No. 9,101,397;
- United States Patent No. 10,271,909;
- United States Patent Application No. 14/585,853; and
- United States Patent Application No. 16/198,367.

2. Related Litigation

The '906 patent has been asserted in the following litigation:

- *Intuitive Surgical, Inc. v. Auris Health, Inc.*, No. 18-1359-MN (D. Del.) (pending).

3. Patent Office Proceedings

The '906 patent is not subject to any proceedings filed in the Patent Office.

C. Lead and Backup Lead Counsel (§42.8(b)(3))

Lead Counsel is: Ching-Lee Fukuda (Reg. No. 44,334), clfukuda@sidley.com, (212) 839-7364. Back-Up Lead Counsel are: Thomas A. Broughan III (Reg. No. 66,001), tbroughan@sidley.com, (202) 736-8314; and Sharon Lee, sharon.lee@sidley.com, (202) 736-8510).[1]

D. Service Information (§42.8(b)(4))

Service on Petitioner may be made by e-mail (at the email addresses above & SidleyAurisTeam@sidley.com). Petitioner's mail or hand delivery address is: Sidley Austin LLP, 1501 K Street, N.W., Washington, D.C. 20005. The fax number for lead and backup lead counsel is (202) 736-8711.

[1] Petitioner will file a motion for Sharon Lee to appear *pro hac vice* according to the Board's orders and rules.

I. Introduction

The systems and methods claimed by the ’906 patent were well-known as of that patent’s priority date. The ’906 claims are directed to a surgical system comprising a “master” control or input device that a surgeon can manipulate in three dimensions to cause a corresponding movement in a “slave” surgical instrument, and an image display for displaying a real time image of the surgical site along with information relevant to the surgical procedure. The surgeon can use the same master control both to operate the surgical instrument and to change the displayed information, including potentially accessing auxiliary information about the patient for display.

Such surgical systems were well-known in the prior art as of the late 1990s. WO 95/01757 to Borst (“Borst” (Ex.1004)) discloses a robotic surgical system where a surgeon moves a master control surgical instrument in multiple dimensions, and those movements are measured, scaled, and then superimposed on a slave output surgical instrument at the tip of a robotic arm. Ex.1004, 15:25-28. To assist the surgeon, Borst provides multiple video displays that depict several views of the surgical site and other relevant information. *Id.*, 1:9-17. U.S. Patent No. 6,102,850 to Wang et al. (“Wang ’850” (Ex.1007)) describes well-known mechanical and electrical details of how to implement master/slave control of

surgical instruments in robotic surgical systems as of December 1999. Ex.1007, Abstract, 7:21-40.

Though Borst does not show using a master control *both* to operate a surgical instrument and to change the display of information, that functionality was well-known to a person of ordinary skill in the art (POSA) at the time. For example, U.S. Patent No. 5,373,317 to Salvati et al. ("Salvati" (Ex.1005)) discloses a remote robotic surgical system with a physician controller that had dual modes, one for operating the surgical instruments and another for modifying the displayed surgical information. Ex.1005, 2:29-34. Similarly, U.S. Patent No. 6,496,099 to Wang ("Wang '099" (Ex.1006)), recognizes that is useful, desirable, and efficient to allow a surgeon to use the same master control both to perform a procedure and to access and display auxiliary information relevant to the procedure, such as preoperative images or real-time ultrasound images. Ex.1006, Abstract.

In allowing the challenged claims, the Examiner found that the novel aspect of the claims was a master control that allowed "manipulating a linkage of a master control in three dimensions" and use of "a linkage of an input device configured for manipulation in three-dimensions." Ex.1002, 222-24. To the contrary, master controls that could be manipulated in three or more dimensions were well-known—for example as taught by each of Borst, Wang '099, and Wang '850—and all the limitations of the claimed methods and systems were well-known in the art.

A POSA would have found it obvious to modify the system disclosed in Borst to include all limitations of the challenged claims in view of either Salvati or Wang ’099. Wang ’850 is presented as further evidence of well-known techniques for implementing master/slave control of surgical instruments. None of these references was considered during the prosecution of the ’906 patent.

II. Regulatory Information

A. Certification that Petitioner May Contest the ’906 Patent (§ 42.104(a))

Petitioner certifies that the ’906 patent is available for *inter partes* review (“IPR”), and that Petitioner is not barred or estopped from requesting an IPR of the ’906 patent claims. Neither Petitioner, nor any party in privity with Petitioner, has filed a civil action challenging the validity of any claim of the ’906 patent. The ’906 patent has not been the subject of a prior IPR by Petitioner or a privy of Petitioner.

Petitioner also certifies this petition for IPR is timely filed as this petition was filed less than one year after September 4, 2018, the date Petitioner was first served with a complaint alleging infringement of a claim of the ’906 patent. *See* 35 U.S.C. § 315(b); Ex.1011.

B. Identification of Claims Being Challenged (§ 42.104(b))

Claims 16, 22, 23, 25, 26, 51, and 53 are unpatentable based on the following art and grounds.

Prior Art Reference	Abbreviation
WO 95/01757 to Borst	"Borst" (Ex.1004)
U.S. Patent No. 5,373,317 to Salvati et al.	"Salvati" (Ex.1005)
U.S. Patent No. 6,496,099 to Wang et al.	"Wang '099" (Ex.1006)
U.S. Patent No. 6,102,850 to Wang et al.	"Wang '850" (Ex.1007)

Ground	35 U.S.C. §	Claims	Prior Art Reference(s)
1	103	51, 53	Borst, Salvati
2	103	51, 53	Borst, Salvati, Wang '850
3	103	16, 22-23, 25-26	Borst, Wang '099
4	103	16, 22-23, 25-26	Borst, Wang '099, Wang '850
5	103	51, 53	Borst, Wang '099
6	103	51, 53	Borst, Wang '099, Wang '850

Petitioner's positions are supported by the Declaration of Blake Hannaford (Ex.1003), an expert in telerobotic surgery who has over 20 years of experience in the field. Ex.1003, ¶¶2-8.

C. Fee for *Inter Partes* Review (§ 42.15(a))

The Director is authorized to charge the fee specified by 37 C.F.R. § 42.15(a) to Deposit Account No. 50-1597.

III. Background

A. Background Technology

The '906 patent relates to telerobotic surgery, an area that the patent acknowledges was well-developed by the late 1990s:

> ***Telesurgery is a general term for surgical systems where the surgeon uses some form of remote control***, e.g., a servomechanism, or the like, ***to manipulate surgical instrument movements***, rather than directly holding and moving the tools by hand. In such a telesurgery

> system, the surgeon is ***typically provided with an image of the surgical site on a visual display*** at a location remote from the patient. ***The surgeon can typically perform the surgical procedure at the location remote from the patient whilst viewing the end effector movement during the surgical procedure on the visual display.*** While viewing typically a three-dimensional image of the surgical site on the visual display, the ***surgeon performs the surgical procedures on the patient by manipulating master control devices at the remote location, which master control devices control motion of the remotely controlled instruments***.

Ex.1001, 2:61-3:11; Ex.1003, ¶52.[2]

The '906 patent admits that prior art systems disclosed master control devices that communicated with the surgical instruments via a control system. Ex.1001, 3:16-25 ("The control system typically… relays input commands from the master control devices to the associated robotic arm and instrument assemblies" and back); Ex.1003, ¶53.

Use of master controls was known in the art, and prior art already recognized and provided solutions for the consideration that, "[o]perating multiple devices may distract the surgeon, thereby reducing the efficiency of performing various procedures" in part because "it is cumbersome utilizing various devices

[2] All emphasis herein is added unless otherwise noted.

where each device has a separate user interface." Ex.1006, 1:33-36; Ex.1003, ¶54. According to the prior art, it was known to "be desirable to provide an interface that would allow the surgeon to select and control multiple surgical devices from a single input device" and that such an interface "would allow the surgeon to mutually exclusively select and control" those surgical devices. Ex.1008, 3-4; Ex.1003, ¶54.

B. Summary of the '906 Patent

The '906 patent is directed to "[s]ystems and methods for performing robotically-assisted surgical procedures on a patient enable [sic] an image display device to provide an operator with auxiliary information related to the surgical procedure, in addition to providing an image of the surgical site itself." Ex.1001, Abstract; Ex.1003, ¶41. Figure 1 depicts the system's components, including an operator's console and robotic arms. *Id*., 4:40-46; Ex.1003, ¶41.

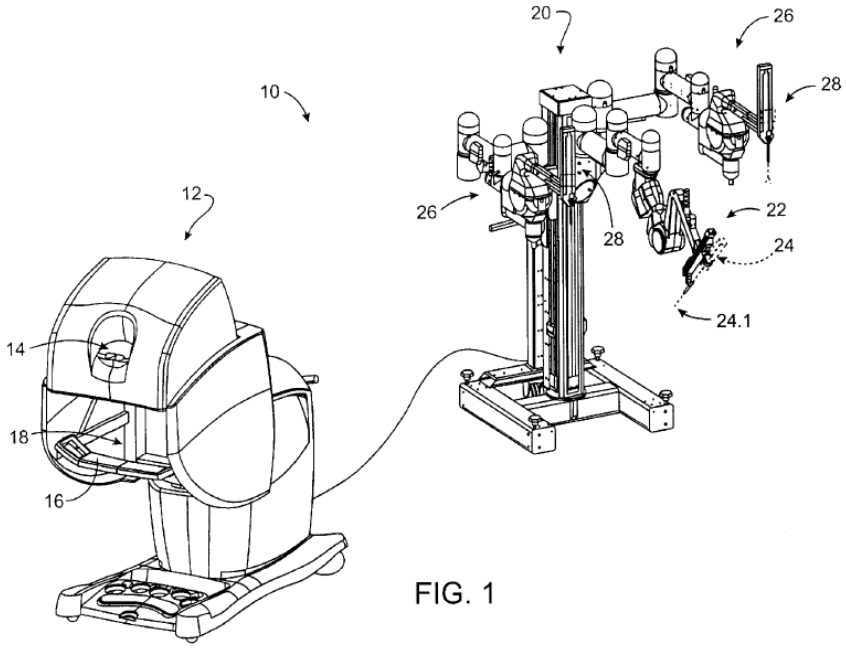

FIG. 1

The ’906 patent discloses that a master control is used to both manipulate the surgical instruments and, in a different mode, to access and display auxiliary information relevant to the surgical procedure. Ex.1001, 3:61-4:2, 4:16-23; Ex.1003, ¶42. The master control and surgical instruments operate in a master and slave relationship: “The master control 70 will be referred to simply as ‘master’ and its associated robotic arm 26 and surgical instrument 28 will be referred to simply as ‘slave.’” *Id*., 9:64-10:5; Ex.1003, ¶42.

When accessing auxiliary information, the master control is disassociated from the surgical instruments and used to select or change the auxiliary information instead. Ex.1001, 4:25-35; Ex.1003, ¶43. “Typically, when one, or both, or either, of the masters are to be used selectively to place an image corresponding to auxiliary information from a selected source… in the image or

scene of the surgical site, the operative association between the master, or masters, and the slaves is temporarily interrupted" and then later "re-established to permit the operator to proceed with the surgical procedure." *Id.*, 23:2-30; Ex.1003, ¶43.

Auxiliary information to be displayed can be patient data retrieved from a remote location or from a probe (such as an "ultrasound transducer") during surgery, as illustrated by Figure 14:

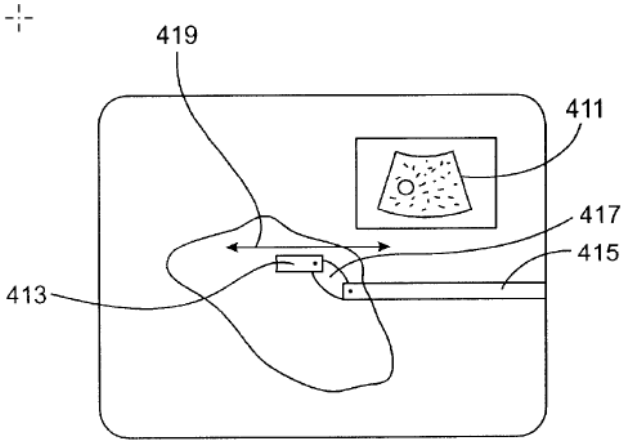

FIG. 14

Ex.1001, 5:41-45, 24:7-14; Ex.1003, ¶44. Auxiliary information can include "a patient's ECG signal," "preoperative information," "preoperative images," and "inter-operative images." *Id.*, 12:52-65, 16:39-41, 17:20-23; Ex.1003, ¶44. Sources of auxiliary information "may even comprise a separate computer operatively connected to the system 10" where "the surgeon has prepared preoperative information for a specific patient on which a surgical procedure using the system 10 is to be performed." *Id.*, 17:18-23; Ex.1003, ¶44.

The ’906 patent discloses displaying auxiliary information in a typical web-style window format overlaid on the image of the surgical site. Ex.1001, Fig. 12, 5:30-35; Ex.1003, ¶45. “[T]he auxiliary image can be displayed in a discrete window, or in a ‘picture in picture’ arrangement, extending over the image of the real-time surgical site image.” *Id.*, 14:27-29, *see also* Figs. 13A and 13B; Ex.1003, ¶45.

C. Prosecution History

The patent application leading to the ’906 patent was filed on December 14, 1999, and issued on February 18, 2003. Ex.1003, ¶46.

In the first office action, the Examiner rejected all but one of the pending claims and objected to the other claim as an improper multiple dependent claim. The Examiner rejected the claims as anticipated or obvious in view of cited prior art, in particular U.S. Patent No. 5,855,553 to Tajima. Ex.1002, 147-51; Ex.1003, ¶47. The Examiner found that:

> [I]t would have been obvious… to use the same master control for manipulating a surgical tool and accessing auxiliary data to provide a more efficient means for performing a surgical procedure and to additionally reduce distraction to the surgeon. It would have further been obvious… to access the surgical tool and the auxiliary data individually to provide a safer means for performing a procedure while avoiding unintentional movements.

Id., 149; Ex.1003, ¶47. The Examiner further found that “the manner in which the auxiliary data is displayed would have been an obvious matter of design choice,”

and that "it would have been obvious… to move the windows or change the dimensions by selecting and 'dragging' as is well known in the art." *Id*., 150; Ex.1003, ¶47.

In response, Applicant argued[3] that the Examiner's obviousness findings were "broad and conclusory." Ex.1002, 160; Ex.1003, ¶48. Based on available pages, Applicant's primary arguments were that Tajima "fails to disclose operator control of displayed information on an image display… [and] to disclose a processor in a second operating mode changing the displayed information in response to manipulation of an input device." *Id*., 162; Ex.1003, ¶48.

In the next office action, the Examiner rejected all pending claims as obvious over Tajima in view of additional prior art. Ex.1002, 182-86; Ex.1003, ¶49. The Examiner found that it would have been obvious "to selectively access auxiliary information using a three-way joystick device as taught [in the cited art] in the invention as taught by Tajima et al. to enable access to quantitative position data as well as provide convenience to the surgeon by not having to 'let go' of the controller to grasp a conventional pointing device." *Id*., 184; Ex.1003, ¶49. The Examiner found further that although the art was "not specific as to how the

[3] Multiple pages of Applicant's response are not available in the PTO file history, but certain of Applicant's arguments are described in the available pages.

auxiliary data is located on the display, lacking any criticality, the manner in which the auxiliary data is displayed would have been an obvious matter of design choice to a person of ordinary skill in the art depending upon the particulars of the application." *Id.*, 184-85; Ex.1003, ¶49.

Following an interview with the Examiner (Ex.1002, 190), the Applicant submitted a response amending the pending claims to require manipulation of the master control in three dimensions and argued that "[e]ach of the cited references fail to teach a method wherein the operator can move the surgical instrument by manipulating the control, dissociate the control from the instrument, access auxiliary information by manipulating the control." *Id.*, 200, 206-09; Ex.1003, ¶50.

The Examiner then allowed all pending claims, stating "the prior art does not fairly teach or suggest manipulating a linkage of a master control in three dimensions as applied to the present invention [and, likewise,] the prior art does not fairly teach or suggest a linkage of an input device configured for manipulation in three-dimensions as applied to the present invention." Ex.1002, 222-24; Ex.1003, ¶51.

D. Earliest Possible Priority Date of the '906 Patent

The '906 patent issued from Application No. 09/464,455, filed on December 14, 1999. Ex.1001, cover. The patent claims priority as a continuation-in-part to

Application No. 09/457,406, filed on December 7, 1999. *Id.* It also claims priority to Provisional Application No. 60/111,711, filed on December 8, 1998 (Ex.1009). *Id.* The provisional application does not provide written description support for claims 16 (or its dependents), 51, or 53, and therefore the earliest possible priority date for those claims is December 7, 1999. Ex.1003, ¶29.

Claim 16 requires "accessing a source of auxiliary information" and "displaying the auxiliary information" by using the same master control that operates a surgical "end effector" while the user is "viewing a real time image of a surgical site." Ex.1003, ¶30. Claims 51 and 53 require two distinct operating modes, one in which the user operates the end effector using the master control while viewing a live image of the surgical site, and a second in which the user operates the master control to "chang[e] the displayed information" to add information relevant to the surgical procedure on the image display. Ex.1003, ¶30. As discussed below, the parties' proposed constructions in the co-pending litigation demonstrate that the parties agree that the "changing the displayed information" limitation of claims 51 and 53 requires that the claimed system/method display both (i) a live image of the surgical site and (ii) information relevant to the procedure (*i.e.*, information other than the live image). Ex.1003, ¶30.

While Application No. 09/464,455 has relevant disclosure now included in the ’906 patent specification, *see supra* III.B. Summary of the ’906 Patent, a visual or automated comparison reveals there is basically no overlap between the ’906 specification and the provisional disclosure. Ex.1003, ¶31. The provisional application does not disclose displaying auxiliary information or information relevant to the procedure on the display aside from a live image of the surgical site. Ex.1003, ¶31. The provisional application discloses an image display that can display a real time image of a surgical site during a procedure, and it further discloses that an operator can change the zoom or the angle of that real time image. *See, e.g.*, Ex.1009, 1:30-32, 2:9-11, 5:23-26, 6:4-5, 6:15-19, 6:21-24, 7:6-8, FIGs. 3-5; Ex.1003, ¶31. But aside from the real-time image of the surgical site itself, the provisional does not describe displaying any additional auxiliary or relevant surgical information as required by claims 16, 51, and 53. Ex.1003, ¶31. Nor then does the provisional disclose using the same master control both (1) to operate the surgical end effector and, (2) when disassociated from the end effector (claim 16) or in a second operating mode (claims 51 and 53), to access and display auxiliary information (claim 16) or information relevant to the procedure (claims 51 and 53) other than a live image of the surgical site. Ex.1003, ¶31. All of the supporting disclosure for these integral features of the challenged claims included in Application No. 09/464,455 which issued as the ’906 patent, some of which is

cited in § III.B above, is missing from Provisional Application No. 60/111,711. Ex.1003, ¶31.

Because the provisional does not disclose written description support for these elements of the claims, none of claims 16, 51, and 53 (or their dependent claims) can claim the benefit of the provisional's filing date. Ex.1003, ¶32. Thus, for purposes of this Petition, the claims' earliest possible priority date is December 7, 1999.[4] Ex.1003, ¶32.

E. Person of Ordinary Skill in the Art

A person of ordinary skill in the art would have been a person with a good working knowledge of robotics and medical devices such as endoscopes. Ex.1003, ¶38. That knowledge would have been gained by an undergraduate education in electrical engineering, mechanical engineering, robotics, biomedical engineering,

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[4] The parent CIP application 09/457,406 does not appear to provide support for these limitations either. Ex.1003, ¶33. However, its December 7, 1999 filing date is only one week before Application No. 09/464,455 was filed and is well after May 1999, when Wang '099 was filed, and well after all other prior art relied upon herein. Ex.1003, ¶33. Accordingly, the one week difference has no impact on this Petition and Petitioner uses December 7, 1999, as the earliest possible priority date for purposes of this Petition. Ex.1003, ¶33.

or a related field of study, along with about two years of experience in academia or industry studying or developing robotics or medical devices such as robotic surgical systems or endoscopes. Ex.1003, ¶38. This description is approximate; varying combinations of education and practical experience also would be sufficient. Ex.1003, ¶38.

IV. Claim Construction

Claims "shall be construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent." 37 C.F.R. § 42.100(b); *see Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). Claim construction requires consideration of "the words of the claims themselves, the remainder of the specification, the prosecution history, and extrinsic evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art." *Phillips*, 415 F.3d at 1314. The specification is "usually" dispositive and "the single best guide to the meaning of a disputed term." *Id.*, 415 F.3d at 1315 (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). Absent any special definitions, claim terms receive their "ordinary and customary meaning" as would be understood by one of ordinary skill in the art at

the time of the claimed invention. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007) (quoting *Phillips*, 415 F.3d at 1312).

Auris proposes constructions for several terms below. However, because the teachings of the prior art references are squarely within the scope of the challenged claims even under Petitioner's narrower constructions, the Board likely will not need to adopt specific constructions to resolve any dispute. *See Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (claim terms need only be construed to the extent necessary to resolve the case).

A. "end effector" (claims 16, 51, and 53)

Claims 16 and 51 specify "*moving an end effector… so as to [prepare for or] perform at least part of a surgical procedure*" and claim 53 specifies "*a surgical end effector*." The term "*end effector*" should be construed as a device at end of a surgical instrument for manipulating (cutting, grasping or otherwise acting on) body tissue. In the co-pending litigation, Intuitive has proposed that "end effector" should be construed as a device at the end of an instrument, designed to interact with the environment. Ex.1012; Ex.1003, ¶61.

As the plain language of the claims provides, the end effector is used to perform a surgical procedure. The specification's description of an "end effector" is consistent with the claims. The specification provides that "[t]ypical surgical end effectors include clamps, graspers, scissors, staplers, and needle holders, for

example." Ex.1001, 2:13-15. It also provides that "the end effector 60 can be in the form of any desired surgical tool, e.g., having two members, or fingers, which pivot relative to each other, such as, for example, scissors, pliers for use as needle drivers, or the like. Instead, it can include a single working member, e.g., a scalpel, cautery electrode, or the like." *Id*., 8:14-19, 8:8-11. Thus, a surgical end effector is a device at end of a surgical instrument for manipulating (cutting, grasping or otherwise acting on) body tissue. Ex.1003, ¶62.

Intuitive's proposed construction, which simply recites interacting with the environment, is too broad because it would capture end effectors that do not manipulate body tissue or could not perform part of a surgical procedure as required by the claims. As explained below, the prior art renders obvious "*end effector*" under either parties' construction. Ex.1003, ¶63.

B. "master control"/"master" (claims 16, 51, and 53)

Claims 16 and 51 specify a "*master control*" and claim 53 specifies a "*master*," and all three claims provide that the master can be manipulated in three dimensions. The term "*master [control]*" should be construed as a user control device having links connecting joints that processes received three-dimensional input to command a slave device to perform corresponding three-dimensional movement. In the co-pending litigation, Intuitive has proposed that "*master*

[control]" should be construed as an input device of a master-slave configuration. Ex.1012; Ex.1003, ¶64.

The '906 patent explains that a master control is one that can be manipulated in multiple dimensions and that the manipulation causes a corresponding movement of the slave end effector. Ex.1001, 10:1-5 (describing a "method whereby control between master movement and corresponding slave movement is achieved"), 10:47-50 ("when the master is moved from one position to a next position, the corresponding movement of the slave to respond is computed at about 1300 Hz"); *see generally id*., 10:1-52. The result is that the end effector tracks the movement of the master, *id*., 11:51-54 ("a control system employed to cause the slave to track master input is generally and schematically indicated by reference numeral 200"); *see generally id*., 11:1-65, though the end effector's movements can be scaled, *id*., 12:24-31. The patent further explains: "To move the orientation of the end effector 60 and/or its position along a translational path, the surgeon simply moves the pincher formation 86 to cause the end effector 60 to move to where he wants the end effector 60 to be with reference to the image viewed at the viewer 14. The end effector position and/or orientation can be arranged to follow that of the pincher formation 86." *Id*., 9:23-29. Ex.1003, ¶65.

As explained below, the prior art renders obvious "*master [control]*" under either parties' construction. Ex.1003, ¶66.

C. "changing the displayed information" (claims 51 and 53)

The term "*changing the displayed information*" should be construed as adding, under operator control, information relevant to the surgical procedure to an existing live image of the surgical site. In the co-pending litigation, Intuitive has proposed that this term should be construed as adding information relevant to the surgical procedure together with a live image of the surgical site. Ex.1012. Thus, the parties agree that this limitation requires displaying both (i) a live image of the surgical site and (ii) information relevant to the procedure (*i.e.*, information other than the live image). Ex.1003, ¶67.

The plain language of the claim requires that "*changing the displayed information*" be done "*in response to the manipulation of the input device*." The claim also provides that an operator manipulates the input device. During prosecution, the applicant distinguished the prior art on the basis of this limitation, explaining to the Office that "Tajima fails to disclose ***operator control*** of displayed information on an image display." Ex.1002, 160, 162-63 (emphasis added). Thus, the applicant disclaimed systems that are not under operator control. Ex.1003, ¶68.

Because the claim specifies "changing" the displayed information, that means the system must already be displaying information. Thus, the claim is limited to adding new information (and potentially removing the old information) to an existing live image of the surgical site. This is consistent with the

specification, which repeatedly states that an operator uses the master control to selectively access or change the information that is displayed on or near an existing live image. *E.g.*, Ex.1001, Abstract, 3:28-39, 4:3-34, 5:20-44, 12:41-13:16, 13:22-14:44, 15:24-54, 15:67-16:6, 16:37-44, 17:9-51, 19:10-29, 19:41-46, 20:1-21, 20:22-26:5, 26:26-52, 27:42-55, Figs. 11, 12, 13A, 13B, 14, 16A, 16B, 17A, 17B. Ex.1003, ¶69.

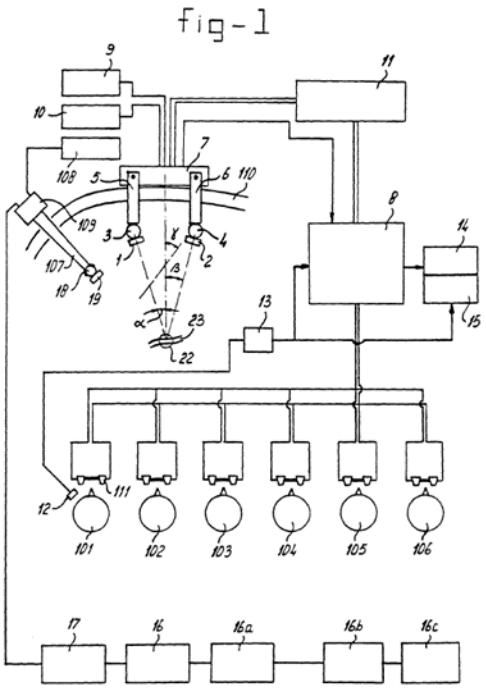
As explained below, the prior art renders obvious "*changing the displayed information*" under either parties' construction. Ex.1003, ¶70.

V. Summary of the Prior Art

A. Summary of Borst

Borst was published on January 19, 1995, more than one year before the '906 patent's earliest possible priority date of December 7, 1999. Borst is therefore prior art under at least pre-AIA 35 U.S.C. § 102(b). Ex.1003, ¶71.

Borst describes "a minimally invasive robotic surgical system that integrates automated target tracking of a moving body part by robotic surgical tools with stereoscopic video-image guided control of these tools by the surgeon." Ex.1004, 1:9-17; Ex.1003, ¶72.



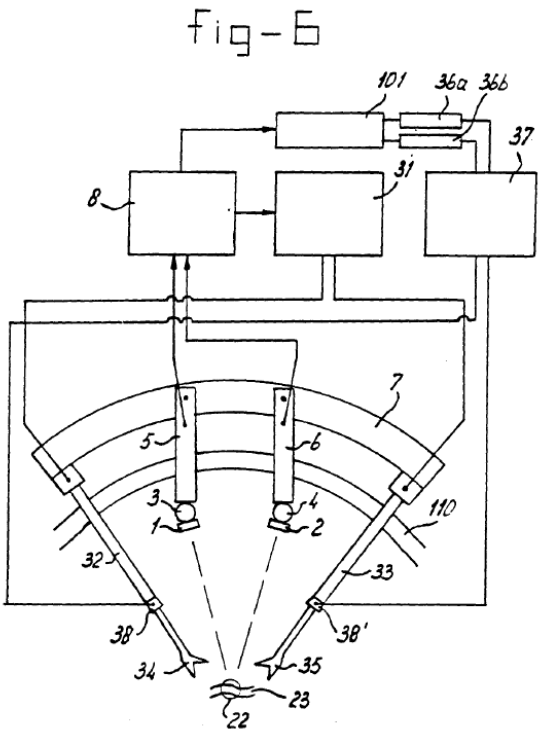
The Borst system comprises:

"a) thoracoscopic ***3D video-imaging of the surgical target area*** and ***stereoscopic video display in operating spectacles***; b) ***3D video-tracking of beacons in the vicinity of the surgical target area***…; c) virtual target image arrest by real time image manipulation to minimize beacon movement; d) target motion compensated ***thoracoscopic robot arms with thoracoscopic surgical tools which track the moving target in real time***; e) ***surgeon directed manipulation of robotic surgical tools with the surgeon's motions superimposed on the automated tracking motions***; f) voice command control [of several features]…"

Ex.1004, Abstract, *see also id.*, 1:9-17 (describing "system that integrates … stereoscopic video-image guided control …"); Ex.1003, ¶73.

Video imaging and tracking is provided by "at least a first and second camera to be mounted… to direct their respective optical ranges to a moving target" that produce "output signals containing video images of the moving target," which are provided to an "image processor" that then sends them to a "display means." Ex.1004, 7:25-8:9. The "primary surgeon 101 has a microphone 12 which allows voice activation of the digital zoom capability of the images from the CCD cameras 1, 2 by a voice control unit 13.… [T]he zooming may be provided by other means than by voice activation, e.g. by a foot switch." *Id*., 18:25-19:1. Ex.1003, ¶74.

Figure 6, below, "is a schematic diagram of ***operator controlled (scaled) motions of surgical instruments*** which are superimposed on automated target tracking movements of robotic arms with surgical instruments." Ex.1004, 15:25-28. Ex.1003, ¶75.



Borst explains that the surgeon manipulates control robotic instruments, such as tweezers, and the system translates the surgeon's movement of the control instrument to a corresponding movement of an output surgical instrument mounted at the end of the robotic arm[5]:

> "The ***surgeon 101 manually handles control robotic instruments 36a, 36b*** (with left hand and right hand, respectively) (e.g. tweezers)

[5] Borst describes the surgical instrument at the end of a robotic arm as a "robotic surgical instrument" (Ex.1004, 24:2), an "output surgical instrument" (23:33-34), or a "manipulation instrument" (9:2). For clarity, this Petition will refer to that instrument using the term "output surgical instrument" or "output instrument."

> which control a robotic computer system 37, which in turn steers by means of independent controls 38, 38' ***the output surgical instruments 34, 35*** (robotic telesurgery) which are mounted on the tracking robot arms 32, 33. ***Any movement of the surgeon 101 with the control robotic instruments 36a, 36b is translated*** - with or without voice command controlled scaling down of movements - ***to the robotic surgical instruments 34, 35***. The combined motion of robotic surgical instrument 34 resulting from the ***control signals generated by tracking control 31 and the control robotic instrument 36a results in operation on the moving target 22 by robotic surgical instrument 34***. The same applies to surgical instrument 35."

Ex.1004, 23:30-24:11, *see also id.*, 8:15-9:9 ("one manipulation instrument to be connected to the robot arm and to a robotic computer system to control its actions… one control robotic instrument to be manually operated and connected to the robotic computer system to supply the robotic computer system with control signals."); Abstract ("surgeon directed manipulation of robotic surgical tools with the surgeon's motions superimposed on the automated tracking motions"). Even though Borst does not use the words "master" and "slave," a POSA would have understood that Borst describes a master-slave configuration, where the surgeon manipulates the master control in three dimensions and these movements are translated to corresponding movements by the slave instrument. Ex.1003, ¶76.

B. Summary of Salvati

Salvati issued on December 13, 1994, more than one year before the '906

patent's earliest possible priority date of December 7, 1999. Salvati is therefore prior art under at least pre-AIA 35 U.S.C. § 102(b). Ex.1003, ¶77.

Salvati is "directed to a consolidated control handle and viewing screen for a video borescope or endoscope or the type having a remotely articulated tip." Ex.1005, 1:7-11. "An endoscope is a medical device which can be inserted into a body cavity, e.g. the esophagus or colon, for diagnostic or surgical purposes." *Id*., 1:20-26; Ex.1003, ¶78.

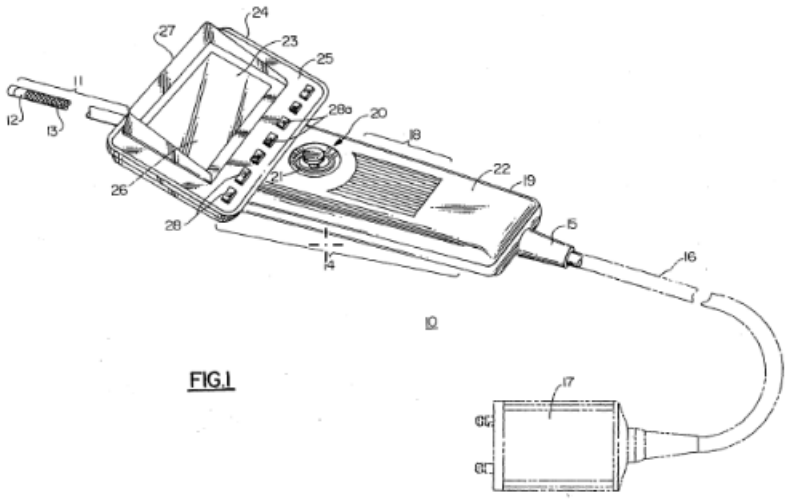


FIG.1

The distal end of the endoscope is inserted into the human body and the "proximal end of the insertion tube 11 terminates in a combined control handle and viewing screen assembly 14" and "[t]he module 17 contains video processing circuitry matched to the video camera which is incorporated into the viewing head 12." Ex.1005, 3:56-4:3. "Distally of the joystick device 20 is a small, full-color viewing screen 23." *Id*., 4:20-24. Ex.1003, ¶79.

The two-dimensional "joystick device 20 is mounted on a circuit board 30

within the housing 19 and has an associated X-axis variable resistance 31 and Y-axis variable resistance 32." Ex.1005, 4:42-44.

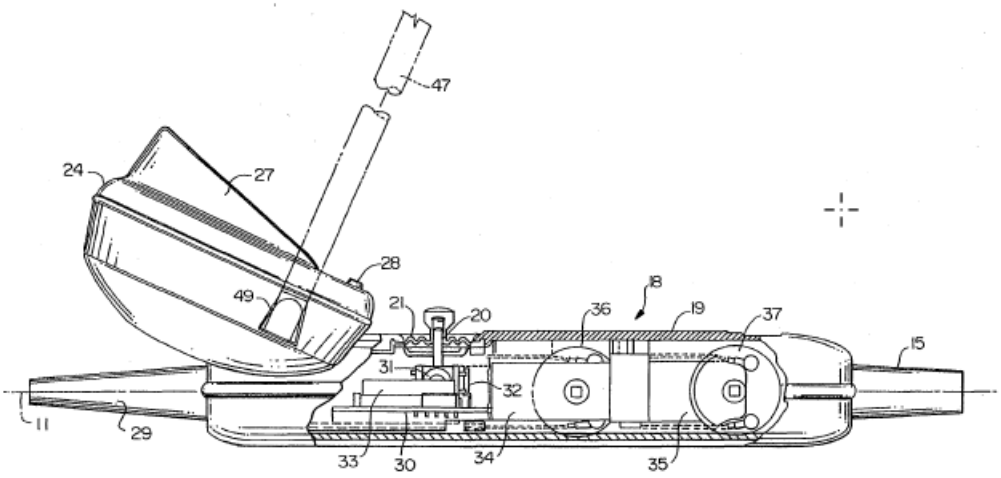


FIG.2

"Positioned within the housing 19… X and Y servo motors 34 and 35… [that] produce differential displacement in the respective cable pairs [that] flexes the articulation section 13 in the sideways direction (left to right) or the up-and down direction." Ex.1005, 4:47-61. Ex.1003, ¶80.

The Salvati system operates in two distinct modes, inspection mode and freeze-frame mode. The joystick "can serve a dual function; in a first mode controlling the bending of the endoscope… articulation neck; and in a second mode controlling the cursor position of the viewing screen." Ex.1005, 2:29-34. "In the inspection mode, the joystick device 20 is operatively coupled to the servo motors 34 and 35, so that movement of the joystick 20 produces a corresponding movement of the articulation section 12." *Id.*, 4:57-61, *see also id.*, 5:7-15. "In the

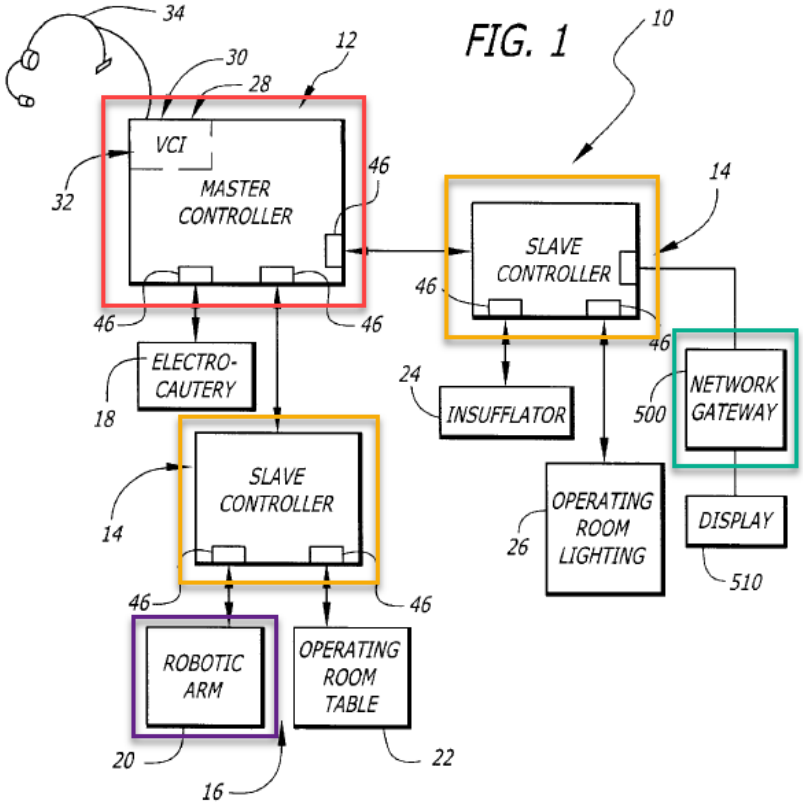
second, or freeze-frame mode… a single frame of the video signal that represents the target 38 is seized and stored, and is fed continuously to the video screen 23." *Id*., 5:16-19. Movement of the joystick moves a cursor within the frozen image, and allows the operator to select points of the image for measurement. *Id*., 5:28-34. To switch between modes "depress the freeze-frame keyswitch 28a." *Id*., 5:37-39, 4:34-37. Ex.1003, ¶81.

C. Summary of Wang '099

Wang '099 was filed on July 15, 1999, and issued on December 17, 2002. As explained above, the '906 patent's earliest possible priority date is December 7, 1999. Wang '099 is therefore prior art under at least pre-AIA 35 U.S.C. § 102(e). Ex.1003, ¶82.

Wang '099 discloses a "medical system that can be used to perform a surgical procedure [and that] includes a network gateway that can retrieve remotely located patient data and display the data on a monitor at the surgical site." Ex.1006, Abstract. The system has a "master controller for selecting and controlling a plurality of devices" that receives user commands and converts them into signals that control other devices in the system. *Id*., 2:13-20. "Each of the plurality of devices to be controlled are in electrical communication or in wireless communication with the master controller, either directly or via a slave controller…." *Id*., 2:15-20. Ex.1003, ¶83.

Referring to Figure 1 below, the master controller 12 could, for example, be used with "robotic arm 20 for holding and manipulating an endoscope… [that] is electrically connected with the master controller 12 via one of the at least one slave controllers 14." Ex.1006, 4:35-48. The master and slave controllers are emphasized in Figure 1 (highlighted) below, with red and yellow respectively, and the robotic arm is emphasized with purple:



"Also in electrical communication with the master controller 12 via a slave controller is an operating room table 22, an insufflator 24, and an operating room lighting system 26. It is envisioned that any electrically controlled device utilized in an operating room environment may be attached to the master controller 12."

Ex.1006, 4:35-48. Rather than having a separate interface for each device in an operating room, "[t]he master controller 12 is configured to provide a main user interface for each of the devices electrically connected thereto." *Id*., 4:49-57. Ex.1003, ¶84.

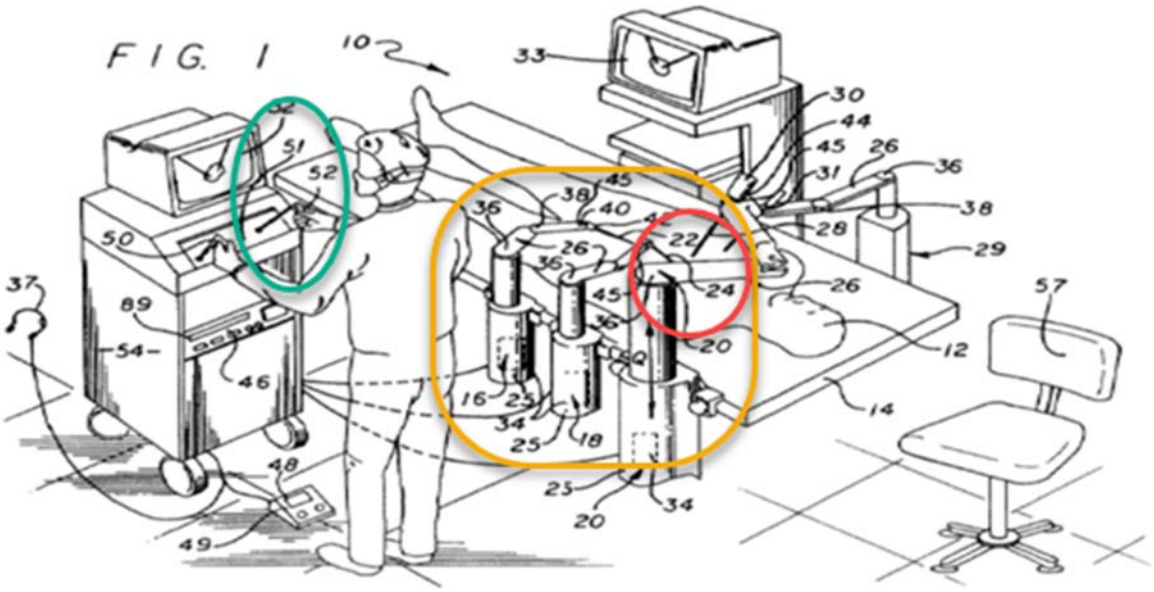
The medical system "may include a connection to a hospital computer network via a network gateway 500" (emphasized with green above) which may be a personal computer. Ex.1006, 10:21-31. "By connecting to the hospital network, patient information that is available at computer terminals in the hospital would also be made available in the operating room." *Id*., 10:31-33. Ex.1003, ¶85.

D. Summary of Wang '850

Wang '850 was filed on June 11, 1997, and issued on August 15, 2000. The '906 patent's earliest possible effective priority date is December 7, 1999. Wang '850 is therefore prior art under at least pre-AIA 35 U.S.C. § 102(e). Ex.1003, ¶86.

Wang '850 discloses a surgical system that "includes a pair of surgical instruments that are coupled to a pair of robotic arms [and] have end effectors that can be manipulated to hold and suture tissue." Ex.1007, Abstract. "The surgeon manipulates the handles and moves the end effectors to perform a cardiac procedure such as a coronary artery bypass graft." *Id*. "The system may also have a robotically controlled endoscope which allows the surgeon to remotely view the

surgical site." *Id.* Ex.1003, ¶87.



Surgeon control is implemented using a master-slave configuration:

> "The movement and positioning of instruments 22, 24 attached to the first and second articulate arms 16 and 18 is controlled by a surgeon at a pair of master handles 50 and 52 [(green oval)]. ***Each of the master handles 50, 52 which can be manipulated by the surgeon, has a master-slave relationship with a corresponding one of the articulate arms 16, 18 [(yellow oval)] so that movement of a handle 50 or 52 produces a corresponding movement of the surgical instrument 22, 24 [(red oval)] attached to the articulate arm 16, 18.***"

Ex.1007, 7:21-40, *see also id.*, Abstract ("The robotic arms are coupled to a pair of master handles by a controller. The handles can be moved by the surgeon to produce a corresponding movement of the end effectors."). Ex.1003, ¶88.

E. Motivation to Combine

Borst, Salvati, Wang ’099, and Wang ’850 all disclose robotic surgical systems as of ’906 patent’s December 1999 priority date. Ex.1003, ¶89. As of that date, a POSA would have been very familiar with the basic features of such systems that are included in the challenged claims and disclosed by these references. Ex.1003, ¶89. Moreover, a POSA in medical robotic surgical systems would have known how to successfully modify and adapt the devices and systems by using components and concepts from other devices and systems, or by modifying existing features or adding new ones. Ex.1003, ¶89.

The four references have similar features, and are directed to the same field of endeavor. Ex.1003, ¶90. All four references disclose robotic systems for performing medical procedures, and Borst, Wang ’099, and Wang ’850 disclose robotic surgery systems. Ex.1004, 1:9-17; Ex.1005, 1:7-26; Ex.1006, Abstract; Ex.1007, Abstract; Ex.1003, ¶90. All four disclose a display for displaying an image of the procedure. Ex.1004, 7:25-8:9; Ex.1005, 3:56-4:24; Ex.1006, Abstract; Ex.1007, Abstract, FIG. 1, 6:15-17; Ex.1003, ¶90. All four disclose a controller manipulated by a physician that allows the physician to control the tip of a robotic arm. Ex.1003, ¶90. In view of these similarities between the Borst, Salvati, Wang ’099, and Wang ’850 systems, a POSA would have been motivated and found it obvious to incorporate certain features disclosed in Salvati, Wang ’099, and Wang ’850 into the implemented Borst system. Ex.1003, ¶90.

In particular, and as explained more fully below, a POSA would have understood that the control surgical instruments of Borst could be modified to include features of the controllers described in the other references. Ex.1003, ¶91. The Examiner made the same finding during prosecution, explaining that it would have been obvious in incorporate additional features into a master control. Ex.1003, ¶91. For example, the Examiner found it would have been obvious "to use the same master control for manipulating a surgical tool and accessing auxiliary data to provide a more efficient means for performing a surgical procedure and to additionally reduce distraction to the surgeon." Ex.1002, 149; Ex.1003, ¶91. The Examiner also found that controlling the surgical tools and accessing auxiliary data "individually" would "provide a safer means for performing a procedure while avoiding unintentional movements." *Id*.

1. Borst and Salvati

Borst discloses a control robotic instrument that a surgeon uses to control an output surgical instrument at the tip of a robotic arm as well as a mouse or joystick to control a cursor or mouse on the screen to interact with the system. Ex.1004, Abstract, 20:35-21:2; Ex.1003, ¶92. Salvati likewise describes a robotic system where the operator can control the robotic movement of an endoscope and can also control a cursor on the display screen to interact with the system. Ex.1005, 2:29-34, 5:7-39; Ex.1003, ¶92. Salvati explains that using a single input control (*e.g.*, a

single joystick) with two different operating modes to perform the "dual function" of controlling the robotic instruments and modifying the information on the display "avoids the need for a second similar device and eliminates the need for a separate keypad." Ex.1005, 4:62-5:45; Ex.1003, ¶92. Salvati explains that prior art approaches that used separate input devices were inconvenient. Ex.1005, 2:11-19 Ex.1003, ¶92.

A POSA considering Borst would have recognized that Borst's separate control devices could be simplified using the techniques described in Salvati to achieve the exact benefit described in Salvati: avoiding the need for a second input device. Ex.1003, ¶93. A POSA would have been motivated to modify Borst to achieve the same benefit by removing the separate joystick/mouse and allowing the control instruments to perform the functions of the joystick/mouse. Ex.1003, ¶93.

2. Borst and Wang '099

A POSA would have been motivated to modify Borst to access and display auxiliary information relevant to the surgical procedure in view of Wang '099. Ex.1003, ¶94. Borst discloses that its displays can show a real-time image of the surgical site along with other information relevant to the procedure, including EKG and haemodynamic parameters, Ex.1004, 19:34-20:4, and different views of the surgical site, *id.*, 19:25-29. Ex.1003, ¶94. A POSA would have recognized that other information could be displayed to the surgeon as well, and would have been

motivated to look to other references describing such information. Ex.1003, ¶94. Wang '099 is one such reference. Ex.1003, ¶94.

Wang '099 discloses a robotic surgery system that could retrieve and display patient data from the hospital network, explaining that "[b]y connecting to the hospital network, patient information that is available at computer terminals in the hospital would also be made available in the operating room." Ex.1006, 10:31-33; Ex.1003, ¶95. Wang '099 further explains that its "master controller 12 is configured to provide a main user interface for each of the devices electrically connected thereto" which provides a doctor with "simpler and more direct" control, reduces movement in the operating room, and increase sterility. *Id.*, 4:49-5:4; Ex.1003, ¶95. A POSA at the time would have known that the ability to access and display relevant auxiliary information using the same master control and same display, was useful, efficient, and minimized distractions from the operation itself. Ex.1003, ¶95. Accordingly, a POSA would have been motivated to modify Borst's system to access and display auxiliary information using the same master control as taught by Wang '099. Ex.1003, ¶95.

In addition, selecting the presentation format of any auxiliary information would have been a matter of simple design choice. Ex.1003, ¶96. The Examiner recognized that "the manner in which the auxiliary data is displayed would have been an obvious matter of design choice to a person of ordinary skill in the art" and

"it would have been obvious at the time the invention was made to move the windows or change the dimensions by selecting and 'dragging' as is well known in the art." Ex.1002, 150, 184-85; Ex.1003, ¶96. A POSA would have understood that Borst's system could be modified to incorporate the ability to obtain and display auxiliary information from Wang '099 with a high degree of predictability and that it would work as expected. Ex.1003, ¶96.

3. Borst and Salvati or Wang '099 in Further View of Wang '850

Borst discloses control robotic instruments that, when moved by a surgeon, cause corresponding scaled movements to output surgical instruments. Ex.1004, 15:25-28, 23:30-24:2; Ex.1003, ¶97. Borst does not explicitly describe the details about how its system measures the movement of the control instrument or how it translates that to movement of the output instruments at the tip of the arms. Ex.1003, ¶97. If needed, a POSA would have looked to other references that describe the structure and functionality of master-slave devices for the implementation details of those features. Ex.1003, ¶97.

One such reference is Wang '850, which describes how a surgical system can read the movement of a master control instrument and translate that into a corresponding movement of a slave instrument. Ex.1007, Abstract, 7:21-40; Ex.1003, ¶98. Wang '850 describes a conventional structure for a master-slave surgical system, including the mechanical features of the master control and the

software and electronics for translating movement of the master to movement of the slave. *Id.* A POSA would have recognized that Wang '850's control system could have been used to implement Borst's control robotic instruments and read and translate movements of the controls to corresponding movements of the robotic arms and output instruments. Ex.1003, ¶98.

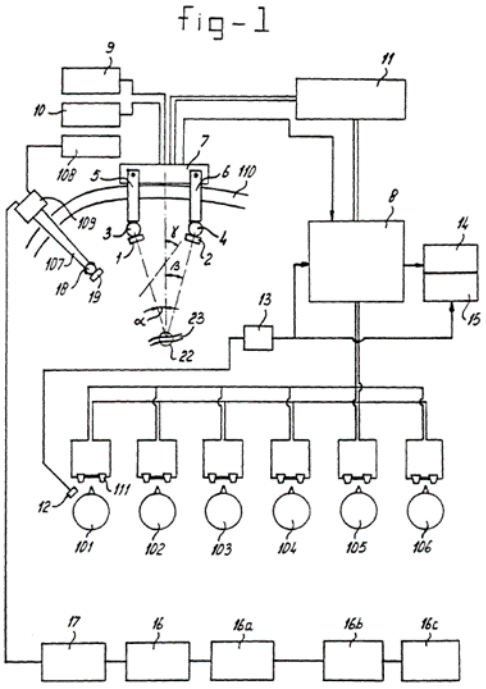
Thus, a POSA considering Borst in view of either Salvati or Wang '099 would have further considered Wang '850. Ex.1003, ¶99.

VI. GROUND I: Borst and Salvati Render Claims 51 and 53 Obvious

A. Claim 53

1. "A system for performing a surgical procedure at a surgical site on a patient, the system comprising:"

To the extent the preamble is limiting, Borst discloses it. Borst discloses "a ***robotic system*** for observing and remote treatment of moving parts… [T]he invention relates to a ***minimally invasive robotic surgical system*** that integrates automated target tracking of a moving body part by ***robotic surgical tools with stereoscopic video-image guided control of these tools by the surgeon***." Ex.1004, 1:9-17. Borst identifies "***[c]losed chest coronary artery bypass graft surgery***" as an exemplary surgical procedure. *Id.*, 1:9-17. Ex.1003, ¶100.

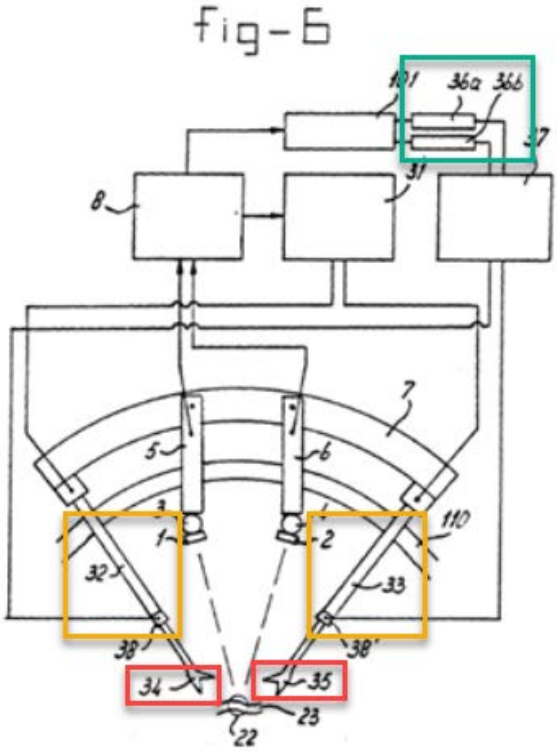


2. "a master having an input device, a linkage of the input device configured for manipulation by a hand of a system operator so as to define a manipulation in three dimensions"

Borst discloses or renders obvious this element. As discussed above, a "*master*" is a user control device having a plurality of links and joints configured to receive three-dimensional input and command a slave device to perform a corresponding three-dimensional movement. Ex.1003, ¶101.

"Master having an input device… to define a manipulation in three dimensions": Borst discloses a medical system that includes "surgeon directed manipulation of robotic surgical tools with the surgeon's motions superimposed on the automated tracking motions." Ex.1004, Abstract. "Figure 6 is a schematic diagram of operator controlled (scaled) motions of surgical instruments which are

superimposed on automated target tracking movements of robotic arms with surgical instruments." *Id.*, 15:25-28. "The surgeon 101 ***manually handles control robotic instruments 36a, 36b*** (with left hand and right hand, respectively) (***e.g. tweezers***) [green boxes above] which control a robotic computer system 37, which ***in turn steers… the output surgical instruments 34, 35*** (robotic telesurgery)." *Id.*, 23:30-24:11. Ex.1003, ¶102.



A POSA would have understood that a surgeon manipulates a control surgical instrument (*e.g.*, tweezers) in multiple dimensions and that Borst's control system detects those movements and causes the output surgical instrument at the tip of the arms to make corresponding movements. Ex.1003, ¶102. Borst explains that the system may "scale" the motions of the control surgical instruments, which means

the system directs the output instruments to make corresponding movements that are smaller in scale but otherwise identical to the movements of the control instruments. Ex.1003, ¶102.

Borst explains that the surgeon can move the control instruments in three dimensions (or more): "[a]ny movement of the surgeon 101 with the control robotic instruments 36a, 36b is translated… to the robotic surgical instruments 34, 35." Ex.1004, 23:30-24:11. Borst explains that the system includes robotics to "translate and rotate" the surgical instruments, indicating the instruments can move in multiple dimensions. Ex.1004, 23:2-6. Borst explains the instruments are used to operate on a moving target such as the coronary artery or a beating heart. Ex.1004, 1:31-34, 19:30-34, 22:23-25, 31:27-28. Ex.1003, ¶103.

A POSA would understand that because the surgeon's movement of the control instrument (*e.g.*, tweezers) is superimposed on the output instrument to allow operation on a moving target, the control instrument can be moved in at least three dimensions ("*define a manipulation in three dimensions*"). Ex.1003, ¶104. As explained for "*linkage…*" below, a POSA would have understood Borst measures the movement of the control instrument using multiple links and joints. Ex.1003, ¶104.

"Linkage of the input device configured for manipulation by a hand of a system operator": Borst explains that a "surgeon 101 manually handles control

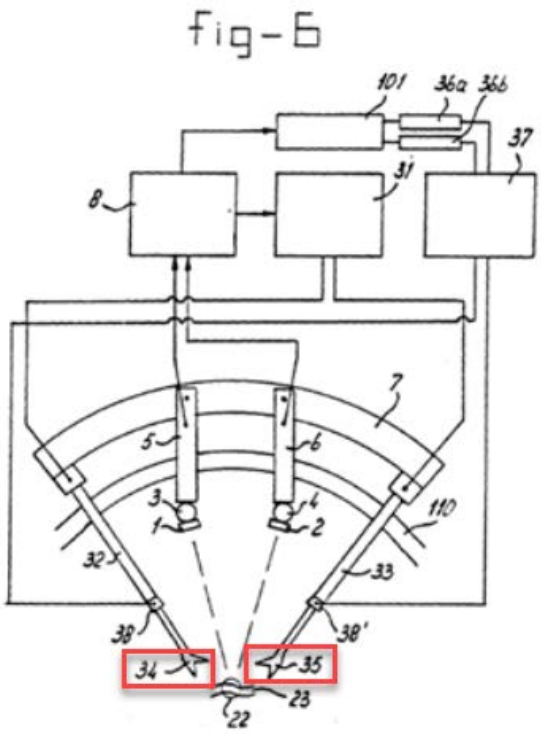
robotic instruments 36a, 36b (with left hand and right hand, respectively) (e.g. tweezers)," and thus, its input device can be "*manipulate[ed] by a hand of a system operator*." Ex.1004, 23:30-35. Ex.1003, ¶105.

Borst explains that "[a]ny movement of the surgeon 101 with the control robotic instruments 36a, 36b is translated… to the robotic surgical instruments 34, 35." Ex.1004, 23:30-24:11. A POSA would have understood that to translate the movements of the control robotic instruments to the corresponding movements of the output instruments, Borst needs to measure the movements of the controls. Ex.1003, ¶106. A POSA would have understood that Borst would have done this by attaching mechanical links to the control instrument and measuring the movement of the links using sensors attached to joints between the links. Ex.1003, ¶106. This was the standard way master controls were created in the 1999 timeframe. Ex.1003, ¶106. Even if Borst were found not to explicitly disclose use of a plurality of joints and links, at the very least, Borst renders doing so obvious as use of joints and links was the standard way of implementing such functionality. Ex.1003, ¶106.

3. "a surgical end effector"

As discussed above, a "*surgical end effector*" is a device at end of a surgical instrument for manipulating (cutting, grasping or otherwise acting on) body tissue. Borst discloses "robotic surgical tools" ("*surgical end effector*") used to, for

example, "perform closed chest coronary artery bypass graft surgery." Ex.1004, Abstract. The "robotic surgical instruments" are emphasized below in red boxes:



Id., 23:30-24:11 ("the output surgical instruments 34, 35 (robotic telesurgery) which are mounted on the tracking robot arms 32, 33. Any movement of the surgeon 101 with the control robotic instruments 36a, 36b is translated … to the robotic surgical instruments 34, 35.…"). Borst states that exemplary instruments include tweezers, staplers, and suturing devices ("*surgical end effector*"). *Id.*, 12:3, 23:30-32, 24:13-15. Tweezers, staplers, and suturing devices manipulate or otherwise act on body tissue. Ex.1003, ¶107.

4. "an image display for displaying information relevant to the surgical procedure"

Borst discloses this element. Borst discloses several displays, including monitors and spectacles worn by the surgeon and others. Ex.1004, 18:15-24, 19:3-6, 19:20-28. Together these devices comprise an "*image display*." Ex.1003, ¶108.

Borst displays a real time image of the surgical site that is captured by "a first and a second camera… mounted… to direct their respective optical ranges to a moving target" such as a beating heart. Ex.1004, 1:9-17, 10:29-32 (displaying "a real time unmodified overview of the target area"). For example, a camera is positioned to position "the target segment 22 of the coronary artery 23 in the middle of its video image." *Id*., 17:29-34, 18:15-17, 19:3-6. Borst also explains that "the entire surgical area of interest is monitored by a standard thoracoscope 107 which as a CCD camera" and output to monitors. *Id*., 19:14-21. The spectacles display a zoomed in image of the surgical site while the monitors provide an overview of the entire surgical field. *Id*., 19:25-28. Ex.1003, ¶109.

Borst explains that the monitors can display additional information relevant to the surgical procedure, including EKG and haemodynamic parameters of the patient. Ex.1004, 19:34-20:4. Borst further explains that a surgeon can freeze an image of the target, and this image is used to create an "arrested video image" of the target (which shows the target as being still) that is displayed at least on the surgeon's spectacles. *Id*., 20:32-21:2, 22:32-23:2, *see also id.*, 7:25-8:9. After

capturing a frozen image, the surgeon can use a mouse or a joystick to define beacons, which are areas on the surface of the target used to generate the arrested video image. *Id*., 20:32-21:2. The beacons are then shown on subsequent images of the target. *Id*., 21:12-14, 22:13-16. Ex.1003, ¶110.

The EKG data, haemodynamic parameters, frozen image, and beacons are all "*information relevant to the surgical procedure.*". Ex.1003, ¶111.

5. "a processor coupling the input device to the end effector and the image display, the processor having first and second operating modes, the processor in the first operating mode effecting movement of the end effector in response to the manipulation of the input device, the processor in the second operating mode changing the displayed information in response to the manipulation of the input device"

Borst in combination with Salvati teaches this limitation. Ex.1003, ¶112.

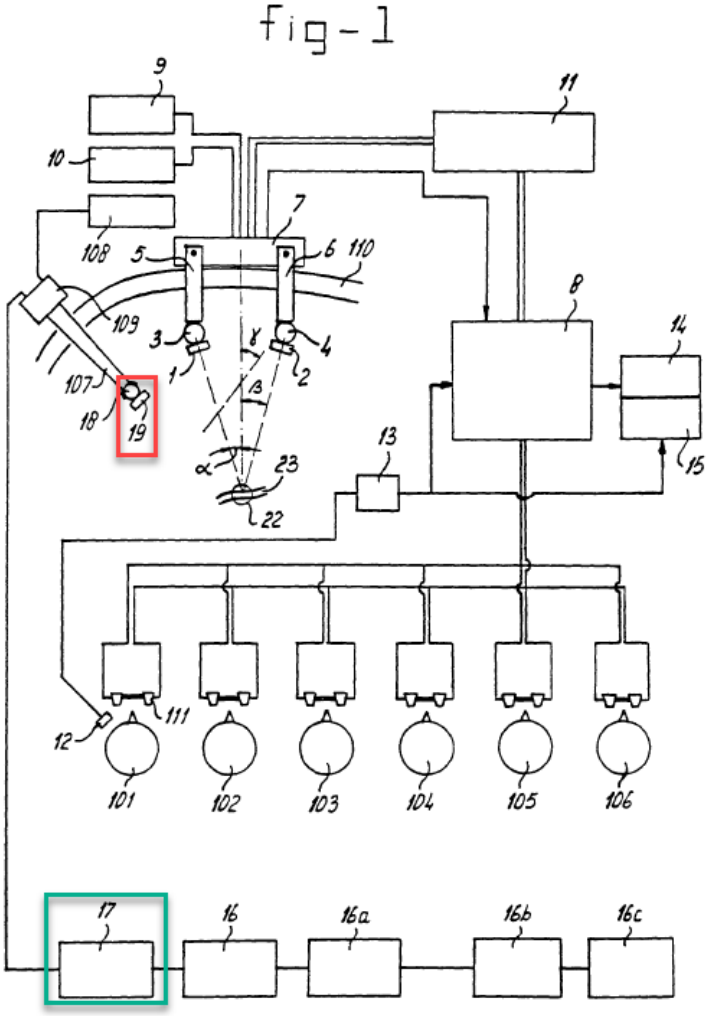
Borst discloses "*a processor coupling the input device to the end effector*" which has a "*first operating mode effecting movement of the end effector in response to the manipulation of the input device*." Borst discloses a "manipulation instrument to be connected to the robot arm and to a ***robotic computer system*** to control its actions" and a "control robotic instrument to be manually operated and connected to ***the robotic computer system*** to supply the robotic computer system with control signals." Ex.1004, 8:15-9:9. The robotic computer system ("*a processor*") thus is coupled to the control robotic instrument ("*input device*") and the output instrument ("*end effector*"). The robotic computer system translates the

surgeon's movements into control signals that the robot uses to correspondingly move the output instruments at the tips of the robotic arms ("*effect movement of the end effector in response to the manipulation of the input device*"). Ex.1004, 13:20-24:11 ("Any movement of the surgeon 101 with the control robotic instruments 36a, 36b is translated… to the robotic surgical instruments 34, 35…"). The robotic computer system also is coupled to the monitors and spectacles ("*image display*"), as the system uses the video images to calculate the movement of the target and such movements are also superimposed on the output surgical instruments. *Id.*, 22:29-23:13, 24:2-6. Ex.1003, ¶113.

Borst also discloses that the robotic computer system can "*chang[e] the displayed information.*" Specifically, Borst discloses that a surgeon can instruct the system to create a frozen image by voice command. Ex.1004, 20:32-33. The surgeon can use a mouse or joystick to interactively define beacons on the surface of the target. *Id.*, 20:35-21:2. These actions would "*change the displayed information*" on Borst's displays. Ex.1003, ¶114.

The Borst system has several displays: "In addition to the ***stereoscopic video image in the operating spectacles system***, the entire surgical area of interest is monitored by a standard thoracoscope 107 which has a CCD camera 19 [red box below] mounted on a ball bearing 18 to allow vision in all directions. … The

output of CCD camera 19 is fed to the video system 17 [green box below]***, which has e.g. 4 monitors connected***." Ex.1004, 19:14-21 (highlighted).



See also id., 10:25-32 ("[T]he medical system defined above further comprises a main camera… to ***supply video image information of any area within the chest to at least one video monitor***."). Ex.1003, ¶115.

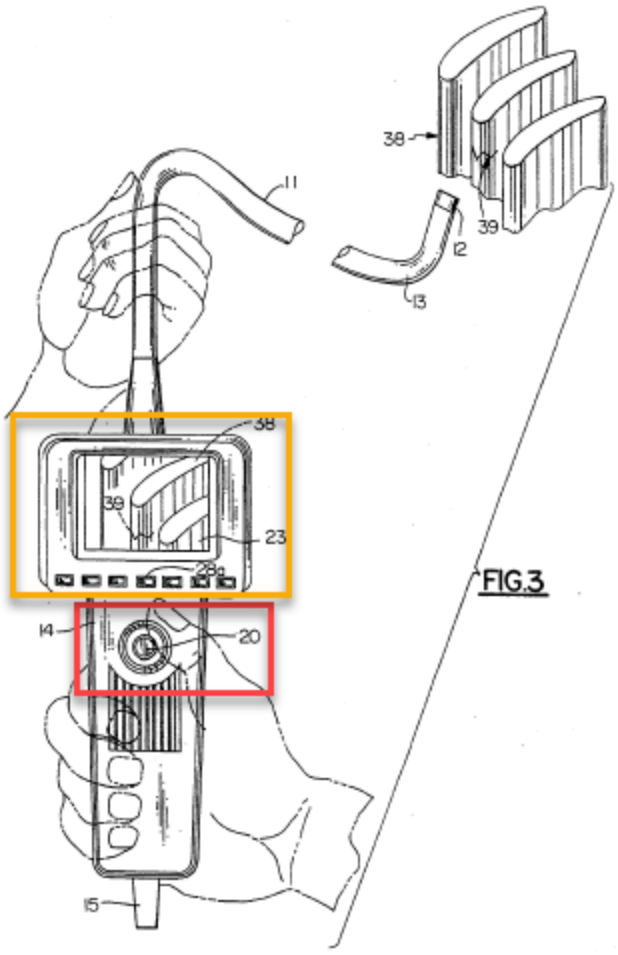
Borst explains that the surgeon can modify the display by selecting a new frozen reference image (Ex.1004, 20:32-22:21) or by zooming the displayed image on one of the displays using a voice command or "other means" such as a foot

switch or, by natural extension, the same master control (*id.*, 18:21-24). The surgeon also can use a mouse or joystick to interactively define beacons that are displayed. *Id.*, 20:35-21:2. Ex.1003, ¶116.

While Borst discloses changing the information on the image display of the robotic surgical system, it does not explicitly disclose that this can be done by the manipulation of the linkage of the master control when the robotic surgical system is in a second operating mode. Ex.1003, ¶117. Instead, Borst shows this is done by a separate mouse or joystick or by voice command. Ex.1003, ¶117. A skilled person would have found it obvious to modify Borst to allow use of the control instruments to change the displayed information in view of at least Salvati. Ex.1003, ¶117.

Salvati discloses "*first and second operating modes*" for a controller allowing "a joystick, trackball, or other manually actuable device [to] serve a dual function; in a ***first mode controlling the bending of the endoscope*** or borescope articulation neck; and in a ***second mode controlling the cursor position of the viewing screen.***" Ex.1005, 2:29-34. Ex.1003, ¶118.

Savlati teaches a "*first operating mode effecting movement of the end effector in response to the manipulation of the input device,*" disclosing use of the controller in "an inspection mode with an operator's left hand holding the control handle" (Ex.1005, 4:62-5:45):



"As shown in FIG. 3, the operator can manipulate the joystick device 20 [red box; "*input device*"], here using the thumb of the same hand that is holding the assembly 14, to steer the viewing head 12 as need be for an optimal position to view the crack 39 on the viewing screen 23 [yellow box; "*image display*"]." Ex.1005, 4:62-5:45 (highlighted). Ex.1003, ¶119.

Regarding the "*second operating mode changing the displayed information in response to the manipulation of the input device*," Salvati discloses that "[w]hen the operator has achieved a satisfactory image of the crack 39, he or she actuates

the freeze-frame keyswitch 28a, which causes the microprocessor 33 to switch over to a freeze-frame mode" where the video screen displays a static image. Ex.1005, 4:62-5:45.

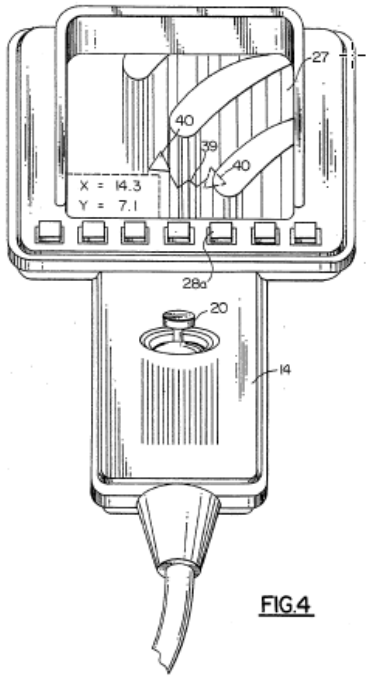


FIG.4

When in this mode, manipulation of the joystick "move[s] the cursor 40 about on the image reproduced on the screen 23, e.g. from one end of the crack 30 to the other" to specify a structure to be measured. Ex.1005, 5:29-32. "When the desired computations are completed, the operator can depress the freeze-frame keyswitch 28a a second time" to "return the probe to its inspection mode, and the joystick device is again operatively coupled to the servo motors 34, 35 to control the remote articulation of the section 13." *Id.*, 5:37-42, *see also id.*, 4:62-5:45. Ex.1003, ¶120.

Summarizing these two functions, Salvati explains: "In the inspection mode, … digital values are furnished ***by the microprocessor to a servo control circuit 46 which operates the servo motors 34 and 35***. In the freeze-frame mode, … [t]he digital values from converters 44, 45 which represent actual joystick positions ***are used in the microprocessor for other purposes, such as cursor position on screen, or to move through an on-screen menu***." Ex.1005, 6:1-10. Ex.1003, ¶121.

Salvati expressly recognizes that benefits of combining two sets of functionality into the same controller: "The dual function of the joystick device as described here avoids the need for a second similar device and eliminates the need for a separate keypad." Ex.1005, 4:62-5:45. Incorporating this functionality into Borst to achieve the exact benefit described by Salvati would have been obvious to a POSA. Ex.1003, ¶122.

Moreover, a POSA would have recognized additional advantages provided by this Salvati's configuration, as such advantages were known in the art. Ex.1003, ¶123. For example, rather than using a separate interface for each device in an operating room, Wang '099 teaches that it is "highly advantageous," Ex.1006, 4:60-67, to use a "master controller 12 [] configured to provide a main user interface for each of the devices electrically connected thereto," *Id.*, 4:49-57, as doing so is simpler, reduces movement in the operating room, and increases

sterility. *Id*., 4:49-5:4. Wang '099 explains that "[i]t is ***envisioned that any electrically controlled device utilized in an operating room environment may be attached to the master controller 12*** either directly or via one of the at least one slave controllers 14." Ex.1006, 4:35-48. Ex.1003, ¶123.

Thus, a POSA would have been motivated to eliminate Borst's joystick or mouse for interacting with the system and instead use Borst's control instruments for that purpose by configuring the control instruments to have multiple modes as taught by Salvati. Ex.1003, ¶124. A surgeon could toggle between modes using Borst's voice commands or a foot pedal or by incorporating Salvati's keyswitch into Borst's system. Ex.1003, ¶124. Doing so would allow the surgeon to toggle Borst's control instruments between multiple modes, for example, one mode that operates the output surgical instruments and another mode that changes information on the display. Ex.1003, ¶124. Using the same master control for these two purposes would provide the two operating modes required by the claim. Ex.1003, ¶124. Given the similarities between Borst and Salvati, the prevalence of master controls with multiple functions, and that nothing about the Borst system prevents such a modification, a POSA would have understood that Borst's system could have been modified to incorporate the dual mode functionality controlled by a master controller with a high degree of predictability and that the modified system would have worked as expected. Ex.1003, ¶124.

B. Claim 51

1. "A method for preparing for or performing a robotic surgical procedure at a surgical site on a patient"

To the extent the preamble is limiting, Borst discloses it for the same reasons it discloses the preamble of claim 53. Ex.1003, ¶125.

2. "manipulating a linkage of a master control of the robotic surgical system in three dimensions while viewing the image display"

Borst discloses or renders obvious this limitation for the same reasons discussed above for the "*a master having an input device, a linkage of the input device configured for manipulation… in three dimensions*" and "*an image display for displaying information relevant to the surgical procedure*" limitations of claim 53. Ex.1003, ¶126.

3. "moving an end effector of the robotic surgical system in response to the manipulation of the linkage of the master control so as to prepare for or perform at least part of a surgical procedure at the surgical site when the robotic surgical system is in a first operating mode"

Borst and Salvati teach this limitation for the same reasons discussed above for the "*a master having an input device…*" and "*a processor coupling the input device to the end effector and the image display, the processor having first and second operating modes…*" limitations of claim 53. Ex.1003, ¶127.

4. "changing the displayed information on the image display of the robotic surgical system in response to the

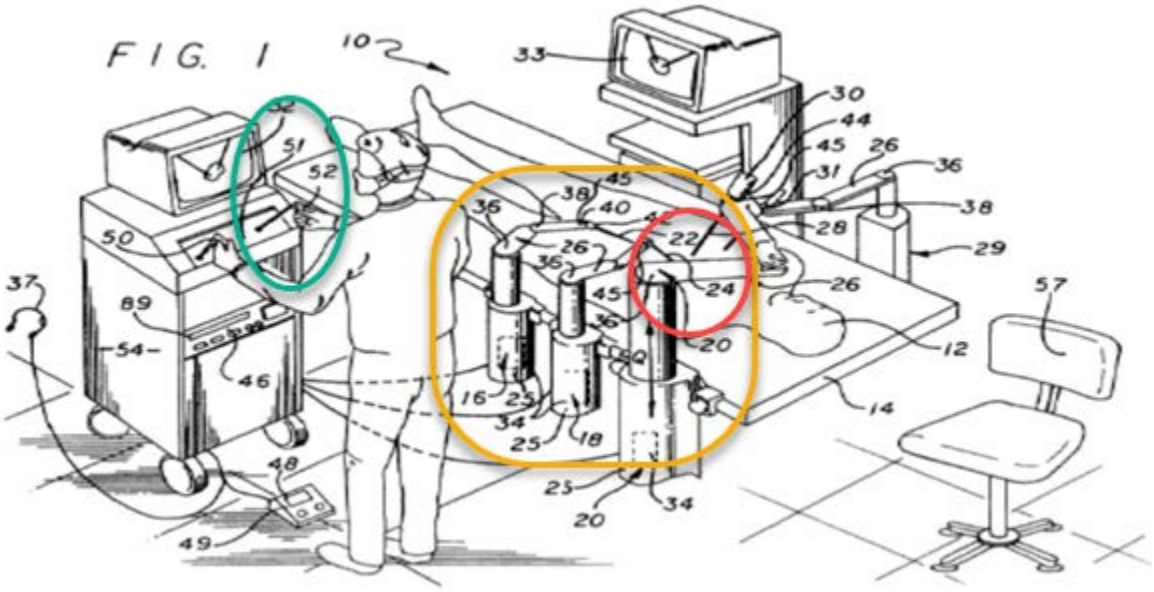
manipulation of the linkage of the master control when the robotic surgical system is in a second operating mode"

Borst and Salvati teach this limitation for the same reasons discussed above for the "*a master having an input device…*" and "*a processor coupling the input device to the end effector and the image display, the processor having first and second operating modes…*" limitations of claim 53. Ex.1003, ¶128.

VII. GROUND II: Borst, Salvati, and Wang '850 Render Claims 51 and 53 Obvious

To the extent the Panel determines that Borst as modified in view of Salvati does not disclose or teach a "*master*" control, a POSA would have found it obvious to modify Borst to include a master control in view of Wang '850. Ex.1003, ¶129.

As illustrated in Figure 1 (highlighted) below, Wang '850 discloses a surgical system that "includes a pair of surgical instruments that are coupled to a pair of robotic arms [and] have end effectors that can be manipulated to hold and suture tissue." Ex.1007, Abstract.



The surgeon control is implemented using a master-slave configuration:

> The movement and positioning of instruments 22, 24 attached to the first and second articulate arms 16 and 18 is controlled by a surgeon at a pair of master handles 50 and 52 [(green oval)]. ***Each of the master handles 50, 52 which can be manipulated by the surgeon, has a master-slave relationship with a corresponding one of the articulate arms 16, 18 [(yellow oval)] so that movement of a handle 50 or 52 produces a corresponding movement of the surgical instrument 22, 24 [(red circle)] attached to the articulate arm 16, 18.***

Ex.1007, 7:21-40. The system typically scales down the surgeon's movement of the master handles to corresponding movements of the end effectors:

> The handles can be moved by the surgeon to produce a corresponding movement of the end effectors. The ***movement of the handles is scaled so that the end effectors have a corresponding movement that is different, typically smaller, than the movement performed by the hands of the surgeon***.

Ex.1007, Abstract. Ex.1003, ¶130.

Wang '850 explains that each handle has multiple joints, sensors, and links that allow the handle to be moved in multiple degrees of freedom:

> Each handle has multiple degrees of freedom provided by the various joints Jm1-Jm5 depicted in FIG. 2. Joints Jm1 and Jm2 allow the handle to rotate about a pivot point in the cabinet 54 or on the stand 900. Joint Jm3 allows the surgeon to move the handle into and out of the cabinet 54 in a linear manner or in a similar manner on the stand 900. Joint Jm4 allows the surgeon to rotate the master handle about a longitudinal axis of the handle. The joint Jm5 allows a surgeon to open and close a gripper.

Ex.1007, 8:31-40, Figs. 2-3, *see also id.*, 8:41-65. The system translates the movements of each handle into corresponding movement by the slave device. *Id.*, 9:9-47. Ex.1003, ¶131.

As discussed above with respect to the "*master having an input device… so as to define a manipulation in three dimensions*" limitation of claim 53 and the "*manipulating a linkage of a master control of the robotic surgical system in three dimensions.*…" limitation of claim 51, a POSA would have understood that Borst discloses a user control device having links connecting joints to receive three-dimensional input and process the input to command a slave device to perform a corresponding three-dimensional movement. Ex.1003, ¶132. Borst discloses that "operator controlled (scaled) motions of surgical instruments… are superimposed

on automated target tracking movements of robotic arms with surgical instruments." Ex.1004, 15:25-28, *see also id.*, 23:30-24:11. Ex.1003, ¶132.

However, to the extent the Board finds that Borst does not disclose a "master" control with a plurality of links and joints, it would have been obvious to a POSA to incorporate this feature in view of Wang '850. Ex.1003, ¶133. Borst discloses a control surgical instrument but does not describe the mechanical and electrical features that allow the system to measure its movements and translate those to movements of an output surgical instrument. Ex.1003, ¶133. The details of such a master/slave system were well-known as shown in Wang '850, and a POSA would have expected the Borst system as modified in view of Wang '850 to operate successfully as expected. Ex.1003, ¶133.

VIII. GROUND III: Borst and Wang '099 Render Claims 16, 22-23, and 25-26 Obvious

C. Claim 16

1. "A method of performing a surgical procedure on a patient"

To the extent the preamble is limiting, Borst discloses it for the same reasons discussed above for the preamble of claim 53. Ex.1003, ¶134.

2. "manipulating a linkage of a master control in three dimensions whilst viewing a real time image of a surgical site on an image display"

Borst discloses this element for the same reasons discussed above for the "*master having an input device [with] a linkage… configured for manipulation by*

a hand… in three dimensions" and "*image display for displaying information relevant to the surgical procedure*" limitations of claim 53. Ex.1003, ¶135.

3. "moving an end effector in response to the manipulation of the linkage of the master control, said end effector visible on said image display, so as to perform at least part of a surgical procedure at the surgical site"

Borst discloses this element for the same reasons discussed above for the "*master having an input device*" and "*first operating mode effecting movement of the end effector in response to the manipulation of the input device*" limitations of claim 53. Borst describes moving the end effector to perform surgery: "The combined motion of robotic surgical instrument 34 resulting from the control signals generated by tracking control 31 and the control robotic instrument 36a ***results in operation on the moving target 22 by robotic surgical instrument 34***." Ex.1004, 13:20-24:11. Ex.1003, ¶136.

Borst discloses that surgical instruments are visible on the display ("*end effector visible on said image display*"). Ex.1003, ¶137. The surgeon can view "left and right video images in operating spectacles" to "concentrate on the target" as the surgical instruments are in contact with the targets (necessitating that the instruments are also being displayed), and the surgeon also can look at "monitor 16 displaying, for instance, the general view of the heart and chest cavity" in which the surgical instruments are being used. Ex.1004, 19:30-20:4; Ex.1003, ¶137.

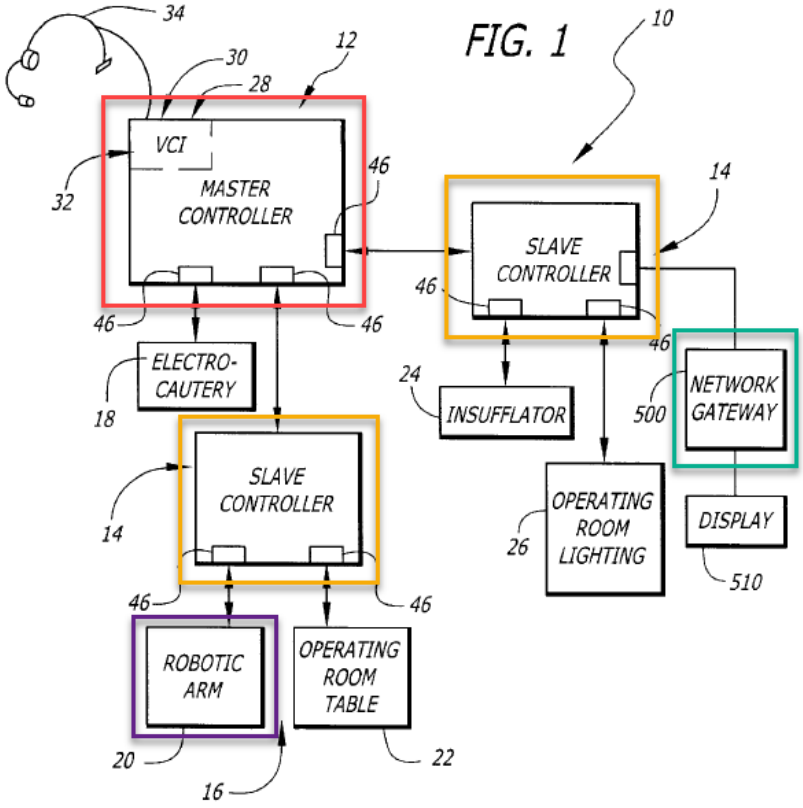
4. "selectively accessing a source of auxiliary information in response to the manipulation of the linkage of the master control"

It would have been obvious to a POSA to modify the system disclosed in Borst to include "*selectively accessing a source of auxiliary information in response to the manipulation of the linkage of the master control*" in view of Wang '099. Ex.1003, ¶138.

Borst discloses the display of a different types of information relevant to the surgical procedure, including "video image information of any area within the chest" (Ex.1004, 10:25-32), video of "the entire surgical area of interest" (*id.*, 19:14-21), and "EKG and haemodynamic parameters of the patient" (*id.*, 20:2-3). A POSA would have recognized that additional relevant information could be displayed, and would have looked to other references that disclose doing so. Ex.1003, ¶139.

Wang '099 discloses a "medical system that can be used to perform a surgical procedure [that] includes a network gateway that can retrieve remotely located patient data and display the data on a monitor at the surgical site." Ex.1006, Abstract. Wang '099 discloses that its "master controller 12 is configured to provide a main user interface for each of the devices electrically connected thereto." *Id.*, 4:49-57, *see also id.*, 2:1-20, 4:35-48. The medical system "may include a connection to a hospital computer network via a network gateway

500" (green box below) which may be a personal computer. Ex.1006, 10:21-22. "By connecting to the hospital network, patient information that is available at computer terminals in the hospital would also be made available in the operating room." *Id.*, 10:30-33. Figure 1 (highlighted) below depicts the relevant components (the master and slave controllers in red and yellow boxes respectively, the robotic arm in a purple box (*see* Ex.1006, 4:35-48)):



Ex.1003, ¶140.

It would have been obvious to a POSA to modify Borst in view of Wang '099 to include using the control instruments ("*master*") to access auxiliary patient data. Ex.1003, ¶141. Wang '099 teaches that the ability to access a patient's file,

for example preoperative images and other diagnostic information, is useful to a surgeon during the operation because it provides additional information relevant to the procedure. Ex.1006, Abstract, 10:21-33; Ex.1003, ¶141. As disclosed by Wang '099, enabling access using the same master control and displaying the auxiliary information on the same viewing screen simplifies the procedure by allowing the surgeon to more easily manipulate and observe the operating room environment. Ex.1006, 1:33-36; Ex.1003, ¶141. Nothing in Borst prevents its system from being modified in this manner and a POSA would have had a reasonable expectation that the modified system would have worked as desired. Ex.1003, ¶141.

5. "displaying the auxiliary information on the image display"

A POSA would have found it obvious to design the Borst system, as modified in view of Wang '099, to include accessing auxiliary information, to include "*displaying the auxiliary information on the image display*." As discussed above, both Borst and Wang '099 include one or more image displays that display the surgical area and information relevant to the surgical procedure. Ex.1003, ¶142.

Wang '099 discloses that the "network gateway… can retrieve remotely located patient data and display the data on a monitor at the surgical site." Ex.1006, Abstract, *see also id*., 10:21-59 ("the patient data may be sent to the

gateway 500 in a format to be displayed by either a monitor 510 connected to the gateway or directly to the monitor.…). Ex.1003, ¶143.

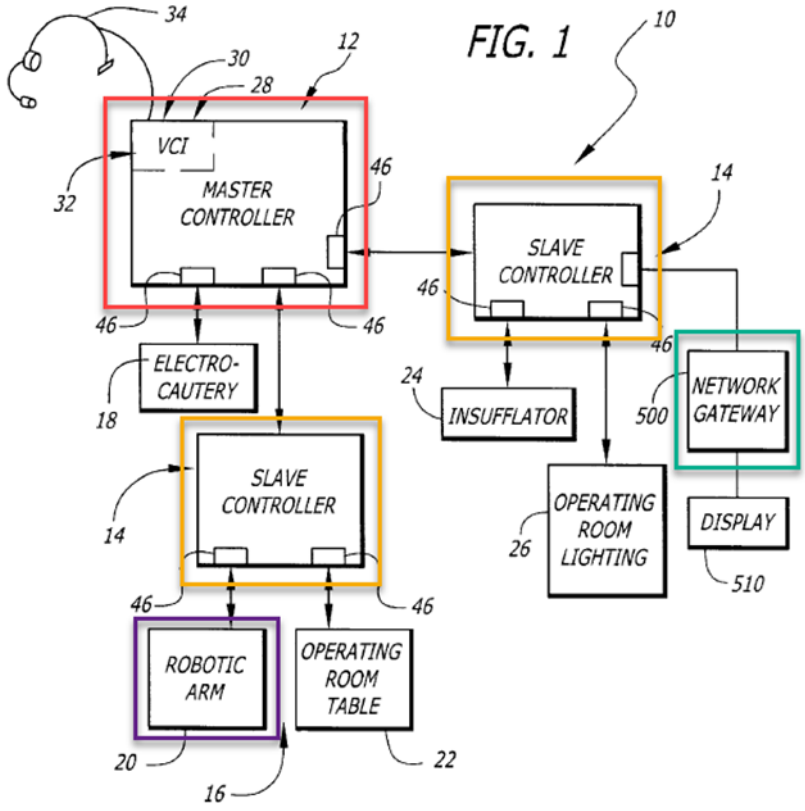
A POSA would have designed the modified Borst system to display the auxiliary information on the image display so that the surgeon can easily and efficiently review the information during the surgery so that he or she can use the information in making surgical decisions. Ex.1003, ¶144.

6. "wherein the master control is operatively associated with the end effector to cause the end effector to move in response to the manipulating of the master control, and wherein the selectively accessing the source of auxiliary information comprises disassociating the master control from the end effector"

Borst discloses the "*wherein the master control is operatively associated with the end effector…*" element for the same reasons discussed above for the "*master having an input device*" and "*processor in the first operating mode…*" limitations of claim 53. Ex.1003, ¶145.

It would have been obvious to a POSA to design the Borst system as modified in view of Wang '099 to require that "*selectively accessing the source of auxiliary information comprises disassociating the master control from the end effector*." Ex.1003, ¶146. As shown below, Wang '099 discloses that its master controller (red box) operate two different slave controllers (yellow boxes) to perform at least two different functions, either operate the robotic arm (purple box)

or access patient information via a network gateway (green box). Ex.1006, Fig. 1 (highlighted) below.



Because the same surgeon commands and movements could not simultaneously perform both functions using the master control, Wang '099 discloses that the user can select via "selection commands" which device he or she wants the master control at any given time:

> The master controller additionally includes ***means for routing control signals to a device specified by a selection command***. For example, ***if the user wants to operate the laser***, a device used in many surgeries…, ***then the user may issue a selection command indicating such, i.e. speak the word "laser" or the words "select laser"***. As

such, the name of the device may serve as the selection command, or the selection command may be the combination of two or more words. Ex.1006, 2:50-60, *see also id*., 4:35-48, 7:26-28 ("[D]epending upon what devices are connected to the system at any given time, a user may select from any of the connected devices."), 10:21-59. Wang '099 shows use of voice commands to select which device the master controller will operate, but explains that "[t]he system ***may additionally employ a foot pedal, a hand held device, or some other device which receives selection… commands or inputs indicative of such commands*** from a user." *Id*., 2:32-42. This user selection "rout[es] control signals" to a specified device, and thus, it dissociates the master control from other devices. Ex.1003, ¶146.

Accordingly, the Borst system as modified in view of Wang '099, would disassociate the master control from the output surgical instrument when the surgeon selects to use the master control to access auxiliary information ("*selectively accessing the source of auxiliary information comprises disassociating the master control from the end effector*"). Ex.1003, ¶147.

D. Claim 22

Claim 22 depends from claim 16 and specifies that "*causing the auxiliary information to be displayed on the image display comprises displaying the auxiliary information in a discrete window on the image display*." Ex.1003, ¶148.

Wang '099 discloses that "the display of patient data [is] in a web browsable

format, essentially HTML or some other well known web format." Ex.1006, 10:41-59. Wang '099 states that a web browser such as Microsoft Internet Explorer could be used to display the information. *Id.*, 10:26-30; Ex.1003, ¶149. A POSA would have been very familiar with web formats, including HTML, as of the '906 patent's December 1999 priority date. Ex.1003, ¶149. In fact, Wang '099 states that "[b]ecause HTML formatting is well known the specifics of such formatting will not be disclosed herein." *Id.*, 10:41-59; Ex.1003, ¶149.

A POSA would have understood that displaying data in a web browser such as Microsoft Internet Explorer would have "*displayed the auxiliary information in a discrete window on the image display*." Ex.1003, ¶150. It was well-known that Internet Explorer would run in a separate, discrete window. Ex.1010, 3:54-4:3, Figs. 2-13; Ex.1003, ¶150.

The Examiner found that "the manner in which the auxiliary data is displayed would have been an obvious matter of design choice to a person of ordinary skill in the art." Ex.1002, 150, 184-85. Accordingly, it would have been obvious to a POSA to design the Borst system as modified in view of Wang '099 to "*display[] the auxiliary information in a discrete window on the image display*." Ex.1003, ¶151.

E. Claim 23

Claim 23 depends from claim 22 and specifies "*varying the position of the*

discrete window across the image display." This limitation would have been obvious based on Borst and Wang '099. Ex.1003, ¶152.

The ability to vary the position of a window (*e.g.*, an Internet Explorer window) is a fundamental, well-known aspect of window-based displayed because it allows the user to move windows around to view other windows simultaneously or otherwise uncover other information available on the screen. Ex.1010, 3:54-4:3 ("Web page users typically launch a web page browser, such as Microsoft Internet Explorer, and navigate to the desired web page…. Much time is spent ***positioning*** and resizing the web pages on the display screens."); Ex.1003, ¶153.

During prosecution the Examiner found that "it would have been obvious at the time the invention was made to move the windows or change the dimensions by selecting and 'dragging' as is well known in the art." Ex.1002, 150, 184-85; Ex.1003, ¶154.

F. Claim 25

Claim 25 depends from claim 22 and specifies "*varying the dimensions of the discrete window on the image display*." This limitation would have been obvious based on Borst and Wang '099. Ex.1003, ¶155.

The ability to change the dimensions of a window (*e.g.*, an Internet Explorer window) is a fundamental property of window-based displays. Ex.1010, 3:54-4:3 ("Web page users typically launch a web page browser, such as Microsoft Internet

Explorer, and navigate to the desired web page…. Much time is spent positioning and ***resizing*** the web pages on the display screens."); Ex.1003, ¶156.

During prosecution, the Examiner found that "it would have been obvious at the time the invention was made to move the windows ***or change the dimensions*** by selecting and 'dragging' as is well known in the art." Ex.1002, 150, 184-85 (emphasis added). Ex.1003, ¶157.

G. Claim 26

Claim 26 depends from claim 25 and specifies that "*varying the dimensions of the discrete window on the image display comprises manipulating the master control*." For the same reasons as discussed above for the "*selectively accessing a source of auxiliary information in response to the manipulation of the linkage of the master control*" limitation of claim 16, a POSA would have found it obvious to modify Borst in view of Wang '099 to include using the master control to manipulate the display of information on the screen. Ex.1003, ¶158.

As disclosed by Wang '099, enabling access using the same master control and displaying the auxiliary information on the same viewing screen simplifies the procedure for the surgeon by allowing the surgeon to more easily manipulate and observe the operating room environment. Ex.1003, ¶159. It would be inefficient and illogical for a POSA to modify Borst to use the master control to access the auxiliary information but then require the surgeon to switch to a different control to

vary the dimensions of the window that is displaying that auxiliary information. Ex.1003, ¶159. Nothing disclosed in Borst prevents its system from being modified to use the same master control to access and manipulate the display of auxiliary information and a POSA would have had a reasonable expectation that the modified system would have worked as desired. Ex.1003, ¶159.

IX. GROUND IV: Borst, Wang '099, and Wang '850 Render Claims 16, 22-23, and 25-26 Obvious

To the extent the Panel determines that the Borst system as modified in view of Wang '099 does not disclose "*master*" control as described herein, it would have been obvious for a POSA to modify the system to include such "*master*" control in view of Wang '850 for the same reasons as provided above for Ground II. Ex.1003, ¶160.

X. GROUND V: Borst and Wang '099 Render Claims 51 and 53 Obvious

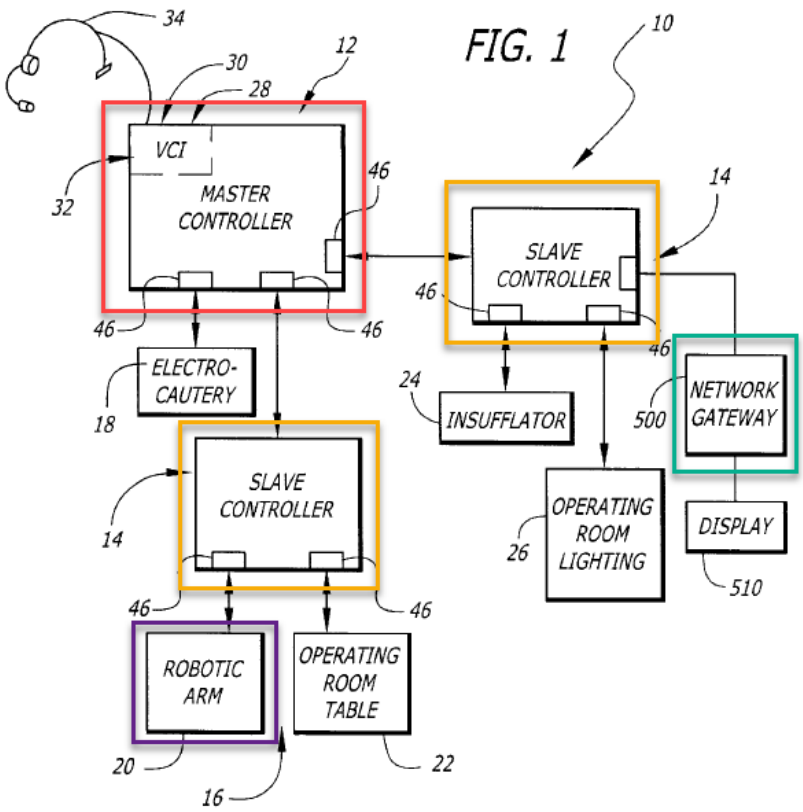
As discussed above in Ground I, Borst discloses all of the elements of claims 51 and 53 except for the limitation requiring a first and second mode of operation. A POSA would have found it obvious to modify Borst to satisfy this limitation in view of Wang '099. Ex.1003, ¶161.

While Borst discloses changing the information on the image display of the robotic surgical system, it does not explicitly disclose that this can be done by the manipulation of the linkage of the master control when the robotic surgical system is in a second operating mode. *See supra* §VI.A.5. A skilled person would have

found it obvious to modify Borst to incorporate that functionality in view of Wang '099. Ex.1003, ¶162.

Wang '099 discloses "*first and second operating modes*," specifically, Wang '099 discloses a "master controller for selecting and controlling a plurality of devices" that receives user commands and the commands are converted to signals that control other devices in the system. Ex.1006, 2:13-20. Wang '099 "envision[s] that any electrically controlled device utilized in an operating room environment may be attached to the master controller 12 either directly or via one of the at least one slave controllers 14." *Id*., 4:35-48. The master controller is operating in a different mode when it is controlling a different device. Ex.1003, ¶163.

Regarding the "*first operating mode*" limitations of claims 51 and 53, Wang '099 shows using the master controller 12 with "an electro cautery device 18" and with "robotic arm 20 for holding and manipulating an endoscope [that] is electrically connected with the master controller 12 via one of the at least one slave controllers 14," Ex.1006, 4:35-48, and with a laser, *id*., 2:52-57. The master and slave controllers are emphasized in Figure 1 (highlighted) below, with red and yellow respectively, and the robotic arm is emphasized with purple:



Ex.1003, ¶164.

Regarding the "*second operating mode*" limitations of claims 51 and 53, as explained above for claim 16, a POSA would have been motivated to modify Borst in view of Wang '099 to access and display additional information about the patient and surgical procedure. *See supra* §VIII.C. Wang '099 explains that the medical system "may include a connection to a hospital computer network via a network gateway 500" (emphasized with green above) and that runs a conventional web browser such as Microsoft Internet Explorer. Ex.1006, 10:21-30. "By connecting to the hospital network, patient information that is available at computer terminals in the hospital would also be made available in the operating

room." *Id*., 10:31-33. Wang '099 discloses that the "network gateway … can retrieve remotely located patient data and display the data on a monitor [(*e.g.*, display 510 in the figure above)] at the surgical site." Ex.1006, Abstract, *see also id*., 10:21-59 ("… the patient data may be sent to the gateway 500 in a format to be displayed by either a monitor 510 connected to the gateway or directly to the monitor.…). Wang '099 discloses that "the display of patient data [is] in a web browsable format, essentially HTML or some other well known web format," Ex.1006, 10:41-59, and can be done using a web browser such as Microsoft Internet Explorer, *Id*., 10:26-30. Ex.1003, ¶165.

Wang '099 discloses use of "selection commands" to change which device the physician wants the master control to operate at any given time:

> The master controller additionally includes ***means for routing control signals to a device specified by a selection command***. For example, ***if the user wants to operate the laser***, a device used in many surgeries…, ***then the user may issue a selection command indicating such, i.e. speak the word "laser" or the words "select laser"***. As such, the name of the device may serve as the selection command, or the selection command may be the combination of two or more words.

Ex.1006, 2:50-60, *see also id*., 4:35-48, 7:26-28 ("[D]epending upon what devices are connected to the system at any given time, a user may select from any of the connected devices."), 10:21-59. This user selection "rout[es] control signals" to a specified device. Ex.1003, ¶166. Thus, the same master control can be used to

operate a surgical instrument and also interface with the web browser displaying additional information about the patient and procedure. Ex.1003, ¶166.

A POSA modifying Borst to include this feature of Wang '099 thus would have configured it to allow use of the same control instruments both to operate the output surgical instruments and to modify the information presented on the display (*e.g.*, the information about the patient and procedure in a web browser). Ex.1003, ¶167. Using the same master control for these two purposes would provide the two operating modes required by the claim. Ex.1003, ¶167. Given the similarities between Borst and Wang '099, the prevalence of master controls with multiple functions, and that nothing about the Borst system prevents such a modification, a POSA would have understood that Borst's system could have been modified to incorporate the dual mode functionality controlled by a master controller with a high degree of predictability and that the modified system would have worked as expected. Ex.1003, ¶167.

XI. GROUND VI: Borst, Wang '099, and Wang '850 Render Claims 51 and 53 Obvious

To the extent the Panel determines that the Borst system as modified in view of Wang '099 does not disclose "*master*" control as described herein, it would have been obvious for a POSA to modify the system to include such "*master*" control in view of Wang '850 for the same reasons as provided above for Ground II. Ex.1003, ¶168.

XII. No Secondary Considerations Exist

As described above, the presented grounds of unpatentability render obvious each of the challenged claims. No secondary indicia of non-obviousness exist having a nexus to the '906's putative invention contrary to that conclusion. Petitioner reserves its right to respond to any assertion of secondary indicia of non-obviousness advanced by the patent owner.

XIII. Conclusion

Petitioner respectfully submits the evidence presented in this Petition establishes a reasonable likelihood Petitioner will prevail in establishing the challenged claims are unpatentable, and requests Trial be instituted.

Dated: August 30, 2019

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CERTIFICATE OF COMPLIANCE

I hereby certify that this petition complies with the type-volume limitations of 37 C.F.R. § 42.24, because it contains 13,965 words (as determined by the Microsoft Word word-processing system used to prepare the petition), excluding the parts of the petition exempted by 37 C.F.R. § 42.24.

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CERTIFICATE OF SERVICE (37 C.F.R. § 42.6(e)(4))

I hereby certify that the attached Petition for *Inter Partes* Review and supporting materials were served as of the below date by Federal Express on the Patent Owner at the correspondence address indicated for U.S. Patent No. 6,522,906.

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