

1 UNITED STATES PATENT AND TRADEMARK OFFICE

2 BEFORE THE PATENT TRIAL AND APPEAL BOARD

3
4 INTUITIVE SURGICAL, INC.,

5 Petitioner,

6 vs.

7 ETHICON, LLC.,

8 Patent Owner.

) IPR No.

) 2018-01247

) U. S. Patent No.

) 8,479,969

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12
13 DEPOSITION OF SHORYA AWTAR, Ph.D.

14 Washington, D.C.

15 June 17, 2019

16 9:30 a.m.

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21 REPORTED BY: GOLDY GOLD, RPR

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June 17, 2019

9:30 a.m.

Deposition of SHORYA AWTAR, Ph.D., held
at the offices of Weil Gotshal & Manges, 2001 M
Street, NW, Suite 600 Washington, D.C. 20036
before Goldy Gold, a Registered Professional
Reporter and a Notary Public within and for the
State of District of Columbia.

1 A P P E A R A N C E S:

2

3 ON BEHALF OF THE PETITIONER:

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I N D E X

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EXAMINATION

3

WITNESS

PAGE

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SHORYA AWTAR, Ph. D.

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By Mr. Katz

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E X H I B I T

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PETITIONER EXHIBITS DESCRIPTION

PAGE

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Exhibit 1020 U. S. Patent

52

12

No. 9,820,768 B2

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Exhibit 1021 Anderson patent

123

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with witness' annotations

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1 WHEREUPON,

2 DR. SHORYA AWATAR

3 called as a witness, having first been duly sworn by
4 the Notary Public, was examined and testified as
5 follows:

6 EXAMINATION

7 BY MR. KATZ:

8 Q. Welcome, Dr. Awtar. Could you please
9 just state and spell your name for the record?

10 A. Okay. My name is Shorya Awtar, spelling
11 S-H-O-R-Y-A, A-W-T-A-R.

12 Q. All right. And could you just pronounce
13 your last name one more time?

14 A. Awtar; it says with a "V" instead of
15 a "W. "

16 Q. Thank you.
17 I understand that you've been deposed
18 before?

19 A. No, this is my first deposition.

20 Q. Oh, you have not been?

21 A. Yes.

1 Q. Well, let me just give you a few helpful
2 tips to make this go smoothly.

3 A. Okay.

4 Q. First of all, any time if I ask a
5 question you don't understand, please just ask me to
6 repeat it and/or clarify, and I will do so.

7 Also, it's very important, because the
8 court reporter is taking down what we say, that we
9 not talk over each other. So if you will just wait
10 till I finish the question before you answer, and I
11 will try to let you finish an answer before I ask my
12 next question.

13 A. Okay.

14 Q. In addition, we'll probably be taking
15 breaks roughly every once an hour, but more or less
16 it's all up to you. If at any time you feel you need
17 a break, just ask.

18 A. Okay. Thank you.

19 Q. Also, I ask that you do keep your voice
20 up. We do have a little bit of air-conditioning
21 noise in the background, and sometimes the court

1 reporter has a hard time hearing if you start talking
2 softly.

3 A. Okay. I'll be careful, yes, or mindful,
4 yeah.

5 Q. And I don't think it's going to be a
6 problem, but some experts are extremely fast talkers,
7 especially when they read. It doesn't sound like
8 that's going to be a problem, but you want to
9 consciously talk slowly enough so that the court
10 reporter can get you.

11 A. I'll try. If I do end up talking faster
12 than what is normal, will one of you let me know?

13 Q. We will.

14 A. Thank you.

15 Q. Also, just so you understand what's
16 going to be happening, actually there are three --
17 you have declarations in three different IPR
18 proceedings related to U.S. Patent 8479969; is that
19 correct?

20 A. That is correct, yes.

21 Q. And we're actually going to be doing

1 three sequential depositions. I've already spoken
2 with counsel for Ethicon, and we're only going to be
3 focusing today exclusively on the proceeding that is
4 IPR2018-01247. And then tomorrow we'll be doing
5 depositions for 01248 and then 01254.

6 A. That's correct. That's my
7 understanding.

8 Q. Okay. And so actually that's for the
9 court reporter's benefit. So even though it's all
10 really the same patent, we're going to be formally
11 closing our transcript and reopening a new one, just
12 as a technicality issue.

13 All right. So with that, let's begin.

14 Can you just tell me, at a high level,
15 what experience that you have, education and
16 experience that you believe is relevant to the
17 opinions that you're providing in this case?

18 A. Sure. A brief overview of my experience
19 and background was included in the declaration. I
20 can provide a summary of that. Is there any
21 particular aspect that you may want me to elaborate

1 upon further?

2 Q. Sure. There seem to be quite a lot of
3 papers. You're very prolific. Congratulations on
4 that.

5 A. Thank you.

6 Q. I assume not everything in your CV
7 relates directly to evaluating the issues surrounding
8 the '969 patent. So why don't you just highlight for
9 me what you think are the most significant
10 educational --

11 A. Aspects.

12 Q. Yes, aspects, exactly.

13 A. Okay. Thank you. So I'm an associate
14 professor of mechanical engineering at the University
15 of Michigan. As part of my job at the university, I
16 conduct research in, as well as I conduct teaching
17 in, the areas of machine design, mechanism design,
18 robotics, and mechatronics. What this entails is a
19 variety of contraptions, apparatus, that are used to
20 generate motion, that are used to transmit motion,
21 that are used in a variety of applications that may

1 range from medical devices, to precision motion
2 stages, to microelectromechanical systems.

3 So the skill set that I mention in
4 machine design, mechanism design, mechatronics, and
5 robotics is a broad skill set. It's sort of a
6 foundational skill set that, depending on the
7 application, I bring it to the fore and I apply it to
8 a given application.

9 I think your question was more pertinent
10 to medical devices. So definitely I have applied
11 these skills to medical devices as part of my
12 research at the University of Michigan.

13 Subsequent to that -- in fact, I'll
14 describe a bit more my research at the University of
15 Michigan in medical devices.

16 In 2007, I started collaborating with
17 surgeons at the University of Michigan to develop
18 laparoscopic instruments, affordable laparoscopic
19 instruments. I worked with several students and
20 staff members of the university to design and develop
21 multiple prototypes of these laparoscopic

1 instruments. And then eventually, I, along with a
2 surgeon cofounder, started the company FlexDex
3 Surgical. And as part of FlexDex Surgical also, I
4 have been putting my skills, the foundational skills
5 that I mentioned earlier, to use in the design and
6 development of laparoscopic instruments.

7 Q. Just a few questions on that.

8 When you say associate professor, is
9 that a tenured position?

10 A. It is a tenured position, yes.

11 Q. And so you say you began work in 2007 in
12 laparoscopic instruments?

13 A. I began at the University of Michigan in
14 2007. My experience with laparoscopic instruments
15 and minimally invasive surgical instruments and
16 robotics goes all the way back to my Ph.D. days
17 where -- my Ph.D., which went from 2000 till 2003,
18 December 2003 -- my Ph.D. -- actually I'll correct
19 that. Not Ph.D.; the technical name of the degree is
20 Sc.D., doctorate of science, Sc.D. -- my doctorate at
21 MIT was from 2000 till the end of 2003. It was in

1 the area of robotics and mechanisms.

2 As part of that, once again, I was
3 looking at what are the applications of robotics and
4 mechanisms. Medical devices and medical robotics was
5 an area that I became aware of. I wasn't designing
6 any medical instruments at the time, but I was
7 exploring and investigating that space.

8 Prior to my Ph.D. -- again, I'm sorry, I
9 keep using the term Ph.D. Prior to -- I mean post my
10 Sc.D., post my doctorate, I joined General Electric
11 in 2004, January of 2004. For three years while I
12 was there, I had -- the time was given to me to
13 explore and investigate any area of my choice, any
14 application area of my choice.

15 So while I was making use of my skills
16 in mechanical design, machine design, robotics,
17 mechatronics on certain problems that had been
18 assigned to me at GE, at the same time, I was
19 investing a portion of my time investigating medical
20 devices and medical robotics. So that was the period
21 from January 2004 until the end of 2006.

1 In 2007, when I started at the
2 University of Michigan, that's when I transitioned
3 from the research mode to actually designing and
4 developing medical devices for laparoscopy.

5 Q. So, I guess, what you're saying is you
6 started the design of laparoscopic instruments in
7 2007, but you had been researching the topic before
8 that?

9 A. Exactly. Exactly.

10 Q. When you were researching laparoscopic
11 instruments from 2002 to 2006, which instruments were
12 you focused on?

13 A. I was focused on laparoscopic
14 instruments. Instruments -- laparoscopic instruments
15 are handheld instruments that are used in surgery.

16 What was clear in that time frame was
17 that in the U.S., there had already been a
18 significant transition from open surgery to
19 laparoscopic surgery, but outside of the U.S., that
20 transition was still ongoing.

21 Also at the same time, there was quite a

1 bit of buzz associated with surgical robotics because
2 of the DaVinci System that Intuitive had launched.

3 So that was the landscape. The
4 landscape was that of handheld laparoscopic
5 instruments, some emerging robotic technologies. It
6 was the combination, this entire scope of, you know,
7 the technologies that were available at that time
8 that I was looking into and just trying to understand
9 what are the pros and cons, and what are the
10 limitations and so on of these technologies.

11 Q. Between 2000 and 2006, did your research
12 involve investigation of laparoscopic staplers?

13 A. I wouldn't say laparoscopic staplers in
14 particular. In that phase, it was sort of my initial
15 exploratory phase in medical devices. I was at that
16 time looking at just a variety of laparoscopic
17 instruments. At that point I wasn't differentiating
18 between a laparoscopic stapler or a laparoscopic
19 needle driver or a grasper.

20 I think I must have come across a
21 variety of papers and patents that cover these

1 various instruments tips. But at that point, I
2 wasn't particularly focused on one kind of instrument
3 tip.

4 Q. So what was the nature of the research,
5 if it wasn't focused on a particular instrument tip?

6 A. The nature of research was primarily on
7 how the surgeon's control, surgeon's hand movements,
8 are transmitted to the tip of a laparoscopic
9 instrument inside a patient's body.

10 So the research or the investigation was
11 focused more on understanding the mechanics of motion
12 transmission.

13 Q. And did you acquire actual laparoscopic
14 instruments or this was just looking at patents and
15 publications?

16 A. This was patents, publications, on-line
17 videos, images. Oftentimes, companies have
18 animations on their websites. It was -- it didn't
19 involve my holding, acquiring a laparoscopic -- a
20 sample laparoscopic instrument.

21 Q. And was this in formal research or did

1 you generate papers based on it?

2 A. It is hard to qualify research as formal
3 or informal. What I can answer specifically is that
4 I did not generate any papers on this. The issue of
5 formal versus informal, I can only add that some of
6 most serious work that I have done, the most
7 impactful work that I've done, in my own opinion,
8 started out as an open-ended investigation, as I'm
9 sure you have seen, you know how researchers come up
10 with ideas.

11 Q. And jumping up to 2007, when you started
12 design work -- strike that.

13 I understand that your company -- you
14 described your company as an early stage company?

15 A. That is right, yes.

16 Q. Does that mean that you've not formally
17 released a product publicly yet?

18 A. We have released a product formally,
19 publicly. Early stage is simply dictated by metrics
20 such as how much money has been invested in the
21 company, the size of the company, the number of

1 products it has launched, the amount of sales
2 revenues, the number of employees, things like that.

3 Q. How many products has your company
4 launched?

5 A. One.

6 Q. What is that?

7 A. The one product that my company FlexDex
8 Surgical has launched is a purely mechanical,
9 handheld laparoscopic instrument which is used for
10 suturing and knot-tying inside the patient's body.

11 Q. Does the instrument articulate?

12 A. Yes, it's an articulating instrument,
13 yes.

14 Q. And what's the name of it?

15 A. I do not recall the formal name of the
16 product as it might appear on regulatory documents.
17 I can guess.

18 Q. I don't want you to guess. That doesn't
19 help anyone.

20 A. Okay.

21 Q. If I went to your website, would it only

1 have one product?

2 A. It should. The description of the
3 product is a FlexDex needle driver. That may not be
4 the formal name of the product, but it is a FlexDex
5 needle driver, and the description is that it's a
6 purely mechanical, handheld laparoscopic instrument.

7 Q. When you say purely mechanical, what do
8 you mean by that? What is that excluding?

9 A. Purely mechanical is an instrument or
10 system or machine that has only mechanical
11 components, such as gears, levers, springs, cables,
12 pulleys. It doesn't include anything that is
13 electrical. So it doesn't include any sensors or
14 actuators or micro-controllers or batteries, power
15 sources, anything like that.

16 Q. And is the articulation active or
17 passive?

18 MR. MARANDO: Object to form.

19 Go ahead.

20 A. I can answer that. I just wanted some
21 clarification. Can you tell me what you mean by

1 active and passive?

2 Q. I guess I'm not quite an expert in the
3 field. Those are terms that are in the documents in
4 this case.

5 You tell me, what does it mean to be
6 active versus passive?

7 A. Okay. So I can provide my
8 interpretation of those terms.

9 In the context of a laparoscopic
10 instrument, active articulation means articulation
11 that is actively driven and controlled by a user,
12 which would be the surgeon in this case.

13 To further elaborate, active would mean
14 that there would be a certain control input provided
15 by the user or the surgeon, and that control input
16 via a sequence of transmissions drive the
17 articulation of the -- of an end effector at the tip
18 of an instrument. That is how I define active.

19 Q. So what would passive articulation be?

20 A. Passive is -- I would say it's -- it
21 would be perhaps a broader term. Anything that is

1 not active will be passive. Any instance of an
2 instrument having articulation capability but that is
3 not actively driven by the surgeon, in the sense that
4 a control motion of the surgeon produces articulation
5 of the end effector. Anything that doesn't meet that
6 criteria, I would put that in the category of
7 passive, where the surgeon is not actively driving
8 the articulation of the end effector.

9 Q. So using those definitions, was the
10 instrument that you made, that your company designed,
11 active or passive?

12 A. It is an active articulation system or
13 instrument that -- that offers active articulation.

14 Q. Have you ever in your career designed a
15 surgical stapler?

16 A. No, I have not designed a surgical
17 stapler. And by a surgical stapler, we're
18 referencing to an endocutter, a linear endocutter,
19 and I haven't designed an instrument like that.

20 Q. Is your understanding the term
21 endocutter is a well-known term outside of Ethicon or

1 that a term Ethicon is called?

2 MR. MARANDO: Object to form.

3 A. I do not know. I use the term based on
4 multiple patents that I've read and multiple
5 conversations that I've had with surgeons. And it's
6 based on that that's in forming my terminology. I
7 wouldn't know that term, the linear endocutter, is a
8 term that was coined by Ethicon or by the surgical
9 community.

10 BY MR. KATZ:

11 Q. Have you ever worked on a -- strike
12 that.

13 Have you ever designed a surgical
14 stapler of any sort?

15 A. No, I have not designed a surgical
16 stapler of any sort.

17 Q. Have you ever designed a robotic system?

18 MR. MARANDO: Objection to form.

19 A. A "robotic system" is a very broad term.
20 Can you specify a bit further? Because a lot of
21 things are robotic systems.

1 BY MR. KATZ:

2 Q. Well, yes, I mean have you ever --

3 A. Is that any robotic system? Is that it?

4 Q. In your career, have you designed
5 something you would consider to be a robotic system?

6 A. Multiple, yes, multiple times.

7 Q. Was this in a surgical space or in
8 another space?

9 A. I have evaluated robotic systems in the
10 surgical space; not designed, but evaluated. I have
11 designed robotic systems in nonsurgical space in
12 precision motion stages and moving a motion stage
13 over multiple degrees of freedom via robotic
14 technology, by using robotic technology.

15 Q. When you say a motion stage, what is
16 that?

17 A. Motion stage is a stage that moves along
18 multiple directions. So one example is a robotic
19 arm. So if you consider the tip of a robotic arm, it
20 has multiple degrees of freedom. It could translate
21 and rotate. It could open and close. Those are all

1 multiple degrees of freedom.

2 A motion stage, similarly, is a stage in
3 a machine in a robotic system that has multiple
4 degrees of freedom. And those multiple degrees of
5 freedom are achieved by a combination of mechanical
6 design, mechanical structures, sensors, actuators,
7 feedback controls.

8 Q. So are you saying your design is just a
9 generic portion of a robot that could move without
10 regard to a specific use for that robot?

11 A. No. I mean, I would say there are
12 specific uses for the robots that I design. These
13 are robots that would be used, for example, in the
14 semiconductor industry.

15 Since your question was, have I designed
16 a robotic system, and my response was "robotic
17 system" is just a very broad term, I cited an example
18 of a robotic system.

19 Q. And earlier you were talking about
20 multiple degrees of freedom. If something opens and
21 closes, is that one degree of freedom or two?

1 A. It depends. It depends. If there's one
2 control that dictates the opening -- oh, open and
3 close is one degree of freedom. I'm sorry. Open and
4 close is one degree. It's one control that dictates
5 the opening, and the same control, control in a
6 different direction, dictates the closing. And it's
7 one degree of freedom.

8 Q. Is there a definition in your mind of
9 what a degree of freedom is?

10 A. Yes. A degree of freedom is, broadly
11 speaking, again in the field of machine design, the
12 technical subfield of defining degrees of freedom is
13 called kinematics.

14 Kinematics is the study of motion
15 between various bodies. So in the simplest case, you
16 start with two bodies, and you want to define the
17 motion of one body with respect to another body. So
18 in my desire and my pursuit to define the motion of
19 one body with respect to another body, we try to
20 specify how much this first body can move with
21 respect to the second body, how much and in what

1 ways, in what ways --

2 MR. KATZ: If I can just interrupt you
3 for a moment, off the record.

4 (Discussion held off the record.)

5 MR. KATZ: Back on the record.

6 BY MR. KATZ:

7 Q. So I'm sorry for interrupting you were
8 explaining?

9 A. All the ways in which one body can move
10 with respect to another body. In general, there are
11 six ways in which one body can move with respect to
12 another body, and there's no coupling, there's no
13 attachment, there's no connection between the two.
14 The six ways are three translations and three
15 rotations. And those six ways in which a certain
16 body can move with respect to another body are
17 referred to as the degrees of freedom.

18 Depending on the nature of the coupling
19 between these two bodies, if they are completely
20 de-coupled, if they're completely disconnected, then
21 the first body has six degrees of freedom, which is

1 what I described, three translations and three
2 rotations. But if there's some coupling between the
3 two, then the degrees of freedom would be either five
4 or four or three or two, depending on the nature of
5 the coupling between the two bodies.

6 Q. Is the six degrees of freedom the
7 maximum between two bodies?

8 A. Between two bodies, yes. Six degrees of
9 freedom is between two rigid bodies. It is not
10 uncommon to refer to -- refer to articulated robotic
11 arms -- for that matter, even a human arm -- where,
12 because you're not talking about just two bodies,
13 you're talking about multiple bodies, when you count
14 all the relevant degrees of freedom of the multiple
15 bodies, you can exceed six degrees of freedom.

16 Q. So I put some premarked documents in
17 front of you, you've seen, and we're going to go to
18 IS-1010, which is the Anderson patent.

19 A. Question: Were these also premarked?

20 Q. Yes, everything's, yeah, premarked. You
21 see there are some numbers on the bottom? They don't

1 have the regular deposition stickers, but they've
2 already been printed with exhibit numbers.

3 A. Sure. Okay.

4 Q. And have you looked at the Anderson
5 patent before?

6 A. I have.

7 Q. And just to orient ourselves, do you
8 understand the Anderson patent as a disclosure of a
9 surgical robotic system?

10 A. Yes.

11 Q. Why don't we first start with column 1
12 of the patent. Just orienting ourselves, look down
13 at line 52.

14 A. Yes.

15 Q. I just want to read that into the
16 record. It says, "The laparoscopic surgical
17 instruments generally include a laparoscope for
18 viewing the surgical field and working tools defining
19 end effectors. Typical surgical end effectors
20 include clamps, graspers, scissors, staplers, and
21 needle holders, for example."

1 Do you see that?

2 A. Yes.

3 Q. And do you understand the term "stapler"
4 there? I guess, do you have an understanding of what
5 a stapler is in the laparoscopic context?

6 A. Yes.

7 Q. What is your understanding?

8 A. So a stapler in a laparoscopic context
9 can mean one of multiple things. It includes an
10 instrument that's just staples in a laparoscopic
11 manner. It can include an instrument that staples as
12 well as cuts a tissue.

13 Q. Earlier you mentioned a linear stapler.
14 You understand there's also circular staples as well?

15 A. Yes.

16 Q. Are there any other types, or is it
17 pretty much linear and circular?

18 A. My understanding is that you have linear
19 and circular, but you also have staples that look
20 like more regular staples, or the stapler looks like
21 more regular staplers, the ones that we use in

1 offices. There might be an open, an incision, and
2 the staple is fired just sequentially one at a time
3 to close the surgical opening that might exist.
4 There may be more also; I wouldn't know.

5 Q. So you're not familiar with all the
6 types of surgical staplers?

7 A. I don't know what I don't know, I guess.

8 Q. Okay. Then if you turn to column 11, it
9 starts describing Figure 2. I don't know if it's
10 possible to have Figure 2 and column 11 --

11 A. Can I use a second copy of the same
12 patent?

13 Q. You can, or you can separate the
14 document; that's fine, too.

15 A. I'm at Figure 2 and column 11. Okay.

16 Q. Just to orient of yourself, you
17 understand that Figure 2 discloses a surgical
18 instrument that can be coupled to a robotic system?

19 A. Yes.

20 Q. And a surgical -- one kind of
21 end-effector on the left-hand side which is connected

1 by a shaft -- strike that. Let me start over.

2 In Figure 2 of Anderson, do you
3 understand that there's a tool-mounting portion on
4 the right-hand side which is coupled to a shaft which
5 is coupled to an end effector?

6 A. Yes.

7 Q. Okay. And see the reference to "E"
8 there?

9 A. Yes.

10 Q. And you understand that's conveying the
11 shaft can roll?

12 A. Yes.

13 Q. And that would be one degree of freedom?

14 A. Yes.

15 Q. And in the text at column 11 it says --
16 referring now to Figure 2, "Surgical instrument 28
17 suitably includes an elongated shaft 28.1, having a
18 proximal end 33, and a distal end 31, and a pivot 32,
19 and end effector 38, disposed at the distal end, and
20 an instrument-based 34 disposed at the proximal end."

21 Do you see that?

1 A. Yes.

2 Q. And so the pivot described here would
3 add an additional degree of freedom?

4 MR. MARANDO: Objection to form.

5 A. Yes, I would describe the pivot 32 as an
6 additional degree of freedom, although in this
7 figure, that is not quite clear. The -- for example,
8 the Row E as a degree of freedom, very clear. But
9 the pivot that you're pointing to, 32, there's a
10 fairly limited description in this drawing to
11 ascertain whether that actually is a pivot, other
12 than the fact that the text says it's a pivot.

13 Q. If you look at Figure 3?

14 A. Yes.

15 Q. What's your understanding of that
16 symbol D with the arrow? Is that not describing a
17 pivot?

18 MR. MARANDO: Objection to form.

19 A. Perhaps it is. Can I take a moment to
20 read the description of Figure 3 and see if there's a
21 reference to the double-arrow D?

1 BY MR. KATZ:

2 Q. Yes. Actually if you look in column 11,
3 the paragraph starting at 43, you'll see a reference
4 to "arrow D" midway down.

5 A. Yes, which would characterize that as a
6 degree of freedom. It is an additional degree of
7 freedom.

8 Q. And if you look at Figure 3, the
9 tool-mounting portion, that figure discloses four
10 shafts that can each provide a degree of freedom?

11 A. The four -- can you -- where is that?

12 Q. Let me get this right: I guess it's
13 called transmission numbers 70, 72, 74, and 76.

14 A. Yes.

15 Q. Do you see those?

16 A. Yes.

17 Q. And you understand that each of those
18 transmission members couples rotary motion from the
19 robot arm to provide at least one degree of freedom?

20 A. They can be coupled. They don't
21 necessarily provide it. But if configured and

1 designed properly, then they can provide up to or
2 they can transmit up to four degrees of freedom from
3 the robot arm to the end of the instrument.

4 Q. And if you look at column 12, line 20?

5 A. Yes.

6 Q. Anderson says, "Where more or fewer
7 degrees of freedom are desired, the number of spools
8 may be decreased or increased."

9 Do you see that?

10 A. Yes.

11 Q. So do you understand Anderson to be
12 saying that, in Figure 3, I'm showing four shafts and
13 spools, but you could add more or you could have
14 less?

15 MR. MARANDO: Objection to form.

16 A. That's what the statement conveys.

17 Q. Earlier you mentioned you had some
18 exposure to the DaVinci robot. Have you ever
19 physically seen a DaVinci robot?

20 A. I think so, yes.

21 Q. And where was that?

1 A. This would be at -- at the University of
2 Michigan Hospital System and operating room in the
3 University of Michigan Hospital System.

4 Q. So this wasn't -- this wasn't an
5 experimental robot. What you saw was an actual robot
6 used for surgeries?

7 A. I saw an actual robot that was for use
8 in actual surgeries; I did not see it in use.

9 Q. Did you see it operating at all, or did
10 you see it in a turned-off state?

11 A. I saw it in a turned-off state as well
12 as -- as well as what I believe was a training state
13 or some kind of training that some people were
14 performing, or they were getting trained on the
15 robot.

16 Q. Well, okay. So you believe you saw a
17 DaVinci robot being used by a user sitting at the
18 console?

19 A. Yes.

20 Q. But it just wasn't an actual surgery?

21 A. Not an actual surgery, yes. Yes. So it

1 was -- and it was moving, so it wasn't static, so it
2 was in an on state, but not in a clinical setting.

3 Q. And when was that?

4 A. I would say the earliest would have been
5 2007 that I saw it directly. Prior to that, I've
6 seen it in videos and papers, but the actual --
7 directly seeing it was in 2007.

8 Q. And did you see a physical, actual
9 DaVinci robot any other time or just that one time?

10 A. Subsequently, a few times.

11 Q. Same place?

12 A. It's hard for me to remember same place.
13 I think, yes, I think it all would have been in the
14 University of Michigan Health System. It may not be
15 the same OR, but it is a massive hospital system. I
16 think I'd like to convey that I've seen it multiple
17 times.

18 Q. When is the most recent time that you
19 saw a DaVinci robot?

20 A. Perhaps at a trade show in 2018.

21 Q. At trade shows, do they actually operate

1 them, or it's in an inoperative state at the trade
2 show?

3 A. They operate them. They operate them in
4 the -- I don't know what mode they call it, perhaps
5 it's a demo mode of some sort, where they let
6 surgeons come and give it a try, and, of course, on
7 phantom tissue-like material.

8 That's, I think, in 2018 is probably
9 when I -- not probably; I would say certainly I saw
10 it at a trade show.

11 Q. Have you ever seen a DaVinci robot with
12 a stapler attached?

13 A. A DaVinci robot with stapler attached, I
14 can't recall definitively. I would say no.

15 Q. No? But you are aware that Intuitive
16 Surgical sells stapler attachments for DaVinci
17 robots?

18 A. Yes.

19 Q. In your report, you discussed something
20 called haptic feedback?

21 A. Yes. Yes.

1 Q. Do DaVinci robots have haptic feedback?

2 A. Not the -- not the ones that I'm aware
3 of. At least for the longest time they didn't. If
4 recently they started to bring that functionality
5 perhaps in the new systems, then I'm not aware of
6 that.

7 But the systems that I'm aware of, I
8 believe these are the SI, XI systems, they do not
9 have haptic feedback.

10 Q. But they do have linear staplers?

11 A. They do have linear staplers.

12 Q. If you look at the '969 Patent --
13 actually, before we get there, can you turn to your
14 declaration?

15 A. Yes.

16 Q. I would like you to look at paragraph 27
17 and 28 of your declaration. Let me know when you're
18 there.

19 A. Yes.

20 Q. In paragraph 27 you state that you've
21 been informed that the '969 Patent should be

1 construed using the broadest reasonable construction
2 in the light of the specification of the patent?

3 A. Yes.

4 Q. And then you say in paragraph 28, "To
5 the extent I do not provide a construction for a
6 term, I've applied that term's ordinary meaning to a
7 person of ordinary skill in the art, in light of
8 specification."

9 A. Yes.

10 Q. Do you provide any construction for any
11 term in your declaration?

12 A. No.

13 Q. So you just apply for every term in the
14 claims that you opine on, you're applying the
15 ordinary meaning of those terms?

16 A. Ordinary meaning of those terms, read in
17 light of the specifications, yes.

18 Q. When you say read in light of the
19 specification, what do you mean by that?

20 A. I'm sorry. Can you repeat the question?

21 Q. When you say read in light of the

1 specification, what do you mean by that?

2 A. So in looking through the claim
3 language, if there is -- if there is an
4 interpretation that is the needed, then that
5 interpretation is being made in the context of the
6 specification that is already provided in the patent
7 application.

8 Q. Well, if there's like for instance, if
9 there's a word "shaft," we're saying we know what
10 shaft means here because this is a medical instrument
11 versus a farm silo?

12 A. Yes --

13 Q. Is that what you mean?

14 MR. MARANDO: Objection to form.

15 A. I'm sorry. Repeat the question, please?

16 Q. Right.

17 When you're saying you're interpreting
18 the ordinary meaning in light of the specification,
19 what I'm understanding what you're saying is, if you
20 have a term such as "shaft," shaft has a meaning in
21 surgical instruments which is different than the

1 meaning in the farm industry.

2 MR. MARANDO: Objection to form.

3 BY MR. KATZ:

4 Q. Is that what you mean?

5 A. That would be one -- yes, that would be
6 one example of reading the meaning of shaft. So
7 perhaps I'll try to explain my thought process again.

8 If there were to be a claim in a med
9 device patent that includes the term "shaft," I don't
10 think I need to refer to the specification in that
11 context, because I think that a POSITA, in the
12 context of laparoscopic instrument, if the term
13 "shaft" is used, a POSITA would know that they are
14 referring to -- the claim is referring to an
15 instrument shaft.

16 If there is lack of clarity, which I
17 don't think there will be for a person of ordinary
18 skill in the art, but if there is a lack of clarity,
19 then the figures and the specification will provide
20 adequate illustration.

21 Q. If you look at Figure 13, shown on

1 page 19 of your declaration, Figure 13 is from
2 Anderson, correct?

3 A. It is, Figure 13 from Anderson, yes.

4 Q. And you've labeled some of the
5 components. Do you see that?

6 A. Yes.

7 Q. Can you tell me what's an idler spool?

8 A. Often in cable-based transmission
9 systems, there is a pulley or a rotating member which
10 can be referred as a pulley or as a spool, could be
11 incorporated for the purpose of routing, to be able
12 to route the cable appropriately from one location to
13 another location.

14 This particular pulley or spool that
15 does the job simply of routing but doesn't add any
16 further transmission to the system is referred to as
17 an idler pulley, and in this case, an idler spool.

18 Q. If you look at page 20 of your
19 declaration, in the second sentence you write, "The
20 '969 Patent also discloses exemplary articulation
21 joints that facilitate articulation about one or two

1 axes. "

2 Do you see that?

3 A. Yes.

4 Q. So if I have articulation about two
5 axes, is that two degrees of freedom or just one?

6 A. If those are independent, if I have
7 articulation about two axes, and those two rotations
8 of articulation, typically those are referred to as
9 "yaw" and "pitch," if they can be controlled
10 independently, then they would be referred to as two
11 separate degrees of freedom.

12 You can have a situation where you have
13 articulation where there's some portion of the
14 articulation that is about the yaw axis and some
15 portion that is about the pitch axis, so you do have
16 two rotations, but these two rotations, if they are
17 tied to each other, that they are related to each
18 other, then even though you can say that there's
19 rotation about in the yaw direction and there's
20 rotation in the pitch direction, you may still have a
21 single degree of freedom.

1 Q. And in the sense you do refer to
2 articulation joints, plural, and is it the case in
3 the '969 Patent that the two axes are provided with
4 two different joints?

5 MR. MARANDO: Objection.

6 BY MR. KATZ:

7 Q. One joint for yaw, followed by another
8 joints that provides pitch or vice versa?

9 MR. MARANDO: Objection to form.

10 A. Can I request a repeat of the question?

11 Q. Sure.

12 You make reference to articulation
13 joints, plural, there in your reference to the '969
14 Patent.

15 Do you see that?

16 A. Yes.

17 Q. Am I correct that in the '969 Patent,
18 pitch is controlled by one joint and yaw is
19 controlled by another joint immediately following or
20 preceding the pitch joint?

21 MR. MARANDO: Objection to form.

1 A. At least in one embodiment in '969 that
2 I can recall. I don't want to limit it to just that
3 one embodiment. But at least in one embodiment that
4 is true.

5 Q. If you can look at the next page of your
6 declaration page 13?

7 A. Yes.

8 Q. You see you have Figure 133 from the
9 '969 Patent?

10 A. Yes.

11 Q. Is that two joints providing yaw and
12 pitch or one joint?

13 MR. MARANDO: Objection to form.

14 A. It's a matter of semantics in that one
15 can refer to everything that you see in Figure 133 as
16 one articulation joint, that one articulation joint
17 compromises multiple pivot joints. One of them along
18 an axis TA1, and the other pivot joint along an axis
19 TA2.

20 Q. So when you look at Figure 133, do you
21 consider that to be one joint or two?

1 MR. MARANDO: Object to the form.

2 A. I consider it to be one articulation
3 joint with two rotational -- with two rotations.

4 Q. And then, if we go back to paragraph 21,
5 you write, "In each of these exemplary embodiments,
6 the articulation joint is operably coupled to the
7 tool-mounting portion, such that the rotary members,
8 which are controlled remotely from the surgeon's
9 console, control the articulation about the
10 articulation joint."

11 Do you see that?

12 A. Yes.

13 Q. What do you mean by the term "operably
14 coupled"?

15 A. In this case, operably coupled means --
16 I will read the sentence once again. "In each of
17 these exemplary embodiments, the articulation joint
18 is operably coupled to the tool-mounting portion such
19 as that the rotary members which are controlled
20 remotely from the surgeon's console, control the
21 articulation about the articulation joint."

1 So in this context, "operably coupled,"
2 that is a coupling between the articulation joint and
3 the tool-mounting portion. The way I'm interpreting
4 the term "operably coupled" is, there's an operation
5 in the tool-mounting portion that is coupled to an
6 operation of the articulation joint.

7 Q. What does it mean to have an
8 operation -- what does it mean to have an operation
9 from the tool-mounting portion be coupled to an
10 operation of the articulation joint?

11 A. In the context of mechanical devices,
12 operation of any component or subsystem typically
13 involves some motion or some movement. So operation
14 in the tool-mounting portion, what I meant by that
15 was certain motions or movements that happen in the
16 tool-mounting portion that are coupled to certain
17 movement or motions in the articulation joint or of
18 the articulation joint.

19 Q. And by "coupled," you mean that a
20 movement in the tool-mounting portion has some effect
21 on the movement, to what it's coupled to?

1 MR. MARANDO: Object to form.

2 A. Yes, coupled. What I mean is, it's
3 related, that one drives the other. It's just the
4 usual meaning of the word "coupled." Something is
5 coupled to the other means that there is a
6 cause-effect relationship between the two. That's
7 what is meant by "coupled" in this conversation.

8 Q. I'm now holding a pencil. A standard
9 pencil has a tip on one end and an eraser on the
10 other. Is the tip coupled to the eraser -- is the
11 tip operably coupled to the eraser?

12 MR. MARANDO: Objection to form.

13 A. No.

14 Q. Why not?

15 A. No. In this instance, the tip is
16 rigidly coupled to the eraser, not operably coupled
17 to the eraser. In operable coupling, there is --
18 again, there's two elements to the system, and the
19 two elements of the system are such that it is two
20 separate elements of the system, where an operation
21 of one element drives or is coupled to the operation

1 of the other element. Unlike in the case of a
2 pencil, where there aren't two different elements,
3 it's just one single element, and the coupling that
4 you refer to is simply a continuation of the
5 structure from one end to the other end; in which
6 case this would just be perhaps a structural coupling
7 as opposed to an operational coupling.

8 Q. Are you aware of the -- some little
9 device, usually some little animal, maybe a donkey,
10 where it has -- it has little pieces that have wires
11 through them, and you press the button in the bottom
12 of the base and it collapses, and you release the
13 button and it gets taut. Are you familiar with that
14 toy? Have you ever had that?

15 MR. MARANDO: Objection to form.

16 A. I'm not familiar.

17 Q. You press the bottom and the animal
18 collapses, and you release it and it gets rigid?

19 MR. MARANDO: Objection to form.

20 BY MR. KATZ:

21 Q. If you're not familiar with it, that's

1 fine.

2 A. I can imagine something in my head. I
3 don't -- I don't think I've seen an animal like that.

4 Q. It's a little toy.

5 Because the movement of the button
6 causes something to get rigid, would that be an
7 operable coupling?

8 MR. MARANDO: Objection to form.

9 A. Since it's a little speculative, at
10 least for me -- I know you probably can imagine this
11 thing playing in your head right now -- would you use
12 an example that I might be familiar with?

13 Q. Sure.

14 You have a passive articulation joint
15 that can move freely, and then you have a locking
16 mechanism where you pull the wire and it locks into
17 place, or a cable. Is that cable operably coupled to
18 the joint?

19 MR. MARANDO: Objection to form.

20 A. I follow this example. I just want to
21 process it for a few more minutes.

1 Q. Sure?

2 A. Yes, I would say the cable in this case
3 is operably coupled to the articulation joint.

4 Q. And if we look at your page 13,
5 Figure 133?

6 A. Yes.

7 Q. Where it's got the two pivot joints
8 within what you call the articulation joint?

9 A. Yes.

10 Q. Would you view the cable only effecting
11 the proximal pivot, can you identify -- actually,
12 maybe you can help me out.

13 Which cable affects the proximal pivot
14 as opposed to the distal pivot? Would that be 6152?

15 A. Can I refer to the patent?

16 Q. Yes. You have a copy of the patent in
17 front of you.

18 A. Okay, can you please repeat your
19 question, and I'm going to look for some relevant
20 content?

21 Q. Can you identify a cable that only

1 controls the proximal pivot and not the distal pivot?

2 A. Okay. So in this case I believe it's
3 not any one cable that produces one articulation.
4 It's a combination of the cables that produces any
5 given articulation.

6 So in this instance, the cable --
7 actually all four cables will work to produce the
8 rotation about TA1, and all four cables in
9 conjunction will produce the rotation about TA2.

10 MR. KATZ: Okay. Very helpful. Thank
11 you.

12 We've been going for an hour, so now
13 will probably be a good time for a break.

14 (Brief recess.)

15 MR. KATZ: Back on the record.

16 BY MR. KATZ:

17 Q. I'd like you to turn to paragraph 76 of
18 your declaration.

19 A. Yes.

20 Q. And there you say that a surgeon
21 would've found a robotic tool with passive

1 articulation to be clinically unacceptable.

2 Do you see that?

3 A. Yes.

4 Q. I want to show you an Ethicon patent,
5 Exhibit 1020. It's U.S. Patent No. 9820768, filed
6 June 29, 2012, issued November 21, 2017.

7 [Exhibit 1020, U.S. Patent No. 9820768,
8 was marked for identification.]

9 A. Is this part of the exhibits --

10 Q. No, no. I've just labeled it as an
11 exhibit. That's why you confirmed that this, in
12 fact, is an Ethicon robotic tool with passive
13 articulation?

14 A. So this is not a patent that we have.

15 Q. It is not a patent that we filed in this
16 proceeding. I would just like you to confirm this is
17 an Ethicon patent that discloses a robot with passive
18 articulation?

19 MR. MARANDO: Objection to the exhibit.

20 Relevance.

21 THE ATTORNEY:

1 Q. Go ahead?

2 A. I can confirm that it talks about an
3 ultrasonic surgical instrument with control
4 mechanisms. I can read the assignee from here, which
5 is Ethicon, LLC. But to confirm that this is a robot
6 that -- I'm sorry, that talks about passive.

7 Q. Let me direct your attention to the
8 description of Figure 78 to 83, which you're free to
9 look at, which is on column 5.

10 A. Okay.

11 Q. And you see a line, about line 10?

12 A. Okay.

13 Q. It says, "Figure 78 to 83 illustrate one
14 embodiment of a passive articulation mechanism for
15 use with a robotic surgical system and/or manual
16 surgical instrument."

17 Do you see that?

18 A. Okay. Yes, I see the reference.

19 Q. And so you agree that even though, in
20 your opinion, some surgeons may not want passive
21 articulation in their robot, clearly some people,

1 Ethicon, considered the concept of passive
2 articulation in a robot to be something worth
3 pursuing?

4 MR. MARANDO: Objection to form.

5 A. I don't agree, because -- I've just
6 gotten hold of this patent. If you would really like
7 me to read through this patent and form a thoughtful,
8 careful opinion on this, that would take some time.

9 I stick to the opinion that I have
10 stated here that is based on my experience and that's
11 -- that's, you know, as being a thoughtful,
12 deliberate process that has gone into conveying that
13 opinion.

14 This, I don't know the context. I don't
15 know what were all discovered in these various
16 figures and the specifications, so I'm sorry I will
17 not be able to confirm the statement that you made at
18 the beginning of question.

19 Q. Okay. The statement that you're making
20 in your declaration is regarding whether something
21 would be clinically acceptable or unacceptable; is

1 that correct?

2 A. Yes, yes.

3 Q. I take it you're not trying to say that
4 nobody would have thought of putting passive
5 articulation in a surgical robot?

6 MR. MARANDO: Objection to form.

7 A. My opinion is that based on what I know,
8 based on what I think a POSITA would have known in
9 2011, they would not have been motivated to put
10 together a passive articulation system in conjunction
11 with a robotic system, as they existed in 2011. As
12 that state of the art existed in 2011, that
13 motivation would not have existed, is what I'm
14 saying.

15 Q. I want to make sure you're clear.

16 I see you're talking about what's
17 clinically acceptable and clinically unacceptable to
18 a surgeon?

19 A. Yes.

20 Q. Okay. That's one issue.

21 And another issue is a person in the

1 ordinary skill of art would be motivated to combine
2 passive articulation with a robotic surgical system.
3 And I'm asking about that second part.

4 A. Understood.

5 Q. Okay. And you're saying,
6 notwithstanding me showing you an Ethicon patent
7 discussing passive articulation in a robot, you're
8 going to testify that in your opinion, no one, not
9 each the listed inventors on United States Patent
10 9820768, would have thought of combining passive
11 articulation on a surgical robot?

12 MR. MARANDO: Objection to form.

13 BY MR. KATZ:

14 Q. Is that your statement?

15 MR. MARANDO: Objection to form.

16 A. That was your statement. My statement
17 is what is here. I can elaborate on this, if you
18 would like, how I formed this opinion, what I think
19 about, you know, why a POSITA would have had this
20 kind of an opinion or assessment in 2011.

21 Q. What I'm trying to figure out is, is it

1 tied to the clinical unacceptability, or is there
2 something more?

3 MR. MARANDO: Objection to form.

4 A. The two are related. Perhaps can I
5 explain.

6 Q. Well, I guess first I want to understand
7 what it is you're explaining.

8 I'm asking about your position that it
9 would be clinically unacceptable to build such a
10 robot.

11 A. That is my opinion. That's my position,
12 yes.

13 Q. And then I'm saying, in your holding
14 that opinion, even though I just showed you an
15 Ethicon patent that proposed putting a passive
16 articulation robot. You will maintain that position
17 even though in the face of the U.S. Patent 9820768
18 that I showed you?

19 MR. MARANDO: Objection to form.

20 A. Yeah, and again, you mentioned two
21 things, right? Something being clinically acceptable

1 or unacceptable -- not you; I mentioned two things
2 and you clarified this for me. Something being
3 clinically acceptable or not acceptable. And the
4 second aspect, which is would a POSITA be motivated
5 to do something, even though it was not deemed
6 clinically acceptable in 2011.

7 Those are my statements. You know,
8 evidence like this from 2017 is not something that I
9 can take into consideration in -- in making my
10 statement at this point in time.

11 The statement stands on its own in the
12 sense that how does a POSITA decide what to do when
13 they're trying to come up with a new surgical
14 instrument. I'll tell you my experience when I'm
15 designing surgical instruments, or any of the
16 engineers in my company, who would very well fall in
17 the category of a POSITA, is designing an instrument.
18 They are -- they're trained in the mechanical
19 engineering discipline, but they're also trained in
20 understanding clinical relevance.

21 So clinical relevance is important.

1 Anything that I design is based on numerous
2 discussions with surgeons, and anything that a POSITA
3 designs, that -- the feedback from surgeons, the
4 clinical context or relevance is conveyed to
5 engineers who are designing instruments and tools for
6 a given clinical application.

7 Would anyone ever think of doing
8 something like this? That is not what I've said.
9 Perhaps someone would think of doing something like
10 this. Would that person be a POSITA, I don't think
11 so.

12 There are always people who are trying
13 to invent new things, trying to do things that are
14 nonobvious. There are people who said that they like
15 to come up with things that the customer hasn't asked
16 for. Those people are called visionaries and
17 innovators.

18 That is not my understanding of what a
19 POSITA is. My understanding of a POSITA is the way
20 I've defined this individual, and that definition
21 actually agrees with Dr. Knodel's declaration and his

1 definition as well. And that is, driving and
2 pursuing the design of surgical instruments based on
3 feedback and inputs and interaction with surgeons.

4 Q. Are you testifying that no surgeon in
5 2011 would have even considered using a robot with
6 passive articulation?

7 MR. MARANDO: Object to form.

8 A. That's not what I'm testifying. I said
9 I can't speak on behalf of every surgeon that is out
10 there. I can speak on behalf of myself.

11 My opinion and my understanding on this
12 matter is informed by my interaction with dozens of
13 surgeons. And each of those instances, you know,
14 again, when I was designing surgical instruments, I
15 think it's an obvious thing, then, when you're doing
16 it as an engineer, if you're designing a surgical
17 instrument for use in a clinical setting -- I have
18 not been in the clinical setting myself. I'm not a
19 surgeon myself.

20 It is an obvious and natural first step
21 that you seek to get feedback from surgeons, which is

1 what I've done. Not only in the design of a
2 particular instrument, but in general, because I'm in
3 this space. In general, I'm trying to keep myself
4 aware of what is important to a surgeon. And
5 consistently the thing that they point out as being
6 the most important is the safety of a patient, the
7 well-being of a patient.

8 And in that regard, in the design of
9 surgical -- minimally invasive surgical tools,
10 whether the tool or if the tool inadvertently or
11 intentionally pushes against a tissue or an organ and
12 there's -- and that pushing or that interaction can
13 cause damage to the patient, then that is something
14 that is, perhaps, at least in my experience and my
15 interactions with surgeons, that is highest on the
16 considerations that a surgeon has.

17 But that is my experience. I'm speaking
18 from my experience. I'm not speaking on behalf of
19 surgeons. I am not making the statement at all that
20 there is no surgeon in 2011 who would have found
21 passive articulation acceptable.

1 I -- I cannot speak on behalf of
2 everyone else. I'm just conveying what my
3 understanding is and what my experience is as of 2011
4 and I am also conveying based on that experience and
5 based on my interaction with engineers and designers,
6 what a POSITA would be aware of, someone who is
7 trying to design instruments for minimally invasive
8 surgery.

9 Q. Would you say that you've interacted
10 with about a dozen surgeons related to robotic
11 surgical tools?

12 A. I'd say at least multiple dozens of
13 surgeons.

14 Q. You have interacted with multiple dozens
15 of surgeons concerning robotic surgical tools?

16 A. Concerning laparoscopic or minimally
17 invasive surgical tools. Any surgeon that you talk
18 to in the context of minimally invasive surgery, it
19 is inevitable that there is a discussion on what the
20 state of the art is, which could be articulating
21 mechanical instruments, traditional straight-stick

1 instruments, or robotic instruments.

2 Irrespective of instrument type in
3 minimally invasive surgery, the interaction has
4 always been what are the critical requirements? What
5 is it that you worry about the most?

6 Before they say -- again, this is my
7 experience. Before they say they want dexterity, I
8 want articulation, the first thing they say is I want
9 to make sure that the instrument that I am using does
10 not adversely hurt or impact the patient.

11 Q. Okay. I just want clarity on this one
12 point.

13 A. Yes.

14 Q. About how many surgeons have you
15 discussed the design of robotic surgical tools with,
16 where that was the topic of the conversation?

17 A. Okay. I have discussed the design of
18 minimally invasive surgical tools, including a subset
19 of that being robotic surgical tools. I've had those
20 discussions with, I would say, at least a dozen
21 surgeons and likely more.

1 I have not kept a count of the number of
2 surgeons, but in the academic setting that I'm in and
3 the various trade shows and conferences that I go to,
4 I would say that number is a fairly large number. I
5 can comfortably say it will be more than a dozen, but
6 since you asked for a specific number, I'll say a
7 dozen.

8 Q. All right. Earlier you were talking
9 about safety.

10 A. Yes.

11 Q. When designing a robotic tool for
12 safety, would you expect that the amount, let's say,
13 for a gripper, that the gripping force would be
14 designed to be limited so that you didn't grip too
15 hard?

16 MR. MARANDO: Objection to form and
17 scope.

18 A. Gripping force would be a consideration.
19 In the context here, this wasn't a gripping force
20 issue. This was the amount of force that is applied
21 by the instrument in pushing against an organ or

1 tissue, which means to me is a greater concern or
2 greater issue.

3 But to your point, to your question, is
4 there a concern, is there a question associated with
5 how much gripping force is a robotic instrument
6 applying on a tissue, is that a valid question? Yes,
7 it is.

8 Q. You, in fact, discussed some measured
9 gripping forces --

10 A. Yes.

11 Q. -- of the DaVinci robot, correct?

12 A. Yes, I referred to a publication that
13 presents gripping forces by the DaVinci robot, yes.

14 Q. Do you know one way or another whether,
15 in fact, the DaVinci robot limits the amount of
16 gripping force that applies for safety reasons?

17 MR. MARANDO: Objection to form and
18 scope.

19 A. Do I know from the point of view of
20 having looked at DaVinci or Intuitive's designs?

21 MR. MARANDO: Just keep in mind that

1 this is public record.

2 A. I have no information or access to those
3 details, but as -- as an engineer, as a technologist
4 in the area of mechanical devices and robotic and
5 mechatronic systems, I would be really surprised if
6 Intuitive or anyone else didn't put some kind of
7 limit on the forces that are applied on tissues,
8 depending on the actual kind of an effector that is
9 in question. So I would assume that, as a safety
10 feature, I would assume there is some kind of limit
11 that is created and implemented.

12 I would also say that another limit to
13 gripping forces would come from the kind of
14 actuators, motors, that are built into a DaVinci
15 robot. Again, I don't know the -- I don't know the
16 actual details of the actuators that are used, but I
17 have a sense of the size, the overall form factor of
18 a DaVinci robot, and I can imagine the size of the
19 motor that would go into it.

20 And earlier you were showing me four
21 control discs. I can imagine that there would have

1 to be at least four motors on the robot arm of the
2 DaVinci.

3 Being aware of the size of the overall
4 robot arm, I can imagine what kind of size of motors
5 would be used in there. Based on that
6 understanding -- and again, based on my knowledge of
7 sensors, actuators, mechatronics, robotics -- I can
8 tell that those motors would themselves be limited in
9 terms of how much torque they can generate, which
10 then ultimately will impact how much gripping force
11 can be generated. So the two things that I mentioned
12 -- one, just safety features that are built into the
13 robot, and two, the capability, the capability and
14 sizing of components that go into the robot.

15 Q. Have you undertaken analysis to
16 determine, based on the size of the Intuitive DaVinci
17 robot arm, how much torque can be provided by the
18 Intuitive DaVinci motors?

19 MR. MARANDO: Objection to form and
20 scope, and again, this is a public record.

21 A. I have made a qualitative assessment, a

1 qualitative analysis, to assess the capabilities of
2 the motors and actuators that would go into a DaVinci
3 robot.

4 Q. And from that assessment, what did you
5 determine as the maximum torque that could be
6 generated by an Intuitive robot motor?

7 A. Just one minute.

8 MR. MARANDO: Steven, can we just talk
9 for one second offline?

10 MR. KATZ: Let's go off the record.

11 MR. MARANDO: Outside the presence of
12 the witness.

13 (Brief recess.)

14 MR. KATZ: Back on the record.

15 BY MR. KATZ:

16 Q. I've just had a discussion with counsel
17 and I just want to clarify something: This is a
18 public deposition. It's a public record. No
19 question of mine is intended to ask you to provide
20 information that's confidential to Intuitive
21 Surgical.

1 If you believe your opinion would
2 require the disclosure of information that you think
3 is Intuitive confidential, just let me know that, and
4 I'll decide how to handle it at that point.

5 But to the extent you've done analysis
6 that is not Intuitive confidential, feel free to
7 provide that, fair?

8 A. Fair, yes.

9 Q. And if you have any questions about
10 where to draw that line, just say, look, I think this
11 might be getting into Intuitive confidential
12 information, and I'll figure out whether to change
13 the subject or how to handle it.

14 A. Okay. Repeat the question, please.

15 Q. Based on publicly available information,
16 did you come to any conclusion about the maximum
17 torque an Intuitive DaVinci robot motor can generate?

18 MR. MARANDO: Objection to form and
19 scope.

20 A. Like I said, I've done a qualitative
21 assessment. I think you're asking for a specific

1 number.

2 BY MR. KATZ:

3 Q. If you came up with one.

4 A. I would say I can -- coming up with a
5 number is a quantitative calculation. I guess I can
6 attempt it in realtime, but perhaps I shouldn't.

7 Q. Let me clarify my question. I'm not
8 asking about a calculation you can do now. I'm
9 asking what calculations did you do in forming your
10 opinion.

11 A. Yes.

12 Q. If you didn't have a calculation, then
13 you didn't have a calculation, and that's fine.

14 A. So -- so what I know, for example, from
15 the exhibit that you cited, that did an experimental
16 measurement of the gripping forces provided by a
17 DaVinci robot -- I don't recall the exact model, I
18 can look it up if you would like that level of
19 specificity. But the particular study that is cited
20 in that paper talks about gripping forces that are
21 less than ten pounds. I believe the maximum might be

1 -- if you give me a few moments I can look up that
2 actual number.

3 So this published result, for a variety
4 of different end effectors, the highest gripping
5 force number that they have reported is 8.5 pounds.
6 This 8.5 pounds, that kind of number, to me, is
7 consistent with the size of the robotic system that
8 I'm aware of that a DaVinci has and the size of a
9 motor that might fit into a robotic system like that.

10 When I said qualitative analysis, the
11 kind of process that I follow would be to look at the
12 robot arm and try to imagine what size motor would
13 fit into this end portion of it. And a rough
14 estimate that I would make is, you see that Coke can
15 that you have? Perhaps a half or a third of that
16 size motor would fit into the robotic arm. That size
17 is consistent with a less-than-ten-pound grasping
18 force number. And that's -- that was the kind of
19 qualitative assessment that I was talking about.

20 Q. Other than determining that it was
21 consistent, did you have any assessment regarding

1 whether the size of those motors could generate,
2 let's say, 40 pounds of force?

3 A. Yes, and my assessment was that this --
4 the capability of the motors should be limited to
5 about ten pounds, and 40 pounds is a very large
6 number. The '959 Patent talks about much higher
7 clamping forces when it comes to stapling. And I
8 believe those numbers were in the range of 70 to
9 120 pounds.

10 Q. Let's figure out what we're talking
11 about here.

12 Number one is, you are citing forces
13 from an article, correct?

14 A. Yes.

15 Q. The article is what exhibit number? Do
16 you see it there?

17 A. Yes. It is Exhibit Number 2009.

18 Q. I take it you've personally done no
19 measurements of the forces generated by a DaVinci
20 robot?

21 A. Not on a DaVinci robot, yes.

1 Q. And I was not -- and I believe what you
2 were talking about is the amount of force measured at
3 the gripper --

4 A. Yes.

5 Q. -- of a DaVinci robot?

6 A. Yes.

7 Q. You weren't talking about the maximum
8 torque the motor could generate; is that correct?

9 A. That's right. These numbers, the
10 article is -- the measurement they provide is the
11 gripping force, not -- they don't have any access to
12 be able or any way to be able to measure the motor
13 torque directly, but the motor torque is correlated
14 to the gripping force.

15 Q. And that article mentioned that
16 different instruments provided different forces?

17 A. That is true.

18 Q. So the force is dependent on the
19 instrument, it's not just a function of the motor?

20 MR. MARANDO: Objection.

21 A. The force is a function -- at least the

1 safety aspect, I would imagine, is a function of the
2 instrument. But then there will be an upper limit to
3 what the motor can provide.

4 BY MR. KATZ:

5 Q. And I take it you've done no analysis to
6 figure out what that upper limit is?

7 A. No quantitative analysis. No
8 quantitative analysis. I have assessed it based on
9 just assuming a certain size of the motor that might
10 fit into the robotic arm.

11 Q. And I take it as a general proposition,
12 would you agree that -- would you agree that when
13 designing any robot that is capable of applying a
14 significant force, that you would put in some kind of
15 safety limits to control the force being delivered by
16 the motion stage?

17 MR. MARANDO: Objection to form and
18 scope.

19 BY MR. KATZ:

20 Q. Or let me just even ask a much simpler
21 question.

1 You're designing a robot -- earlier you
2 talked about in a semiconductor space?

3 A. Right.

4 Q. You certainly don't want to snap a wafer
5 or destroy components, right?

6 A. Yes.

7 Q. In fact, so you would expect the robot
8 to be able to deliver much more force than what the
9 programming would allow the robot to deliver; isn't
10 that correct?

11 MR. MARANDO: Objection to form and
12 scope.

13 A. You used the term, "The motor can
14 provide much more force." That "much more" is a very
15 subjective kind of thing, and every engineer or
16 designer chooses that "much more" very carefully. It
17 could be 5 percent more. It could be 50 percent
18 more.

19 It typically depends on how much luxury
20 you have in terms of the real estate. If you really
21 -- if the size of the overall system is not that big

1 a factor, then you would choose an actuator or a
2 motor that is, what we'd say, oversized in the sense
3 that it has a lot more buffer beyond what is intended
4 versus if you have a situation or condition where
5 you're trying to minimize the size of the robot,
6 which I think would be the case for any surgical
7 robot. In that case, you would maintain a much
8 thinner buffer margin beyond what is actually needed
9 from a safety standpoint. There's no reason to
10 oversize a motor in that instance.

11 Q. Let's look at that article. So I'm now
12 showing you Exhibit 2009?

13 A. Yes.

14 Q. And is this the article that you're
15 relying on regarding forces generated by actual
16 DaVinci robots?

17 A. Yes.

18 Q. The date of this article is March 2011,
19 right?

20 A. Yes.

21 Q. That's when the article was published?

1 MR. MARANDO: Objection to form.

2 A. Yes.

3 BY MR. KATZ:

4 Q. What year was the robot made that was
5 being tested here?

6 MR. MARANDO: Object to form.

7 A. I wouldn't know.

8 BY MR. KATZ:

9 Q. Certainly prior to 2011, right?

10 A. Has to be, yes.

11 Q. Did you read this article?

12 A. Yes. It was some time back, but yes.

13 Q. If you look on page 527 of this article,
14 which is the fifth page, if you look at the second
15 full paragraph.

16 A. Okay.

17 Q. It says, "The study had some
18 limitations, including the use of extended-use
19 training instruments --

20 A. Excuse me. Page 527, first column?

21 Q. I'm sorry. Second column, second full

1 paragraph. Sorry.

2 A. Okay. "Finally"?

3 Q. No, the one below that.

4 A. Okay.

5 Q. "This study had some limitations."

6 Do you see that?

7 A. Yes.

8 Q. And it says, "This study had some
9 limitations, including the use of extended-use
10 training instruments for most of the measurements, as
11 well as the use of the standard platform patient side
12 cart that is over five years old."

13 A. Okay.

14 Q. "Extended-use training instruments are
15 not validated to maintain the programmed closing
16 forces that are standard for clinically used
17 instruments."

18 A. Okay.

19 Q. Do you see that?

20 A. Yes.

21 Q. Do you recall now that the fact this

1 article from 2011 is referring to a robot that was
2 over five years old?

3 A. Yes.

4 MR. MARANDO: Object to form.

5 A. That is what they've stated, yes.

6 BY MR. KATZ:

7 Q. And you see how it says that these are
8 training instruments that will not have the same
9 force as a new instrument?

10 A. That's not exactly what this says.

11 Q. Okay. Well --

12 A. I can read it.

13 Q. Can you --

14 A. Let me read it.

15 Q. Sure.

16 A. "The study has some limitations,
17 including the use of extended-use training
18 instruments for most of the measurements, as well as
19 the use of a standard platform patient side cart that
20 is over five years old. Extended-use training
21 instruments are not validated to maintain the

1 programmed closing force that are standard for
2 clinically used instruments."

3 What this is, what I interpret from this
4 is that the measurements that are made using these
5 instruments and the five-year-old standard platform,
6 those instruments are not validated, and, therefore,
7 either the measurement may be slightly higher or
8 slightly lower compared to or different compared to
9 what the latest programming of closing forces might
10 be for perhaps a recent or newer combination of the
11 instrument and the robot.

12 Q. And why would -- why would that be?

13 So my question is, why would an
14 extended-use training instrument have a force that's
15 different from what the programmed closing force
16 should be?

17 MR. MARANDO: Objection to form.

18 A. Again, I'm not a user of the DaVinci.
19 I'm not in a hospital system. But I can imagine that
20 training instruments are probably used a lot more
21 times than what a clinical instrument might be

1 intended for. And as a result, the calibration or
2 the validation of training instruments perhaps has
3 stopped after a certain life. And maybe that's why
4 these instruments were not validated.

5 Q. But you would expect that newer
6 instruments would have significantly higher gripping
7 force, wouldn't you?

8 MR. MARANDO: Objection to form.

9 A. Why would I?

10 BY MR. KATZ:

11 Q. In your experience, you would not expect
12 newer instruments to have a significantly higher
13 gripping force?

14 MR. MARANDO: Objection to form.

15 A. If there's a clinical need for higher
16 gripping forces, then one would expect that. But if
17 there's no clinical need that stated that an
18 instrument should have higher gripping forces, then
19 there's no reason to have that expectation.

20 Q. Wouldn't you expect that an older
21 instrument that's been used would have reduced

1 gripping forces due to wear in the instrument?

2 MR. MARANDO: Objection to form.

3 A. It can go both ways. It can go both
4 ways in the sense if there is increased friction in
5 the system, then perhaps the motor is generating the
6 same torque, but the gripping force is less. But
7 that's not necessarily always the case.

8 Sometimes over time, the mechanisms and
9 mechanical systems get loose, and as they get loose,
10 friction goes down. And as friction goes down, the
11 same amount of torque on the motor can produce
12 slightly higher gripping forces at the end effector.

13 So I don't -- I don't think, one way or
14 the other, just the fact that something is older
15 would produce lower gripping forces.

16 One other thing I would like to mention
17 is that a motor doesn't wear off. A motor for a
18 given current that you pump into the motor produces
19 the same torque today or five years from now or ten
20 years from now, as long as the magnets inside the
21 motor don't get demagnetized, and there is no reason

1 to believe that would be the case here. So if
2 there's nothing electromechanical, if there's nothing
3 that is wearing off, then there's nothing that would
4 produce a reduction in the motor force or motor
5 torque.

6 Q. In fact, in this article they found that
7 the new instruments have significantly higher
8 gripping force than the older instruments, correct?

9 MR. MARANDO: Objection to form.

10 BY MR. KATZ:

11 Q. You can look on page 525, if you like.

12 A. Okay.

13 Q. Second paragraph from the bottom of 525,
14 first column. Do you see down below, the first
15 column towards the bottom says, "When compared to an
16 older training instrument, the newer instrument had a
17 significantly higher gripping force at each
18 position"?

19 A. Let's look at the corresponding table
20 that they're referring to. Okay. So now let's
21 compare what they say is significantly higher, which

1 is a subjective choice. That's their choice of
2 words.

3 So compare the first line, 8.05 and
4 8.78, the delta is 0.73 newton, and that's less than
5 10 percent of the difference. And that would hold
6 true across these three roles.

7 So in this case, there is consistency in
8 that the new instrument is providing a slightly
9 higher -- that's my choice of term, as opposed to
10 "significantly" higher -- approximately 10 percent
11 higher.

12 And in this instance, there may be
13 certain aspects in the usage of the instrument over
14 time, either mechanical aspects or the fact that the
15 software may not be validated, the software may not
16 be updated, that may be producing the slightly higher
17 gripping force with the new instruments, as compared
18 to the older instruments.

19 Q. And I'm sure somewhere in this article
20 -- do you happen to know how to convert newtons to
21 pounds per square inch?

1 A. Pounds -- oh, newtons convert to pounds,
2 so ten pounds force is 44 newtons.

3 Q. So if we look Table 2 in this article --

4 A. Yes.

5 Q. -- it says, "Grip forces for all robotic
6 instruments tested."

7 Do you see that?

8 A. Yes.

9 Q. It shows the double-fenestrated grasper?
10 Did I pronounce that correctly?

11 A. Yes, fenestrated, yes.

12 Q. Double-fenestrated grasper, and 2.26
13 newton's force.

14 A. Yes.

15 Q. And you're saying -- I'm sorry, what did
16 you say to the pounds would be how much?

17 A. I think this parenthesis, the number --
18 that 0.15 is probably correct.

19 Q. It says standard deviation. 44 newtons
20 is about ten pounds.

21 That would be about half a pound?

1 A. Yes.

2 Q. So they had a DaVinci robot, and they
3 plugged in different instruments and tested, they
4 tested the force they generated?

5 A. And more specifically, if you look at
6 Figures 1 and 2, they show you exactly how this was
7 done. They created this housing unit and inserted a
8 load cell. And in the tip of the housing unit, they
9 compressed using -- using the tip of any given
10 instrument.

11 Q. But they had a standard robot arm, and
12 they would plug in each instrument?

13 A. Yes, and I think they did -- they
14 mentioned not just the standard. They mentioned SSI
15 and the standard systems, robotic systems.

16 Q. But for each robot, they would plug in
17 all the different instruments?

18 MR. MARANDO: Object to form.

19 A. That's my understanding, yes.

20 Q. And so on Table 2, the
21 double-fenestrated grasper generated 2.26 newtons of

1 force?

2 A. Yes.

3 Q. And then the Hem-o-lok clip applier
4 applied 37.57 newtons of force?

5 A. Yes.

6 Q. So same motor --

7 A. Yes.

8 Q. -- applied to one instrument generated
9 2.26 newtons, and to the other instrument, the
10 instrument was able to generate 37.57 newtons?

11 A. That's right, yes.

12 Q. Same motor?

13 A. Yes, same motor.

14 Q. So why wasn't the double-fenestrated
15 grasper generating 37 newtons like the clip applier?

16 MR. MARANDO: Object to form.

17 A. Because of the clinical relevance of any
18 given instrument. Suppose you set the same motor,
19 different grip and force levels. Well, that's the
20 beauty of software. That's where in the programming
21 you set appropriate limits. And the limits are set

1 based on the clinical use of any given instrument
2 type.

3 A Hem-o-lok clip, as you can imagine, is
4 a clip that is applied to staunch the flow of blood
5 through some vessel, and, therefore, there is some
6 substantial amount of force that needs to be applied
7 to achieve that clipping action or the clip has to
8 lock in place.

9 A double-fenestrated grasper is --
10 again, this is my understanding -- is one of the
11 instruments that is made for delicately grasping a
12 tissue or perhaps some portion of an organ, and
13 therefore there is a desire to keep the gripping
14 forces within a certain -- to keep the minimum.

15 Hence, you see this variation that it
16 depends on the context of the particular instrument
17 that you have on a given robotic system.

18 Q. Is there a minimum amount of force
19 required for a linear cutter to operate?

20 MR. MARANDO: Object to form.

21 BY MR. KATZ:

1 Q. Let me ask a better question.

2 Is there a minimum amount of force that
3 a surgical linear stapler must provide for clamping
4 to be clinically acceptable to surgeons?

5 MR. MARANDO: Object to form.

6 A. My assessment is based on the numbers
7 that I see in the '959 Patent, and there is a range
8 here that is provided that is 70 to 120 pounds.
9 Based on this range -- again, I have not made any
10 direct measurements of such kind of forces myself.
11 My information is based on what I've read in the art
12 and the literature. Based on that, I would respond
13 to your question by saying the lower limit is
14 70 pounds.

15 In addition -- in addition to the
16 quantitative numbers, what I'm aware of, again
17 reading several of the patents that are part of the
18 exhibits here, it's that the amount of force that is
19 needed for clamping, stapling, and cutting is a
20 substantial amount of force compared to holding
21 tissue, as in the case of a fenestrated grasper,

1 holding a needle, a dissector, any of the traditional
2 laparoscopic or minimally invasive instruments.

3 Q. I believe when you're referring to the
4 70-pound figure, that was force for clamping in a
5 linear stapler; is that right?

6 A. I'd like to just quickly confirm that.

7 Q. Sure. Just tell me where you're
8 reading.

9 A. Yes. I'm looking at Column 84.

10 Q. Of the '969 Patent?

11 A. Of the '969 Patent, Column 84, line 25
12 and 26.

13 Q. And does that confirm that you're
14 referring to clamping force when you're referring to
15 the 70 pounds?

16 A. That confirms that -- I mean, literally,
17 this is closure forces. Based on what I've read and
18 what I understood, the range of closure forces does
19 correspond to clamping forces.

20 Q. So this figure is referring to the force
21 applied to the anvil, and not the force applied by

1 the knife to cut tissue; is that correct?

2 MR. MARANDO: Object to form.

3 A. I would agree to that, yes.

4 BY MR. KATZ:

5 Q. Do you know if there's a minimum
6 clinically acceptable force that must be applied to
7 the knife to cut tissue in a linear stapler?

8 MR. MARANDO: Object to the form.

9 A. I think the clinical requirement is not
10 on the force on the knife. The clinical requirement
11 is the clamping force on the tissues. And then it's
12 the job of whoever is designing the instrument to
13 translate or to -- to translate the closure of the
14 clamping force, the force on the knife that is
15 cutting, which in turn would be translated to the
16 torque from a motor or a lever that is generating
17 this kind of force.

18 Q. Am I correct that your -- your 70-pound
19 figure that you just discussed, that the sole basis
20 of that figure is the '969 Patent?

21 MR. MARANDO: Object to form.

1 A. Yes. Right now, this is the only patent
2 that I can point to. And looking at the literature
3 on endocutters or linear staplers, I believe this is
4 the range that I have come across.

5 I do not have any other patent that I
6 can point to right now, but if given the time, I can
7 come up with more references that can support the
8 number in this range.

9 Q. You referred to the size of the robot
10 arm in the DaVinci, your quantitative assessment,
11 right?

12 A. Yes.

13 Q. In fact, the Anderson patent that we're
14 discussing, Exhibit 1010 --

15 A. Yes.

16 Q. -- does not provide dimensions for the
17 robot arm of the Anderson invention, does it?

18 A. It doesn't or not that I know of. Not
19 that I can recall providing dimensions.

20 Q. When you were reviewing the Anderson
21 patent, did you review any of the patents that are

1 incorporated into Anderson by reference?

2 A. There are a lot of patents, so just give
3 me one second, please.

4 Q. Well, let me ask a different question:
5 When you were reviewing the Anderson patent for what
6 it taught, did you consider material from patents
7 that it incorporates by reference?

8 A. Some material, but there's a lot of
9 patents that it had been incorporating by reference,
10 and that is -- I did not review every single one of
11 those.

12 Q. And I'm not asking you from memory --

13 A. Okay.

14 Q. -- to tell me which ones they were. I
15 just want to know if you have.

16 A. Okay.

17 Q. In paragraph 36 of your declaration, if
18 you want to read that to yourself for a minute and
19 I'll ask a question.

20 A. Okay. Yes.

21 Q. And you mention there in the first

1 paragraph, paragraph 36, "Surgical, quote, 'stapler
2 probe,' unquote, may refer to a device that simply
3 applies staples and does not cut tissue at all."

4 A. Yes.

5 Q. On this point, I note that Dr. Knodel
6 had agreed that a device that simply staples is a
7 vastly different device from an endocutter, unquote.

8 A. Yes.

9 Q. That's what he stated?

10 A. Yes.

11 Q. Now, you say that as a surgical stapler
12 may refer to a device that simply staples?

13 A. Yes.

14 Q. But also may not?

15 A. Yes.

16 Q. So you just don't know from those words
17 alone whether it's just a stapler or a stapler plus
18 cutter?

19 MR. MARANDO: Object to form.

20 A. So there was a lack of clarity in this
21 term. For this particular term, I looked through all

1 of Anderson's patent to see where, beyond this
2 reference, which I think is very early in the
3 description of Anderson, there is really no further
4 substantiation of the term "stapler probe," either in
5 the specification, the text, or in the figures.

6 There's nothing in the figures that I saw that could
7 be termed as a stapler probe or just as a stapler or
8 anything like that.

9 The term stapler probe is not a term
10 that I'm familiar with. Again, I know endocutters,
11 linear endocutters, surgical staplers, laparoscopic
12 staplers; but stapler probe is sort of an odd term,
13 and I was looking for some -- some clarification of
14 this term in the patent itself. And in doing so --
15 again, just by -- the term itself to me doesn't refer
16 -- doesn't indicate one or the other. It could be
17 one, it could be the other, it could be both. But
18 when I look at any of the other figures that are
19 provided in the Anderson patent, and let me now see
20 if I could point you to any one of them.

21 For example, Figure 6 -- Figure 7,

1 Figure 6, these are examples of what -- I think it's
2 an ultrasonic probe at the end. Let me see if there
3 are any further examples shown of an end effector.

4 Actually, I see Figure 20, that doesn't
5 look like a linear stapler to me. Figure 26 is a
6 similar example. Figure 30, Figure 29, Figure 33,
7 Figure 34; in none of these are indicated to me what
8 I understand to be an endocutter or a linear stapler,
9 like what you mentioned, that involves closing and
10 cutting. Closing, actually closing, stapling and
11 cutting.

12 And based on that, A, the fact that
13 stapler probe by itself, that is not a term that I'm
14 aware of that exists in the literature or in a Google
15 search or any paper or patent that I found; in the
16 absence of that, when I look for support for this
17 term in the Anderson patent, the figures that I see
18 all seem to indicate something that opens and closes,
19 but nothing -- and then, by the way, something that
20 opens and closes can apply -- a lock or a clip,
21 potentially can apply just to the staple. But

1 something that simply opens and closes, to me,
2 doesn't appear it can grip, clamp, staple, and cut.

3 Q. If we look at Anderson Column 7, the
4 paragraph starting with line 6.

5 A. Column 7, start line 6, yes.

6 Q. This is the paragraph that mentioned
7 stapler probe. Why don't you read it to yourself and
8 I'll ask you a question.

9 A. Yes.

10 Q. It looks to me that -- in fact, isn't
11 this paragraph referring to all of the instruments
12 that can be connected as a type of probe?

13 MR. MARANDO: Objection to form.

14 A. It is referring to a whole range of
15 instruments. These instruments that are mentioned
16 here, just I can tell you the image that this creates
17 in the mind. These are all examples of instrument
18 tips that are small in size. And perhaps that's why
19 they use the term "probe." I don't know why they've
20 used the term probe in so many instruments, but a
21 probe is something that is tiny and that probes.

1 They talk about -- this is around
2 line 17. And further examples, instrument probe
3 assembly may include suitable OEM components of
4 biopsy probes, which is a tiny probe, suction probes,
5 substance injection probes, surgical accessory
6 application probes, stapler probes, tissue grasping
7 and cutting probes, and the like.

8 So each of these is to me an example of
9 the kind -- of the suite of instruments that are used
10 in laparoscopy that are typically associated with a
11 small end effector. I don't read any of these to be
12 a linear endocutter, which is like perhaps the term
13 reference that shows a pretty significant end
14 effector that is the same diameter, if not slightly
15 bigger than the diameter of the tool shaft as
16 considerable length, that being referred to as a
17 probe is not something that I've seen anywhere.

18 Q. My question was slightly different.

19 A. Okay.

20 Q. I'm just trying to establish, would you
21 agree that this paragraph refers to all the

1 instruments it's referring to as probes?

2 A. All the instruments it -- state the
3 question again, please?

4 Q. In Anderson, in this paragraph on
5 Column 7, it's referring generically to all these
6 types of instruments it is discussing as probes?

7 A. I think it's -- it's using the term
8 probe individually. Like an ultrasonic probe, a
9 suction probe, a substance injection probe. I don't
10 know if Anderson has used the single term probe
11 collectively to refer to all of these.

12 Q. Let me ask it a better way. Anderson is
13 referring to a number of instruments here?

14 A. Yes.

15 Q. And each one is referred to as a probe?

16 A. As a kind of probe, yes.

17 Q. And in your words, what you're saying is
18 you're not familiar with the term stapler being
19 referred to as a probe?

20 A. Never, yes.

21 Q. But here Anderson is referring to the

1 various probes you might have, and one of them is a
2 stapler?

3 A. Is a stapler probe, yes.

4 Q. And Anderson doesn't define that any
5 further. It assumes that those in the art know what
6 a stapler probe is?

7 MR. MARANDO: Object to form.

8 A. I don't know what Anderson might be
9 thinking in choosing this language. I can tell you
10 what my understanding of this language is.

11 Q. And you have more to add other than what
12 you've already told me in the last few minutes?

13 A. No, no.

14 Q. But do you see anything in the Anderson
15 reference that suggests that they were telling those
16 of skill in the art what a stapler probe is for the
17 first time, as opposed to listing an instrument that
18 existed on the prior art?

19 MR. MARANDO: Objection to form.

20 BY MR. KATZ:

21 Q. Let me ask a much cleaner question.

1 A. Please.

2 Q. Did you see anything in the Anderson
3 reference that suggests a stapler probe being
4 discussed here was a new type of instrument, as
5 opposed to one of the instruments that was known to
6 those in the art already?

7 MR. MARANDO: Objection to form.

8 A. I don't want to assume on behalf of
9 Anderson. The flaw of this paragraph is such that to
10 reduce the cost, cost for manufacturing convenience,
11 the instrument may include or OEM parts, and then
12 this is a listing of various OEM parts either current
13 or future. And in that context, Anderson may have
14 listed a stapler probe, perhaps assuming that that's
15 a phrase that is known to people knowledgeable in the
16 art -- I don't know if that is indeed the case. And
17 I would consider myself -- I have more than the
18 ordinary skill in the art, and "stapler probe" is not
19 a term that I would consider to be a specific enough
20 term to tell whether that is just a stapler or
21 endocutter.

1 Q. If you look at the '969 Patent, turn to
2 Figures 74, 75, and 76.

3 A. Can we take a break in a few minutes? I
4 don't want to interrupt the flow of questions, but
5 whenever you think is an appropriate time.

6 Q. Sure. One or two more on this.

7 A. Yes. Did you say Figure 74?

8 Q. Yes. 74, 75, and 76.

9 A. Yes.

10 Q. Do you see an item labeled 3612 in 74?

11 A. Yes.

12 Q. And you see the 3612 label in Figure 75?

13 A. Yes.

14 Q. And in 76 -- no, actually take that
15 back. There is no 3612.

16 A. Yes, in 74 and 75, I see the item
17 labeled.

18 Q. And there is the item labeled 3612 in 74
19 and Figure 75 --

20 A. Yes.

21 Q. -- in the '969 Patent?

1 A. Yes, I see that.

2 Q. Do you understand that what 3612 is
3 referring to is an end effector?

4 MR. MARANDO: Object to form.

5 A. No, no.

6 Q. So it's your testimony that what 3612 is
7 pointing to is not an end effector, correct?

8 MR. MARANDO: Object to form.

9 A. I'm saying neither. I mean, based on
10 these figures, what I'm -- I would like to look at
11 the specs. But the labels here, in Figure 74, it's
12 3630 that is the end effector.

13 If you want, I can read the spec and be
14 more clear on this.

15 Q. We can go there in a moment. I think I
16 won't find the word there, but you can look. I'm
17 just trying to understand your testimony.

18 Is it your testimony that the item
19 labeled 3612, which is that detachable component from
20 where the 3692 arrow is to the distal end, right,
21 that item, is it your testimony that that item should

1 not be called an end effector?

2 MR. MARANDO: Object to form.

3 A. To me, this is contextual. It depends
4 on the context. It's contextual. Perhaps one mere
5 effort to that entire thing as an end effector, if
6 you give me this -- again, I don't recall what the
7 specification might say or says.

8 My initial assessment would be that the
9 stuff that I see at the end -- for example, in
10 Figure 74, around the location of axis AA, that point
11 forward would be the end effector.

12 The only thing that I'm not certain
13 about is whether it would be appropriate to include
14 3662 in the definition of end effector.

15 Q. And so you don't know one way or the
16 other whether it would be appropriate in the art to
17 call all of Item 3612 an end effector or not?

18 MR. MARANDO: Object to form.

19 A. I mean, who am I to decide whether it's
20 appropriate or not. People come up with terminology
21 all the time, and they choose whatever terminology

1 they want to use for inventions and figures and
2 components and elements that they describe in their
3 patent applications.

4 So I can't make as broad a statement as
5 I think you were looking for. I can just tell you
6 that my assessment is that the portion at the end,
7 the portion at the end which is -- again, I don't
8 know what 3630, if there's a definition in the spec,
9 but that to me is the end effector as opposed to
10 3612.

11 Q. I guess are you saying that is your own
12 personal opinion, or are you saying a person of
13 ordinary skill in the art would not consider all of
14 3612 to be an end effector?

15 MR. MARANDO: Objection to form.

16 A. They may or they may not. I cannot say
17 definitively one way or the other. I think I can say
18 definitively what my assessment is.

19 Q. If you want to look at the passage that
20 discusses it, you're free to do so. Like I said, I
21 believe the term used is "disposable loading unit"

1 for 3612. You're free to look, if you wish.

2 A. Okay. But do you have any further
3 questions along the same line?

4 Q. No.

5 A. So I'll skip.

6 MR. KATZ: Do you guys want to break for
7 lunch now. Let's go off the record.

8 (Brief recess.)

9 MR. KATZ: Back on the record.

10 BY MR. KATZ:

11 Q. Welcome back.

12 A. Thank you.

13 Q. Turn to page 10 of your declaration,
14 Figure 136 of the '969 Patent, page -- yes, page 10
15 of your declaration?

16 A. Yes. Page 10, yes.

17 Q. What is Figure 136?

18 A. Let me see the description that is
19 provided here, so just give me a moment.

20 So my declaration says -- first I'll
21 read it and then I can elaborate further.

1 As shown below in Figure 136, which
2 illustrates a transmission that includes a plurality
3 of gears that in a mission engagement with a
4 gear-driven knife bar, to apply control motions to
5 the cutting instrument and sled of an end effector.

6 So that's the description here. Perhaps
7 I can, in addition to that, also mention that this is
8 an inside view of the tool-mounting portion that is
9 shown in the figure right above it, that says
10 Figure 132.

11 Q. And in that tool-mounting portion are a
12 number of gears?

13 A. That is right, and other transmission
14 elements.

15 Q. And you point out knife gear assembly
16 6560?

17 A. Yes.

18 Q. How many of those gears that we're
19 seeing from the knife gear assembly? Actually let me
20 ask a better question.

21 What I'd like you to do is can you just

1 walk me through what the knife gear assembly does?

2 We'll take it step by step.

3 My first question is, which component of
4 a knife gear assembly gets rotary power from the
5 robot arm?

6 A. On this also I want to confirm the
7 specs.

8 Q. Which column are you reading from, by
9 the way?

10 A. I am Column 84. I am reading starting
11 line 27, and I am close to line 45.

12 Okay. I'm sorry. It took me some time
13 to get your question.

14 Q. That's fine. Let me just ask a series
15 of questions.

16 A. Okay.

17 Q. Am I correct that gear 6562 is the gear
18 that's getting power from the robot?

19 A. Yes, and the specific term that is used
20 is the driven disc element.

21 Q. And then gear 6562 is going to drive

1 gear 6566?

2 A. Yes.

3 Q. And they call the collection of 6566,
4 6568, a gear reduction set; is that correct?

5 A. Yes.

6 Q. And it's called a reduction set because
7 it's going to reduce speed and increase torque?

8 A. Yes.

9 Q. And that's a standard gear structure?

10 MR. MARANDO: Object to form.

11 A. Yes. Gear reduction is a standard term
12 that is known, known in the art.

13 Q. And certainly known for 2011?

14 A. Certainly.

15 Q. And then the smaller gear 6568 is
16 driving the larger gear 6570 of another gear
17 reduction set?

18 A. Yes.

19 Q. To further -- so it's a two-stage gear
20 reduction?

21 A. Yes.

1 Q. And these gears are relatively small?

2 MR. MARANDO: Object to form.

3 A. What do you mean by relatively small?

4 Q. Could you say that Figure 136 in your
5 declaration is roughly just scale or maybe a little
6 smaller than what an actual tool-mounting portion
7 would be?

8 MR. MARANDO: Object to form.

9 A. I don't believe I've said anything about
10 the scale in my declaration. Is there --

11 Q. I'm asking you how big is this thing?
12 Do you think this is roughly the size of the
13 tool-mounting portion? Do you think it is 75 percent
14 of the size, 50 percent?

15 MR. MARANDO: Object to form.

16 A. I don't view this 136 as a scale
17 drawing. Are you referring to an engineering
18 drawing, where oftentimes in an engineering drawing
19 you provide a scale at the bottom, that one unit on
20 the drawing corresponds to one inch in real life?

21 Q. No, I'm not suggesting this is drawn to

1 scale. What I'm asking you is based on all the
2 figures showing a complete instrument in the '969
3 Patent, how big is the tool-mounting portion? Is it
4 roughly the size of the Figure 136 reproduced in your
5 declaration?

6 MR. MARANDO: Object to form.

7 A. Not necessarily. It could be or it may
8 not be.

9 Q. Look at Anderson, Figure 2 of Anderson.
10 Do you think that the tool-mounting portion of
11 Anderson is roughly the same size of the
12 tool-mounting portion in the '969 Patent?

13 MR. MARANDO: Object to form.

14 A. This predates that patent. I don't
15 think either of these patents make any reference to
16 either the size of the tool-mounting portion in
17 Anderson or the tool-mounting portion in the '969
18 Patent.

19 My understanding about tool-mounting
20 portions is that they're sized to fit in the
21 necessary components that have to go inside, and

1 they're sized to interface the robot arm. And given
2 those constraints, I don't think there's anything
3 hard and fast about specifying a dimension this way
4 or specifying any enclosure dimension.

5 Q. In the '969 Patent, Figure 136 shows a
6 two-stage gear reduction to increase torque and
7 reduce speed from the driven disc.

8 A. Yes.

9 Q. Is it your testimony that a similar
10 two-stage gear reduction mechanism would not fit in
11 Anderson's tool-mounting portion?

12 MR. MARANDO: Object to the form.

13 BY MR. KATZ:

14 Q. Yes, that's a double negative.

15 In fact, a two-stage gear reduction
16 mechanism such as that shown in the '969 Patent would
17 easily fit in the tool-mounting portion of Anderson,
18 correct?

19 MR. MARANDO: Object to form.

20 A. In my making that assessment, do you
21 want me to assume that this is a proportional

1 representation of an actual practical instrument that
2 I could take what is seen here, it could be scaled up
3 or scaled down, and this is proportionally scaled,
4 scaled up or scaled down and that this is --

5 Q. I don't want you to make any assumption
6 other than what's in Anderson. I am saying, in fact,
7 the two-stage gear reduction mechanism shown in the
8 '969 Patent could fit inside the tool-mounting
9 portion of Anderson, and there's nothing in Anderson
10 that would suggest to the contrary, correct?

11 MR. MARANDO: Object to form.

12 A. I would say, based on what is shown in
13 Figure 2 and what is described in Anderson, my
14 understanding is that there's nothing that defines
15 the size of the tool-mounting portion in Anderson.

16 With that assumption, with that
17 knowledge, a two-stage gear reduction can't fit
18 within the tool-mounting portion such as what is
19 shown in Anderson.

20 Q. If you turn to paragraph 66 of your
21 declaration, you state at the bottom of paragraph 66,

1 "I'm asked by counsel to evaluate Petitioner's
2 analysis of the uncorrected language there."

3 Do you see that?

4 A. Yes.

5 Q. And you're referring to the language as
6 printed in Claim 24 without the certificate of
7 correction; is that correct?

8 A. That is right, and I can perhaps read
9 the language as the one that I've analyzed.

10 Q. Sure.

11 A. So this is the patent ending in '969,
12 Claim No. 24, Column 95, line 59. It says, quote, A
13 tool-mounting portion operably coupled to a distal
14 end of said proximal spine portion, said
15 tool-mounting portion being configured to operably
16 interface with the tool drive assembly, end of
17 quotation. That is the language that I have been
18 asked to analyze.

19 Q. I just want to be clear on what your
20 opinion is and what it is not.

21 A. Okay.

1 Q. You have not rendered any opinion under
2 the assumption that the certificate of correction is
3 applied to Claim 24?

4 A. I have not rendered any opinion on that,
5 yes.

6 Q. I'm sorry. Because you ended with a
7 "yes," I am just going to ask you one more time, just
8 so we're clear.

9 A. Okay.

10 Q. You have not rendered an opinion
11 applying Claim 24 with the certificate of correction?

12 A. I agree with what you said.

13 Q. If we can go back to paragraph 20 of
14 your declaration for a minute, page 9 of your
15 declaration. In the middle there, you have a quote
16 about things being sized. Do you see that? Find it
17 before I read it for the record.

18 A. Would it be in various embodiments, the
19 gear and knife?

20 Q. Yes. You can read it.

21 A. Okay. So on page 9 of my declaration,

1 in the middle of the paragraph, I'm reading, I
2 believe this is a quotation from the '969 Patent,
3 Column 85, lines 4 to 8: "In various embodiments,
4 the gears of the knife gear assembly 6560 are sized
5 to generate the forces needed to drive the cutting
6 instrument through the tissue clamped in the surgical
7 end effector 6012 and actuate staples therein."

8 Q. How would a person of ordinary skill in
9 the art back in 2011 know how to size the gear
10 assembly to generate needed forces?

11 A. I'm sorry. The question is how would
12 they know?

13 Q. Right. The text just says they're sized
14 appropriately, so to speak. It doesn't actually give
15 the sizing; is that correct?

16 A. Yes.

17 Q. So my question is, how would someone in
18 2011, one skilled in the art, know how to size a gear
19 assembly to generate an appropriate amount of force?

20 MR. MARANDO: Object to form.

21 A. A person of ordinary skill in the art

1 would review the literature pretty thoroughly, talk
2 to surgeons as necessary, and first determine
3 technical specification on how much cutting force is
4 needed in a linear stapler -- how much cutting force
5 is needed in a linear stapler.

6 Q. And then with that knowledge, what do
7 they do?

8 A. Then the next step would be, this would
9 end up being an iterative process with multiple
10 design constraints. The design constraints would
11 start with the design input that I just mentioned,
12 understanding how much cutting force is needed.

13 Another design constraint would be what
14 is the available -- available volume, space, for
15 accommodating an actuator within a robotic arm that
16 this instrument was being designed for. There's a
17 possibility that the robotic arm already existed, in
18 which case, there would no longer be a design choice;
19 it would just be yet another constraint that's a
20 given, that this is the motor size that's available
21 for you.

1 For the given motor size that's already
2 available, in this one instance, the designer would
3 now try to match the needs of the clamping -- needs
4 of the cutting, cutting force, and how much power is
5 available from the motor. That power would be
6 asserted with an output torque and an output speed.
7 Then the designer or the design engineer then would
8 determine how many stages of gear reduction would be
9 needed to go from the available motor output to what
10 is desirable for cutting the tissue.

11 That is one instance where the robot arm
12 is already available. In that instance, one -- what
13 might happen is the designer will not have all the
14 free choices. There are two hard constraints that
15 are already placed. This is just dictating the size
16 of the tool-mounting portion, to achieve the
17 necessary level of gear reduction, the size of the
18 gears, making sure that the gear teeth are -- the
19 gears are made of the right material, and the gear
20 teeth are the perfect size and things don't break,
21 followed by dictating the size of the tool-mounting

1 portion.

2 Q. Wouldn't the material be just a, kind
3 of, hard metal?

4 MR. MARANDO: Object to form.

5 A. Hard metal is a nonspecific term. What
6 do you mean?

7 BY MR. KATZ:

8 Q. You weren't suggesting metal versus
9 plastic, were you?

10 A. Yes, sure. Why not? Composites,
11 plastics, high-performance plastics. Metals can
12 include aluminum, could include stainless steel;
13 could be a variety of choices.

14 Q. Earlier you talked about a qualitative
15 assessment of motor size in a robot such as in
16 Anderson. Do you remember that?

17 A. Such as in Anderson, yes.

18 Q. I believe you said -- let's return to
19 Figure 1, maybe that will help, maybe Figure 2 of
20 Anderson. Go to Figure 3.

21 Were you assuming in that analysis that

1 the motors were positioned pretty much roughly under
2 the spools and in, like, a vertical line with those
3 spools?

4 A. No.

5 Q. Where were you assuming the motors were
6 when you were saying the motors were constrained by
7 size?

8 A. I would refer to Figure 1, and I want to
9 mention one thing regarding your question. I think
10 when I was talking about a qualitative assessment of
11 motor sizes, it wasn't Anderson Figure 1. I believe
12 we were having that conversation in the context of
13 the Mucksavage paper, where there was an actual
14 measurement of grasping forces using an actual
15 DaVinci system. Figure 1 of Anderson looks like an
16 actual DaVinci system, but I just don't want to make
17 that presumption.

18 Q. I think you're correct. When you
19 mentioned that, you were referring to an actual
20 DaVinci system.

21 So let me ask you this: Using Figure 1

1 to the extent it's helpful --

2 A. Yes.

3 Q. -- but recognizing you're referring to
4 an actual DaVinci system, where were you assuming the
5 motors were located?

6 A. Yes. Okay. There isn't a label to
7 this. How do I point to something?

8 Q. You can circle it, and we'll mark that
9 copy as an exhibit, but are there any other markings
10 on that document? If there's no other markings, you
11 can circle that and we'll mark it as an exhibit.

12 A. So in the distalmost end of the robotic
13 arm, in the distalmost stage of the robotic arm, my
14 assumption is that the motors are appropriately
15 packaged within the confines of that distalmost
16 region that I showed there, with some appropriate
17 gearing between the motors and discs at the output of
18 the robotic arm, that when made with the
19 corresponding discs in the tool-mounting portion. I
20 did not assume that the motors and the axis was
21 colinear when I -- let me take that back.

1 I did not assume that the motors were
2 directly connected to the discs on the output of the
3 robotic arm. I was assuming that there is some level
4 of gearing that would have happened within the distal
5 end of the robotic arm.

6 Q. Okay. But your assumption was that the
7 motor is located somewhere in the structure labeled
8 28 of Figure 1?

9 A. Since 28 is a — it's a label with an
10 arrow. I don't know what assembly it's referring to.
11 It could very well be 37 or 38.

12 Q. Actually the number 38 refers to the
13 surgical instrument, so that's not very helpful.

14 A. Yeah.

15 Q. I believe the structure you're pointing
16 to is called the carriage?

17 A. Yes, the carriage.

18 Q. So you think that or your assumption is
19 that in the DaVinci, the motor is located somewhere
20 in the carriage?

21 A. In the carriage, yes, with some gearing.

1 MR. KATZ: And I will mark this copy of
2 Anderson with your drawings as Exhibit 1021.

3 [Exhibit 1021, the Anderson patent with
4 the witness' annotations, was marked for
5 identification.]

6 BY MR. KATZ:

7 Q. Now, I take it, in fact, you don't know
8 that there's DaVinci motors in the DaVinci carriage;
9 do you?

10 A. I don't know for a fact.

11 Q. Actually, do you have any basis to
12 believe the DaVinci robot motors are in the DaVinci
13 carriage?

14 MR. MARANDO: Object to form.

15 A. Yes, yes.

16 Q. What is your basis for that?

17 A. The motors can be located anywhere
18 further behind the carriage, so the carriage itself
19 is mounted on an articulating robot arm. If the
20 motors are to be located at any other point on the
21 articulated robot arm, then the motion of the motors

1 would have to be transmitted through one of the
2 articulating joints of the robot, articulating joints
3 of the robot arm.

4 To transmit the output rotation of a
5 motor through or via one of these articulating
6 joints, while possible, is complex, I would say
7 unnecessarily complex, and leads to a lot of design
8 challenges. And therefore, I have not just a reason,
9 I would say a strong reason to believe that the
10 motors would be located on the distalmost end of the
11 robotic arm. And my understanding, and thanks for
12 reminding me of the term, my understanding is that
13 the distalmost end of the robotic arm is the
14 carriage.

15 Q. Now, you've seen the DaVinci robot?

16 A. I have seen a DaVinci robot, that's
17 right.

18 Q. Did you see the motors located on the
19 carriage?

20 MR. MARANDO: Object to form.

21 A. I didn't because motors would not be

1 visible at all. They would be inside the carriage.

2 And the only thing that would be visible would be the
3 four discs on the output side of the carriage.

4 MR. KATZ: I have no further questions
5 on this proceeding for IPR2018-01247.

6 Do you have any questions before we
7 close?

8 MR. MARANDO: Yes. Just a brief
9 redirect.

10 EXAMINATION

11 BY MR. MARANDO:

12 Q. Dr. Awtar, do you recall testifying
13 earlier concerning your opinions in paragraph 73
14 through 76 of your declaration regarding passive
15 articulation?

16 A. Yes, testifying earlier today, yes.

17 Q. Could you turn to paragraph 76 in your
18 declaration, which is Exhibit 2006?

19 A. Yes, I'm here.

20 Q. Paragraph 76 you stated, and I quote,
21 Thus a surgeon would have found a robotic tool with

1 passive articulation to be clinically unacceptable,
2 and a POSITA would have been aware of these facts in
3 the 2011 time frame. Indeed, I was personally aware
4 of these facts in 2011, close quote.

5 Do you see that?

6 A. Yes.

7 Q. Can you please describe how you
8 personally became aware of these facts in the 2011
9 time frame?

10 A. Okay.

11 MR. KATZ: Objection to form. Go ahead.

12 A. I think this is similar to what I said
13 earlier. I pointed out some of these things in my
14 deposition. By the 2011 time frame, I had -- I had
15 been in touch, I had been in interaction and
16 discussions with dozens of surgeons. When it came to
17 trying to understand what were the key requirements,
18 key criteria, key needs, key concerns in using
19 minimally invasive surgical instruments or
20 laparoscopic instruments, one of the key concerns
21 that came up consistently was the possibility of an

1 instrument, laparoscopic instrument, either
2 intentionally or unintentionally hurting the tissue
3 or the organ of a patient. And that was highly
4 undesirable. That was a patient safety concern that
5 the surgeons were highly sensitive to, and in the
6 conversations with them, in my role as the designer
7 of laparoscopic surgical instruments, that concern
8 was conveyed to me, and it became part of my
9 understanding of what is essential and what is
10 necessary, what is critical in the use of
11 laparoscopic surgical instruments.

12 What I also realized was at the time
13 when surgeons used laparoscopic surgical instruments,
14 by virtue of the training that perhaps goes over
15 multiple years, they get a sense, they develop a
16 sense of how much force is acceptable.

17 So when the surgeon is performing
18 laparoscopic surgery, there is some manipulation of
19 tissues and organs by the instrument tip or by the
20 instrument in general, and the surgeons develop a
21 sense of how much is acceptable and how much is not

1 acceptable. And that developing sense is something
2 based on their direct tactile feedback, the haptic
3 feedback.

4 What is critical in this instance is
5 that the surgeon is in a loop. This is -- you know,
6 the surgeon, as he or she is operating on the patient
7 and then they are pressing an instrument against the
8 patient's tissue or organ, by virtue of the fact that
9 they're holding the instrument and they're feeling
10 the force, they are in the loop in the sense that
11 they can take a decision right away as to whether
12 they are potentially exceeding the limit of force
13 that would potentially cause harm to the tissue. So
14 they're able to self-correct themselves in realtime.
15 So that's one aspect.

16 The other aspect in my conversations
17 with surgeons, in trying to understand the state of
18 the art, was just a need for instruments, whether
19 they were purely mechanical or robotic, the need for
20 instruments to be intuitive.

21 And by that, what I mean is if the

1 surgeon moved their wrist or hand in one direction,
2 that the instrument should respond or instrument tip
3 should respond in a similar manner. And the lack of
4 that, any instrument that didn't provide such an
5 intuitive control, would be an instrument that would
6 be more difficult to use or more difficult to adopt.

7 So this is -- it's this collection of
8 discussions with surgeons over a period of time that
9 has informed my opinion that I've stated in
10 paragraph 76.

11 Q. Okay. Just to summarize, can you
12 explain why passive articulation could be clinically
13 acceptable in a handheld laparoscopic tool that would
14 not be clinically acceptable in a robotic surgical
15 tool?

16 MR. KATZ: Objection to form.

17 A. Yes. Yes. So in a passive articulated
18 tool, passively articulated tool, if the surgeon is
19 holding the instrument in their hand, holding the
20 proximal end of the instrument in their hand, the
21 instrument is inside the patient's body, and they are

1 producing or generating articulation of an instrument
2 by pushing the distal end of the instrument -- which
3 in this case would be the end effector -- against a
4 tissue or organ inside a patient's body. Because
5 they are holding the proximal end of the instrument
6 in their hand, they can feel how much force is being
7 applied. And by virtue of their training, and by
8 virtue of their background, and by virtue of their
9 experience, they can tell that they might be reaching
10 a point where they might cause damage to the patient,
11 and therefore, because they are in the
12 decision-making process, they can self-correct
13 themselves. Versus if you have a robotic system
14 where the surgeon is trying to produce articulation
15 of a passive joint by pushing the end effector
16 against a tissue or an organ inside the patient's
17 body, the surgeon doesn't feel any of this force that
18 the instrument is exerting, assuming the robotic
19 system doesn't have that haptic feedback. And in a
20 scenario like that, there is the chance that in the
21 absence of the feedback, the surgeon may end up

1 causing damage to -- end up causing injury to the
2 patient.

3 Q. Just one other question: I think a few
4 times today you may have referred to the "959
5 patent." Can you clarify, were you actually
6 referring to the '969 Patent?

7 A. I apologize for the lapse. I was indeed
8 referring to the '969 Patent. The full patent number
9 is 8479969. The title of the patent is, "Drive
10 Interface for Operably Coupling a Manipulatable
11 Surgical Tool to a Robot." The inventor's last name
12 is Shelton.

13 MR. MARANDO: Thank you. No further
14 questions.

15 MR. KATZ: Just one follow-up question.

16 FURTHER EXAMINATION

17 MR. KATZ:

18 Q. Go back to the Exhibit 1020 I showed
19 you. It has a list of names. That is the patent,
20 U.S. 9820768 Patent, and this is the patent that
21 references passive articulation in a robotic system.

1 Did you ask any of these Ethicon people
2 why they added passive articulation to their robot?

3 MR. MARANDO: Object to form.

4 A. No.

5 Q. Did you ever speak with any of the named
6 inventors of the '768 Patent regarding the
7 appropriateness of passive articulation in a robotic
8 system?

9 MR. MARANDO: Object to form.

10 A. No.

11 Q. In fact, did you speak to any of the
12 named inventors of the '768 Patent at all?

13 MR. MARANDO: Object to form.

14 A. I talked to some Ethicon individuals at
15 one point. I cannot recall whether that individual
16 was one of these. Is that something that I can
17 clarify with the counsel? Because I don't -- I'm
18 pretty certain I did not talk to any one of these
19 individuals. At some point regarding another case,
20 another matter about passive articulation, I talked
21 to an Ethicon engineer at some point.

1 Q. But you don't recall if it was one of
2 these named individuals?

3 A. I do not recall. My recollection is I
4 did not talk to these individuals.

5 MR. KATZ: No further questions. We're
6 off the record.

7 [Proceedings adjourned at 2:08 p.m.]

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1 CERTIFICATE OF REPORTER/NOTARY PUBLIC

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3 I, Goldy Gold, a Notary Public of the
4 District of Columbia, do hereby certify that the
5 within-named witness personally appeared before me at
6 the time and place herein set out, and after having
7 been duly sworn by me, according to the law, was
8 examined by counsel.

9 I further certify that the examination was
10 recorded stenographically by me and this transcript
11 is a true record of the proceedings.

12 I further certify that I am not of counsel
13 to any of the parties, nor in any way interested in
14 the outcome of this action.

15 As witness my hand and notarial seal this
16 26th day of June, 2019.

17

18

19


GOLDY GOLD, RPR

20

Notary Public

21

My Commission Expires: April 21, 2024