UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

JUUL LABS, INC.,	IPR2024-00161
Petitioner,	Patent: 10,334,881 B1
v.	
NJOY, LLC,	IPR2024-00160
Patent Owner.	Patent: 11,497,864

VIDEOTAPED DEPOSITION OF

WILLIAM SINGHOSE, PH.D.

October 24, 2024

9:35 a.m.

Hilton Atlanta
255 Courtland Street NE
Atlanta, Georgia

Marcella Daughtry, RPR, RMR
Georgia License No. 6595-1471-3597-5424
California CSR No. 14315

APPEARANCES OF COUNSEL

For the Petitioner:

MINTZ, LEVIN, COHN, FERRIS, GLOVSKY AND POPEO, P.C.
MR. REZA DOKHANCHY
44 Montgomery Street, 36th Floor
San Francisco, California 94104
858.314.1596
rdokhanchy@mintz.com

For the Patent Owner:

WEIL, GOTSHAL & MANGES LLP
MR. W. SUTTON ANSLEY
2001 M Street NW, Suite 600
Washington, DC 20036
202.682.7018
sutton.ansley@weil.com

And

WEIL, GOTSHAL & Manges LLP
MR. TOM YU
767 Fifth Avenue
New York, New York, 10153
tom.yu@weil.com

Also Present:

Paige Brantley, videographer

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WITNESS: WILLIAM SINGHOSE, PH.D.

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THE VIDEOGRAPHER: This is the video deposition of Dr. William Singhose taken in the matter of JUUL Labs, Inc. versus NJOY, LLC, Case Number IPR2024-00160 in Case Number IPR2024-00161.

Today's date is October 24th, 2024. The time on the record is 9:35 a.m. My name is Paige Brantley, and I am the videographer. The court reporter is Marcie Daughtry.

Counsel, please introduce yourselves, and after which the court reporter will swear in the witness.

MR. DOKHANCHY: Reza Dokhanchy, Mintz Levin.

MR. ANSLEY: Sutton Ansley, the law firm Weil, Gotshal & Manges, here on behalf of the witness and NJOY, LLC. With me is Tom Yu, also with the same law firm.

WILLIAM SINGHOSE, Ph.D.,
called as a witness herein, having been first duly sworn by the shorthand reporter to speak the truth and nothing but the truth, was examined and testified as follows:

EXAMINATION

BY MR. DOKHANCHY:

Q Good morning, Dr. Singhose.

A Good morning.

Q Is there any reason you cannot testify

truthfully and accurately today?

A No.

Q Okay. Do you understand you are here to testify in the matters of IPR2024-160 and 161 regarding the '864 and '881 patents respectively?

A Yes, I do.

Q Okay. What did you do to prepare for your deposition today, if anything?

A Well, I guess, my entire work on the case I would say leading up to this, but you probably mean like within the last week after submitting my report and stuff like that?

Q Yeah, let's start there.

A So I would say over the last week, I reviewed my declarations in this matter and the exhibits to those declarations. I reviewed the institution decisions.

That may be it. That's probably the bulk of what I reviewed.

Q Okay. Did you meet with your counsel to prepare for your deposition?

A Yes, I did.

Q How many times?

A Well, we met yesterday in person, and then we met kind of briefly online, I think on Monday.

Q And how long were each of those meetings?

A I think Monday was probably a half hour to an hour, and then yesterday was most of the day. I had to leave for a while and teach a lecture and come back, but it was -- it was most of the day.

Q And was -- when you say your counsels, are the two gentlemen in the room today?

A Yes, that's correct.

Q All right. I understand you have some expert witness experience related to e-cigarettes; is that right?

A Yes, I do.

Q Aside from that expert witness work, do you have any experience in electronic cigarette design or operation?

A Well, I have a lot of experience on the underlying technologies involved in there, but I have never designed a electronic cigarette or been on a team that designed a whole electronic cigarette.

Q What about any part of an electronic cigarette, is that still true?

A Oh, that's -- that's what I'm saying. I'm very familiar with the various parts in there. For example, these have little computers inside, and they have sensors such as the pressure sensors. Some of the prior art have essentially what's called flex sensors, so they can

detect the flapping of parts.

So that's been a huge part of my life, is dealing with small electronic components that have a small brain and sensors and make decisions about what to do based on that sensor information.

Q Okay. But you never, for example, designed or -- or were involved in designing a cartridge for an e-cigarette, right?

A Not a cartridge for an e-cigarette, no. Cartridges for other kinds of handheld electronic devices.

Q And what sorts of handheld electronic devices is that?

A I can't give you the details on that because it was my work for Google, but I can broadly say, I think comfortably, it was a smart pen.

Q Okay.

A So in those pens, you have to replace the ink cartridges.

Q I see.

And what were those cartridges made out of to the extent you can tell us? Was it just ink or anything else?

A I think I'm comfortable saying that we -- we made those out of plastic, for the most part. So they

are plastic cartridges. You have to put the ink in them, seal it back up, and then the challenging part, of course, is like snapping it in and getting it to be removable. So those would generally be like flexures, and we made those out of plastic as well.

Q I see.

What was inside the cartridges besides ink, if anything? Can you tell me?

A Just ink, yeah.

Q Okay. Can you tell me what the interface to the rest of the pen was like?

A Yeah, it's been a while, so I'm --

Q Okay.

A I can't remember the exact details, but essentially you would press it in. It would snap fit into place.

Q Okay.

A And during that snap fit process, you would essentially make a mate between the ink that's in there and the rest of the ink drawing part of the pen. So essentially it's like a capillary action, a small tube, if you will, and then that would allow the ink to be pulled from the cartridge down to the tip. And then when most of the ink is gone, you would essentially push -- push a little knob, and it will pop back out, and you can

put a new one in.

Q Was that product ever commercialized?

A It was not fully commercialized. We had a very large budget, and we were well along to making it commercialized, and it got canceled sort of at the last minute.

Q I see.

When -- about when was that?

A I started working on that in 2015, and I think that the plug was pulled -- the plug was pulled a couple different times, right. You -- they'd cancel it for a while and then they restart it and cancel. That's the way that Google works on products. Probably the last time I really worked on it was 2018, so it was about a three-year project.

Q Okay. Do you have any firsthand experience using electronic cigarettes, aside from your litigation work?

A No.

MR. ANSLEY: Objection. Vague.

THE WITNESS: Yeah, I've never used them outside of my litigation work. Mostly I did a lot of testing on them, but the testing and usage of them, if you will, was not for my personal use.

Q BY MR. DOKHANCHY: Got it.

Do you follow the industry of electronic cigarettes aside from your litigation work?

A I would say, yes, I do. I mean, when -- you know, JUUL made a perfect splash, and because those founders were grad students at Stanford, and I went to Stanford as a grad student, I naturally had an interest in that. And I didn't know them personally, but I knew other people personally who were -- who were in that class and that development project.

Q I see.

A So because of that, I've always had a bit of an interest.

Q Okay. So one of your opinions relates to the notion that Fuma products, which you say embody the claims of the patents that we're here to talk about today, experienced commercial success.

Do you recall that?

A Yes, I do.

Q And you cite to some numbers of their sales.

A Yes, I do.

Q Right?

Do you know what the sales of the average e-cigarette company were in 2009, 2010, 2011?

MR. ANSLEY: Objection, vague.

THE WITNESS: No, I do not know that.

Q BY MR. DOKHANCHY: Do you know what the average sales -- withdrawn.

Do you know what the sales numbers were like for the leading e-cigarette company in 2009, 2010, 2011?

A No, I don't know that.

Q Okay. And you didn't analyze the sales numbers of any other e-cigarettes in rendering your opinions in this case besides those of Fuma, correct?

A I don't think I analyzed them per se, but I know about them, like I've -- because I've been involved in these cases before, I've seen a lot of sales numbers before, and I didn't forget that.

Q Okay.

A So I'm not sure I wrote them down on a paper and compared things, but I -- I generally am aware of how large the sales can be.

Q Okay. And how large can they be?

A Billions of dollars.

Q And that was in the 2009 to 2011 time frame?

A Oh, not in that time frame, I'm sorry. In that time frame, it was much more in its infancy, and so the numbers would be a lot smaller.

Q Do you know how they compared to the NJOY sales numbers?

A Are you ask --

Q Excuse me, excuse me. The Fuma sales numbers?
A In the same time frame or --
Q Yes.
A Oh. No, I didn't do any cross comparison. I just looked at Fuma, and I saw that they had increasing sales and they were selling over like a four-year period, which tells me that they're successful or they would have gone out of business before that. That's essentially how -- the basis of that opinion.
Q I see.
You also opine that the sales of the Fuma products were a direct result of the claim features of the patents in this case.
Do you recall that?
A Yeah, I mean, I think I was maybe not quite that specific, but I said the success of it is directly tied to these features.
Q Do you have your report in front of you?
A Yes, I do.
I mean, I may have used that terminology.
Q Yeah, I mean, you did, but --
A Okay.
Q -- just to prove it to you, let's --
A Sure.
Q Let's go to it. Paragraph 490.

A 490 what?
Q 490.
A Okay, 490.
Q Do you have it up in front of you?
A Oh, yes, I do.
Q And you say in the last sentence of paragraph 490, "The sales of Fuma's cartridges and starter kits were a direct result of the claim features of the '864 patent, which as described above, eliminated problematic issues in preexisting devices and enhanced the adult consumer experience," right?
A Yes, that's correct.
Q So how do you know that those sales were direct results of the claim features?
A Well, again, this is my opinion of the evidence that I am given. You know, having worked in these industries before, having started a couple companies myself, and I did the analysis where I looked at the '864 patent, and I understood what advantages it provided. I looked at the Fuma product and saw that it embodied it, and I saw this increasing number of sales, and the sales in fact over a four-year period.
Putting that information together, it's my opinion that these sales are -- can be attributed to those features because they did solve problems that

existed in previous vaporizers. That's how I'm making the connection there.

Q Okay. Did you attempt to rule out whether there were any other unclaimed features that were the source of the sales of the Fuma devices?

A Yes, I did. I mean, I looked at that, and I looked at the Fuma products, and I -- I tried to compare them to comparable vaporizers at the time and look for features that basically were not in the '864 that may have attributed to sales, and I could not identify any such features.

Q What comparable vaporizers did you look at?

A Off the top of my head, I can't remember. I basically was looking at -- again, I can't remember the names, but I -- I had -- did examine other vaporizers coming, for example, out of China. I know some -- I had some early versions of the vaporizers that were coming out of there, and I reviewed materials indicating that they had problems such as listing a burnt taste when you got near the end of it because the -- the cotton fiber, whatever is holding it, would start burning.

So that's -- that's what -- that was my comparison, because I was comparing to the -- the products at about the same time that I was aware of, but I don't recall their names off the top of my head.

Q Did you interview any customers of Fuma and ask them why they purchased Fuma products?

A I did not.

Q Did you review any evidence that stated why a customer bought a Fuma product?

A I don't think so.

Q Okay. If you go to paragraph 499, just a few pages down. You say, "After Fuma's e-cigarette that embodies the claimed invention of the '864 patent was commercialized in 2009, other companies similarly began to introduce e-cigarettes that had cartridges that include transverse heating elements in the airflow passageways."

Do you see that?

A Yes, I do.

Q And then you go on to give one example in that paragraph, and then several others in paragraph 500.

Do you see that?

A Yes, I do.

Q Let's take the first one. When was the Bloog first introduced to the market?

A I don't recall that off the top of my head, but this information -- a lot of this information, like you said, in the next paragraph, is coming from a report from 2013. And as I recall, again, off the top of my head

without looking at it, that it's reviewing vaporizers being sold from about 2010 up until 2013.

So none of these predate Fuma's e-cigarette, and they are all between that time period of introduction and 2013 when this report came out.

Q Do you have that Exhibit 2039 in your binder?

A I'm not sure that I do. Let me look in the table of contents for this. I didn't -- I didn't create this document.

I'm not seeing 2039 here. It only goes up to 2036.

Q Okay. So if that -- if that document, the 2013 Carmines Consulting report doesn't say when the Bloog product was first introduced, you don't have any knowledge or evidence when it was first introduced. Is that fair?

A Well, I have knowledge that it was introduced after it, but I think you are asking for the source of that knowledge, and I don't see any other citation in my report, so I think it would be in 2039 or it may be in one of the other documents that I cite, but I'm not sure which one it would be sitting here right now.

Q Okay. What is your knowledge as to when Bloog was first introduced to the market?

MR. ANSLEY: Objection. Asked and answered.

THE WITNESS: My knowledge is that it was introduced after Fuma's e-cigarette was commercialized in 20 -- 2009.

Q BY MR. DOKHANCHY: And the source of that knowledge is what?

A That's what I say. Sitting here I'm not sure. It could be in this Exhibit 2039 or one of the other documents cited.

Q Okay. But you are not sure sitting here right now?

A That's correct.

Q And is the same true of all of the products listed in the table starting on page 264 of your '864 report in paragraph 500?

A I just want to make sure I understand the question. It's the products that I've put associated with paragraph 500, not, for example, going on later on in my report to Green Smoke?

Q Correct.

A Okay, yeah. Just those ones, my source of that information is primarily Exhibit 2039. And my understanding of 2039 is that it's a report from 2013 where the Carmines Consulting group made this report, and they were explaining how these things worked, and they were obviously not past 2013. And my understanding is

that none of those in this report predated Fuma's e-cigarette. That's my understanding based on that report and possibly one of these other documents, but I'm not sure as I sit here.

Q Okay. So as you sit here, you can't point me to any evidence that actually says that any of these products in the table in paragraph 500 were introduced after the Fuma product first?

A Yeah, again, it's -- like, they are obviously before that 2013 report, but I think you are saying what evidence do I have that they weren't from 2008, for example?

Q For example.

A Sitting here right now, I'm not sure where that evidence is.

Q Okay. Okay. I will hand you a copy of Exhibit 1005 in the 160 matter, and it is the Wang reference.

MR. ANSLEY: Thank you.

Q BY MR. DOKHANCHY: And do you recognize that as the Wang reference that you analyzed?

A Yes, I do.

Q And if you can go to the figures at the back, you will see a figure 3.

A Yes, I see that.

Q And your opinion is that the air enters this

cartridge in figure 3 through aperture 106 and then goes down a gap that you say exists between this fiber 105 and the walls of the outer shell 102; is that correct?

A Yes.

Q And let's start with the -- the gap that you say exists. What is your basis for saying that there is a gap there?

A Well, primarily, I see it. Like when I look at figure 3, there's a clear gap between the wall of the shell of this and the ground fiber 105.

Q And Wang doesn't say anywhere in its text that there is a gap between fiber 105 and the wall of shell 102, correct?

A I don't think it's that specific with this description. It does refer to -- I'm pretty sure it refers to gaps or openings.

Q Uh-huh.

A But I don't think it like goes through and points out every single place there's a gap or opening. So I read that textual description of air going into gaps while looking at figure 3 and I saw a gap, and I know as a fluid dynamic expert, that air is going to flow through a gap.

Q There has to be a gap for air to flow, right?

A Well, I would say that would -- that would be

the airflow passage. I mean, air can obviously flow through other materials like sort of one molecule at a time, right? You can have -- it's seeping through, if you will.

But at airflow where there's a -- where there's a lot of air flowing through, it's gonna have to have an opening.

Q In the example you said about air flowing through other materials one molecule at a time, would that be a good design for the cartridge of an e-cigarette?

MR. ANSLEY: Objection. Vague.

THE WITNESS: No, not if that was all the airflow that you had. You -- you don't want them -- the user would have to be sucking through a -- a dense fabric or something. They -- they wouldn't be able to pull much air through that. So you definitely need to have a part -- you need to have an airflow passage that tumbles freely, essentially.

Q BY MR. DOKHANCHY: I see.

And what's your basis for saying that the air flows in that gap as opposed to, for example, down the middle of figure 4?

A Well, I see the gap, but I've also analyzed a lot of these vaporizers, and they often have these

airflow passages along the shell, if you will, along the inside of the shell, and there's a good reason for that, is it provides a cooling of the vapor. You wouldn't want your user to inhale vapor directly. It's boiling, and so there has to be some part of the passageway that essentially achieves a mixing and a cooling effect.

So when I saw that, I immediately thought, well, it's an opening. I can see that, and that makes a lot of sense, because that's where you would essentially be able to cool the vapor and mix it with the air to make the aerosol, which is what you really want to deliver to a person.

Q Wang doesn't say in its text that the air flows down the side between fiber 105 and shell 102, correct?

A That's correct. I don't think it's that specific in its description, in the text. It's just that specific in the figure 3.

Q Okay. You understand Dr. Sturges's opinion is that, as you can see in figure 5, there is a channel created in the middle of the fiber 105.

Do you understand that?

A I think I understood your question, but when I see figure 5, I do not see a channel, but I do understand that's his opinion.

Q And you know the heating element of the coil

104 in figure 3, that's the component that vaporizes liquid to create vapor, right?

A Well, it's certainly part of the component. I mean, that's -- you're gonna drop electricity over there, and it's gonna get real hot, but that wire is gonna heat the material around it. And when that -- whatever material gets hot enough to vaporize, it's gonna be vaporizing.

So it's unlikely that only those specific wires are shooting off vapor. It's gonna heat up all the material around it, and that's gonna become a surface that's emitting vapor.

Q So you are talking about wires coming in and out of that coil. Is that what you are talking about?

A No, I'm talking if we just honed in on that coil, that coil is touching other material. It's touching the -- the fabric soaked in e-liquid.

Q Got it.

A That fabric, it gets hot, and it's gonna be ejecting molecules. So that fabric, that local part of the fabric is certainly going to be part of what is vaporizing --

Q Okay.

A -- the e-liquid.

Q The source of the fabric getting hot is the

coil, right?

A I would say the ultimate source is the battery. I mean, if I do an energy analysis, that's where the -- that's where the source is. The battery is providing that energy, but yes, the coil is definitely getting hot.

Q Okay. So the energy is -- electrons are flowing through the coil from the battery causing the coil to get hot and causing the fiber to get hot. Is that fair?

A That's fair.

Q If there is no gap in that fiber 105, how would the vapor escape to reach the user?

A Sure. Well, the vapor is going to be -- the vapor is one molecule. That's what a vapor is. It's not big droplets. So these molecules get really, really hot and they vaporize it, and essentially they jump off the surface, and so there's these free molecules.

So because they are only one molecule at a time, they are going to be able to pass through the fiber. And so this fiber, if you looked at it and you could somehow see the molecules, you would see them coming out the sides and off the end being driven by that heat source in the middle.

Q So that fiber 105 is soaked in nicotine liquid, right?

A Yes.

Q Okay. So how does the vapor pass through a fiber soaked in liquid?

A Well, it's kind of like drinking a Sprite or a Coke, right? It's all liquid, but there's bubbles that form and flow through the liquid to get to the outside. So essentially it's a boiling operation, and gas can go through liquid as it's boiling outwards.

Q And you think that's the -- the method of operation, that the vapor is extracted through the liquid sitting in the fiber to reach the user's mouth?

A That's certainly a part of it. I mean, without having the actual device and measuring the temperature gradient, I would say that's likely what's going on. If it heats it up so much that the fiber on the very outside gets to the boiling point, then it -- yeah, the liquid would be coming right off the outer surface. But I think also because it's so hot on the outer surface, it's going to even be hotter in the middle. And it's gonna be that boiling operation that -- that again, that you see when you are boiling water or, again, taking the Coke, it's not boiling, but it's -- it's condensing in those air molecules and they're popping up and coming out.

Q Does Wang describe its operation as boiling the liquid that's within the fiber?

A No, it does not use that terminology.
Q It does describe creating vapor, though, right?
A Yes, and creating vapor is effectively a boiling operation.
Q But you are talking about boiling it as it's sitting in the fiber, correct?
A Yes. The fiber, it has to be -- there has to be some physical contact, I would think, or pretty close to this. And so, yeah, it's boiling off or vaporizing e-liquid that is in that fiber.
Q Is the boiling happening just in the area of the coil or is it actually boiling throughout the fiber?
A Again, that's what we don't know. It really depends on how hot that is. I don't think that it could possibly be boiling the entire thing. It would just be too energy inefficient. So there's probably a more localized boiling operation near there, and then like I said, the air is flowing out as bubbles would flow.
It seems overkill to boil the whole thing, and it would probably get kind of uncontrollable because so much would come off with a single hit. So I think it's a more localized boiling operation.
Q Does the -- would the air flow as quickly through the liquid in the fiber 105 as it would if there was a channel down the middle of the fiber?

A Which air are you -- which air are -- just so I know, which air are you referring to flowing?

Q Yeah, that's a good question. Let me clarify the question.

So here's the question. After the vapor is created coming off of the coil, does that vapor reach the user's mouth through the liquid in the fiber 105 as quickly as it would if there was instead a channel so the air could flow freely through it?

A Okay, I think I understand the question.

So if we did actually have a channel going up through, like some kind of tube, like a physical structure and --

Q Well, let me clarify.

A Okay. Sure.

Q It's not limited to a physical structure, my question, just if there's a gap.

A Oh, I see.

And the question is, would -- when it boils off or vaporizes, would it get there faster if there was a opening directly up the middle?

Q Yes.

A Yeah, probably. I mean, that is a little bit of a shorter path to the user's mouth.

Q And not only shorter, but it doesn't have to go

through liquid; it just travels through air, right?

A Yeah, I mean, I still think some of it's gonna go through the liquid. I mean, you can't stop it. It's gonna go wherever it wants to go.

Yeah, so that's gonna be a shorter path. You're unfortunately more likely to burn the user with that direct path. You've got this vapor, and it doesn't have a very long distance to go.

And I think that's why you -- you would want it to go to the outside, cool, mix, coalesce, and then go to the user rather than a direct path into their mouth.

Q I see.

Does anything in Wang say that it is concerned with whether the vapor may be too hot for the user?

A You know, I didn't review Wang for that reason. I mean, I can review it for that reason if you want me to, but I -- I didn't -- I didn't do that analysis. But that's a generally well-known concern.

Q And you are of the view that a piece of paper or fiber can be rolled up without leaving a channel in the middle; is that right?

A Yes, certainly. I mean, if you -- especially if you rolled up, let's say a fiber like -- you know, a fabric, and then you poured or otherwise put e-liquid in there, it's going to actually expand the fiber and

everything is going to collapse. So it -- it would definitely close up any hole. Any small hole that might have been there would probably close up when you saturated it with e-liquid.

Q Could you design a rolled fiber that has a gap in the middle that retains the gap when you put liquid in it?

A Could I do that?

Q Yes.

A I think I probably could. Something like a -- I'm thinking of a carpet with a stiff back, so that when we roll it up, the backing would -- would provide a lot of structural strength, and then when I loaded the liquid into the other side of the carpet, it probably wouldn't be strong enough to -- to compress the back. So I think I could do it.

Q What about without a stiff back? So let me ask the question like this. If you have a rolled fiber or a paper with a gap down the middle, could you have a large enough gap so that when you add liquid, the liquid stays in the fiber and doesn't flood the channel?

A I didn't do that design exercise, but on the fly here, I would think I couldn't do it with something like cotton.

Q Okay.

A Right. Cotton would just all sag and get mushy and close up in a gap there.

You said paper. I think, again, sort of, maybe some sort of cardboard could do that. But again, this isn't a design exercise that I went through.

MR. DOKHANCHY: All right. I'm going to ask the court reporter to mark Exhibit 1, please.

(Deposition Exhibit No. 1 was marked for identification.)

Q BY MR. DOKHANCHY: All right. And Exhibit 1 is Plaintiff Fuma International LLC's Memorandum of Law in Support of Motion to Preclude Testimony of Shanhong Wang at Trial from Cases Civ. No. 1:19-cv-260 and 660, in the Middle District of North Carolina. Document No. 219 on the docket.

And do you have that in front of you, Dr. Singhose?

A Yes, I think I do.

Q Okay. And can you flip about halfway through, and you will see a -- a image, and it says Document 219-6, page 5 of 5 on the bottom. You will see a -- you know, the camera won't get this, but you will see an image that looks like the Wang figure.

A Halfway through the entire stack that I was given or halfway through like the first part?

Q This stack (indicating).
A Okay.
Q This stapled document that's Exhibit 1.
A So the last part of what I have seems to be a deposition transcript.
Q Yeah, it's just before the deposition --
A Okay.
Q -- transcript.
A Okay. I found a figure. Can you show that to me again?
Q That's it.
A Okay.
Q That's the one.
A I got it.
Q And have you seen this image before?
A I don't think I've seen this particular image before with this red annotation line on it, but certainly I've seen this figure 1 before.
Q Right. This is figure 1 from the Wang reference, right?
A Yes. I mean, with -- but it's got some other stuff on it.
Q And are you aware that Mr. Wang drew this red line in a deposition involving Fuma to indicate that the air flows through the middle of the fiber in the

cartridge of the Wang device?

MR. ANSLEY: Objection. Lacks foundation.

THE WITNESS: I am not aware of that. I mean, I believe you, but I'm not -- I wasn't aware of it.

Q BY MR. DOKHANCHY: Yeah, and we'll walk through it. I'm not asking you to just believe me.

But knowing that now, that that's what Mr. Wang testified to, does that change your opinion as to whether air flows down the middle of the fiber 105 in the Wang reference?

A No. I don't think that it flows down the middle. I think -- we can walk through it, but my guess is that he's describing some actual product that he built, which would be a variation of this, not what's actually described in the Wang document.

Q Well, to be clear, he drew the arrow on this figure. Just I don't know if that changes your answer, but I wanted to clarify that.

A I believe he drew it on it, but my guess is -- or what could have been happening is, he could have been describing how his actual product worked rather than what he disclosed in this document.

Q Okay. Well, let's look at the deposition transcript. So if you will keep going forward, you will see a document 219-7. And you see on page 23 of the

transcript, which is page 9 of 38 of document 219-7, the attorney is asking Mr. Wang to identify the elements of the cartridge shown in figure 1, and --

A Can I get to that page? You are getting ahead of me.

Q Yeah, okay, of course.

A Okay. I see. So page -- page 23 of this deposition transcript which is 219-7. Is that what you said?

Q Yes.

A Okay. I'm there now.

Q Okay. So this is where the beginning of the questioning is. So the part about the line comes up a little bit later.

So you see on page 25, line 11, the question is, "Can the witness draw where the air flows through this device -- through the cartridge."

Do you see that?

A Yes, I do.

Q And he says a few lines down, "Since I'm using my cell phone, can I do that? I don't know. Is it okay?"

Do you see that?

A Yes, I do.

Q And if you go forward to page 27 of the

deposition transcript, Mr. Thomas states that the -- well, there's a line of dispute over who added -- added that red line, and the witness on line 16 of page 27 says, "No, actually I drew this line. I drew this line using my cell phone."

Now, do you see that?

A Yes, I do.

Q Okay. And then continuing on, the attorney asks on page 28, line 13, "Does that line go through the center of 101?" And the witness says, Mr. Wang says, "Of course it went through the center."

The next question, "Does that line go through the center of 104?" And after the objection, the witness says, "In this figure, yes, because it has to go through the airflow channel." And then onto the next page, 29, line 2, "Once it does so, it will go through the heater and bring up the smoke or fumes or vapors."

Do you see that?

A Yes, I do.

Q And so taking that all together, Mr. Wang is saying that the air flows through the center of the rolled fiber, picks up the smoke or fumes or vapors, and continues on straight according to that red line, correct?

A Yeah. Putting it all together, I think that's

what he's saying. But again, he's -- started off by referring to this as a device, and it's not a device. It's a picture in a drawing, so it seems very likely that he's testifying about a device that he built, and he's using this to represent the device. But there is simply no airflow pathway up the middle of that in the document in Wang.

Q Okay. All right. You say that one of the innovative aspects of the '864 and the '881 patents at issue here is a crosswise heating element. Is that right?

A Yes.

Q And what are the benefits of a crosswise heating element?

A I think one of the things that it was addressing is, is the fact that if you had a longitudinal one like Wang, and you wrapped the fiber right around it, then as we talked about, that gets really hot. And when the fiber starts to run out of e-liquid, you start to burn that fiber, and you get a burnt taste.

And this burnt taste has plagued this industry for a long time, and so there's been various solutions about trying to deal with it, such as windows looking in to see how much you have left and things like that.

But one simple way to do it is to essentially

physically disconnect that really hot heater element directly from the fibers, and so when the fiber does run out of liquid, you can't burn that fiber. And that's what this transverse heating element achieves, is it separates the heating element from that storage fiber.

Q The NJOY patents that are the subject of this case don't mention anything about a burnt taste, do they?

A That I'm not sure of. I -- I can't recall doing that investigation, but again, it was just a really well-known problem. So I think a person of ordinary skill in the art reading these patents would -- would know that was a problem faced by these devices.

Q So if the problem is that the heating element is touching the fiber, do I have that right?

A That's -- that's one of the problems, yeah. It's touching it, and then when it runs out of e-liquid, all of a sudden you don't have the liquid to absorb the heat.

Q Uh-huh.

A All you are doing is burning cotton or whatever the fiber is, and then now you are burning stuff, and it's a burnt taste.

Q So why isn't it obvious to separate the coil?

A Well, it's not obvious because it's a little

bit hard to do, like you need a much more complicated structure. You need to suspend this heating coil somehow across an open space across the airflow passage, and that means that you have to have some kind of support structure for it. Because these coils are not strong; they will break, and so you would have to support the ends, and you have to connect the ends to some structure to hold it there. You also then have to have a wicking material that does draw the liquid in.

So it's just a much more complicated device. The Wang is incredibly easy. You just lay down your heating coil longitudinally, and you wrap stuff around it. So it's very, very easy to do that, and so that's the temptation is, that here's an easy solution, and it works for a while.

To go beyond that and have it work really well and not end up like the final uses end up, you know, giving this burnt taste to the person, you have to do something quite a bit more complicated.

Q And the complicated part is having a structure that lets it sit horizontally?

A Yeah. Again, you would need to have a -- a support structure. You can't -- you couldn't just be having it float out in air. So these coils are, again, floppy and -- and not very strong, so you'd have to

support the ends. You'd probably have to support down the middle somehow to keep it there. And then again, you would have to have this other -- you would need an air passage down the middle so the air could get to it and then go out the other side.

So you are talking about several other structures that would have to be added. So it's a more complicated structure to start with. It's also harder to manufacture. Again, going back to Wang, that's just so simple to make and manufacture.

So yeah, you're -- you're basically making a number of more difficult design features and making it harder to manufacture.

Q Do you have the '864 patent in front of you? If not, I can give you a copy.

A It might be best if you give me a copy.

Q Okay. Exhibit 1001 to the 160 investigation. Okay.

Here, Doctor.

A Thank you.

Q Can you turn to figure 2.

A Okay.

Q Is figure 2 an embodiment of the claims of the '864 and '881 patents?

A Yes, it is.

Q Okay. So in this embodiment, that 220 that -- sorry, that 222 could be a coil, right?

A Yes, it could.

Q How does the liquid reach -- well, let me take a step back.

That item labeled 204, that's the solution holding medium, correct?

A Yes.

Q Can that have a batting material in it?

A Yes.

Q And -- and it did in the Fuma products that you've reviewed that you say embody the claims, right?

A That's correct.

Q Okay. In this figure, how does the liquid reach item 222 from item 204?

A Well, this is a schematic diagram not a -- it doesn't try to accurately reproduce exactly what's in such a device, but 222, that heating element can have as a part of it a wicking material, and that wicking material would probably go through the center, maybe the center and around it to give it some structure, as we just talked about, and it would go out the left and right sides, and those wicking fibers would go out into 204.

Q Got it.

Do all the claims of these two patents -- well,

let's just say claim 1 -- withdrawn.

Claim 1 of both patents does not require a wick, correct?

A No, it doesn't require a wick. It does require a heating element, and the heating element could have a wick.

Q Right. But you are not saying that the claims require a wick, right?

A I'm not saying that, no.

Q Okay. So in the embodiment of figure 2 that does not have a wick, how does the liquid reach the heating element from item 204 to 222 to get vaporized?

MR. ANSLEY: Objection. Vague.

THE WITNESS: Well, I don't think that figure 2 says there isn't a wick there. Again, it's -- it's a schematic diagram. And if you read the text that goes along with this description, it says that there could be a wick there. So I think it's most likely that there is a wick there for this to actually work.

Could you do it without a wick? You could try. It just wouldn't be as effective.

Q BY MR. DOKHANCHY: Okay. Do you think the claims cover figure 2 as depicted without a wick?

MR. ANSLEY: Objection to the extent it calls for a legal conclusion.

THE WITNESS: Yeah, I think it does cover it without a wick. Although, my limitation of concern would be the heating element being configured to vaporize at least a portion of the solution. That would be really hard to do without a wick.

I mean, if you had some connection, just the metal piece of the coil of the heating element going into the element, that would be -- that would have a capillary action along its surface, and so you would get a few molecules. So it would cover it; it would just be really ineffective.

Q BY MR. DOKHANCHY: So in your view, the method of operation would be the heating element would come in physical contact with the solution holding medium and thereby in contact with the liquid?

A Yeah. As we see in figure 2, there is wires coming off either side of this resistive heating element, and those wires would -- would do two things. They would get kind of warm at the very least, probably hot, and because they are going through the e-liquid container, they are gonna pull in some amount, some small amount of the e-liquid along their surface through whatever hole they are going through.

They have to essentially go through a hole to get out into the airflow passage. There's really gonna

be no way to stop some small number of molecules of e-liquid getting out there, especially when it's real hot, it's gonna be pulled out and boiled off. So it's going to work. It's just not going to be a very good one. You are not going to get a lot of vaporization in that way.

Q Would you get any burnt taste from such a setup?

A It seems very unlikely. What you would -- if you end up burning anything, you'd burn the coil out. You know, the coil itself would burn up if you -- if you put so much electricity across and it got really hot, and it didn't have any way to get rid of its heat, eventually you'd melt the coil. And I guess the melted coil would probably end up with a burnt taste, but it's not the burnt taste that we've been talking about.

Q So help me understand that. So 204 can have a batting material. Without a wick, item 222 needs to directly touch that batting material. Why would there not be a burnt taste?

MR. ANSLEY: Objection. It lacks foundation. Mischaracterizes prior testimony.

THE WITNESS: Yeah. I think there could be a burnt taste, but the burnt taste would be like when a light bulb blows out. Like this is kind of like a light

bulb, and your light bulb can blow out, which means that you overcurrented and melted your -- your resistive element there.

So you'd get that burnt taste, but you wouldn't get the burnt taste from the fiber because you just can't get in there and burn it, right? There's not a good connection where you could get enough thermal energy and burn that fabric. What would happen before is that the coil would -- would melt first.

Q BY MR. DOKHANCHY: Or --

A You have to -- you have to -- you know, you have to have surface area to transfer heat, and there's just not a lot of surface area between the fiber and this. You kind of isolate the coil away from the fiber.

Q Well, if there's enough heat transfer and enough contact to create vapor in a functional e-cigarette device, why isn't there enough heat contact, heat transfer and contact to create burnt fibers?

A Well, my earlier answer, remember it was, this wouldn't work very well, and it won't work very well because you can't get enough heat into the fiber to vaporize very much of the e-liquid.

So it's just that route of getting a lot of heat into the fiber and getting it to a burning temperature just doesn't exist because there's only two

little wires touching, two little ends of the wires. That's why a person of ordinary skill in the art looking at this would not think this could ever burn the fabric because it's not touching the fabric.

Q Well, the inventors on this patent claimed advice whereby that is the method of operation without a wick, is it not?

MR. ANSLEY: Objection. Lacks foundation. Vague.

THE WITNESS: Yeah, I mean, I think that the claim that they have had there covers both with and without the wick. So I'm not here testifying that every incarnation of their claims is a good solution.

Q BY MR. DOKHANCHY: And what about those wires 224 and 226; you mentioned that those would heat some of the liquid that's in the batting material. Why wouldn't that create a burnt taste?

MR. ANSLEY: Objection. Mischaracterizes prior testimony.

THE WITNESS: Well, this is -- again, this is a schematic representation and it's representing a heating element, and these heating elements are designed so they have leads coming in, which is where the electricity flows. And those leads are generally made kind of a bit, let's say, thicker and less resistive, and then they

purposely put in a resistive part of the wire, which means that it's trying to stop the flow of electricity. And by stopping, it gets hotter. It's fighting the flow of electricity there, so that's the part that gets hot.

Again, it's like your light bulb. They've designed it so that current is coming in two different places in your light bulb, but those two places get a little bit warm, but the physical structure is designed so that it gets really warm, really hot, really bright in the coil portion of the light bulb. And that's the way these things are designed, too.

Q BY MR. DOKHANCHY: Could those wires burn the batting material?

A I don't think so.

Q Okay. Do you -- have you ever seen an e-cigarette design that has those wires insulated?

MR. ANSLEY: Objection. Vague.

THE WITNESS: That I don't know. I've seen a lot of -- of sort of scans of these devices.

Q BY MR. DOKHANCHY: Uh-huh.

A And through that scan, you -- I wouldn't be able to tell whether or not the wires were insulated.

Q Okay. Would one reason to insulate those wires be preventing the leads from burning the batting material?

A That sounds reasonable to me, yeah.
Q Okay. And the NJOY patents here don't describe those wires 224 and 226 as being insulated, do they?
A I don't recall that.
Q And so you know that Dr. Sturges opines that the Wang heating coil meets the claim limitations because it has a dimension that's in the crosswise direction, right? And that's the -- like we can call it the width of it, I guess?
A Yes, my understanding is that to meet the -- what I'll call the transverse requirement, he's looking at that, and he's saying there's a width in the transverse direction.
Q Right.
A And he's saying because it has some width there, it is transverse.
Q And in Wang, I think you described this earlier, but the heating coil touches the fibers; is that correct?
A Yes.
Q And so if there's a channel there, the Wang heating coil spans that channel, correct?
MR. ANSLEY: Objection. Vague.
THE WITNESS: But -- okay, so I'm having trouble answering the question because there's not a

channel there.

Q BY MR. DOKHANCHY: Uh-huh.

A So you are asking me to assume there's a channel there. Is it the channel is some kind of structure? We talked about two different sorts of channels, like one with some kind of structure, and then one --

Q Sure.

A -- that just apparently is made by not winding that tightly.

Q Either kind.

A Okay.

Q Let's say there's either kind of channel in Wang in that fiber.

A Okay.

Q That heating coil, the width of it spans the channel that's there in the transverse direction, right?

A Certainly in the one where the fiber is wound directly around it, there is nothing else there. But if I am putting a support structure in there, then I don't think it -- I don't think we know that. Because the support structure could be wider than the coil. Again, that would lead us to an efficiency. I mean, at some point this hot coil has to touch e-liquid.

Q Uh-huh.

A So, again, because it's not there, I'm having a tough time answering the question precisely. That's the best I can do.

Q Okay. But you don't have a view that if there was a channel in Wang as Dr. Sturges says, there is some sort of gap between the heating elements and the fibers, because your view of the operation is that the heating element touches the fibers, right?

A Yeah, I mean, just keeping with the invention of Wang, the heating element needs to be touching it. If we're gonna try to change Wang into something else and we put a -- sort of a physical structure in there and the coil is not touching, it's not gonna work very well, as we just talked about.

You would then need to add some additional component, i.e., a wicking material to pull the e-liquid from the storage through the wall of the structure and then get it to the coil.

Q And would a person of skill in the art at this time know that you would need to add a wicking material?

A In that second case, they would know that, yes, you couldn't just suspend the heating coil in the air passageway and have no way for the e-liquid to get there. So it might not have to be a wick; it could be -- for example, upstream you could inject droplets into the

flow, like in the Xia patent.

THE REPORTER: Like in the what of the patent?

THE WITNESS: X-i-a, I think. We -- we generally call that Xia.

Q BY MR. DOKHANCHY: And so the claim language says that the heating element extends transversely, right?

A Yes.

Q Can something extend in two dimensions or does something only have to extend -- can it only extend in one dimension?

A I think something could extend in three dimensions.

Q Okay.

A So, yeah, two, you could do two.

MR. DOKHANCHY: Okay. All right. Is now a good time for a break?

MR. ANSLEY: Sure.

THE WITNESS: Yes.

THE VIDEOGRAPHER: The time is 10:37 a.m. We are off the record.

(The deposition was at recess from 10:37 a.m. to 10:50 a.m.)

THE VIDEOGRAPHER: The time is 10:50 a.m., and we are back on the record.

Q BY MR. DOKHANCHY: All right. Welcome back, Dr. Singhose. Did you speak to your counsel during the break?

A Yes, I did.

Q And what did you talk about?

A We talked about --

MR. ANSLEY: I just caution you, Doctor --

THE WITNESS: Yes. Yes.

MR. ANSLEY: -- nothing privileged.

THE WITNESS: No, sir.

MR. ANSLEY: To the extent --

THE WITNESS: Just talk --

MR. ANSLEY: -- there was any.

THE WITNESS: Just talk about what I would have to do after this deposition to finish up my work.

MR. DOKHANCHY: Okay. I want to clarify that. I don't think those conversations would be privileged. I think if you are speaking to the witness during -- there's conversations between counsel and the witness during the deposition, those are not privileged, so --

MR. ANSLEY: Well, not necessarily. But we didn't speak about the substance of his testimony, just to be clear.

Q BY MR. DOKHANCHY: Is that correct?

A That's correct.

Q Okay. All right. I'd like to go back to your statement that a piece of paper can be rolled up without leaving a channel in the middle. I would like to hand you a piece of paper and ask you to please roll it up without leaving any channel in the middle --

A Sure.

Q -- that air could flow through.

A Sure. Well, I might not be able to do that on the fly here without any air, but certainly, if I rolled it up and if I --

Q Well, let me --

A -- squeezed it.

Q Let me stop you right there. You're folding it.

A Oh.

Q I'd like you to roll it, so let me give you another piece of paper.

A Okay.

Q Your testimony is that a piece of paper can be rolled up without leaving a channel in the middle.

A Okay. Like I said, I might not be able to do it on the fly here. I'm not actually well practiced in rolling up. I think we need to get the Cubans who are rolling those cigars down there in Cuba to do this.

Q Again, Dr. Singhose, you are folding it.

A Yeah, again, I think it's really hard to -- I'm trying to roll it up, but during the rolling process, I have to apply forces, and those forces are compressing the paper. So I'm trying to roll it up.

Essentially you are asking me to roll it up tightly, right?

Q I'm asking you to roll it up so that there is no way for air to flow through the middle.

A Yeah, so to do that, I have to roll it up tightly.

Q I'm happy to have you roll it up tightly, just not fold it. So if you need another piece of paper, I'm happy to give you one.

A Again, I -- I think the nature of paper, when I go to roll it up, I am compressing it and it's naturally collapsing it. So I think the only way I could roll it up without -- with leaving this channel that you want me to -- or not leaving it, I would have to go very gently, but that, again, would leave a big hole, and if I tried to put a heating element down there, it wouldn't be touching.

So I'm trying to roll it up in the way that it would be used in this product, and that means I would have to roll it tightly, and the minute that I start to roll it tightly, it does fold.

Q Okay.

A So I don't think I can do exactly what you are asking me to do. Although, I -- I was trying.

Q Okay. Thank you.

A Yeah.

Q All right. Let's talk about the -- the heating element in Wang. The -- does the air flow only on the inside of the heating element of Wang or does it flow all around it? How -- how does the air flow with respect to the coil in the Wang device?

MR. ANSLEY: Objection, compound. Objection, lacks foundation.

THE WITNESS: Well, the airflow in Wang come -- comes in the bottom, like we talked about that hole, and then it just expands out into the open areas.

Q BY MR. DOKHANCHY: Uh-huh.

A One is below the soaked fabric, and then there's that gap around the outside edges --

Q Okay.

A -- so it's gonna flow around that. Then it's gonna come back and mix up in that top gap, and it's gonna go out the hole 101. So that's what it's doing, and the heating element is in the middle of all that.

Q I see.

Let's take for the purpose of this question

that -- the assumption that Dr. Sturges is correct, that there is a gap, so that rolled fiber has a gap in which the heating element sits and touches the wall of the fibers.

Do you have that in mind?

A Yes.

Q When the air flows through that gap in Dr. Sturges's view of Wang, would the air flow around all parts of the coil or just on the inside of the coil?

A It would depend on the local touching of that coil to the -- to the fabric. If the fabric is pressing hard on the outside of the coil, then the majority of the airflow would have to go down the middle of the coil. Basically the -- the air is gonna go wherever it can, and more of it's gonna go in the low resistance flow.

Q Okay.

A So it would go right down the middle.

If there was more of a gap, like if, again, somehow he was kind of setting it up where the edges weren't touching the fabric and he was adding, I guess some kind of wick, again, the air is just gonna go wherever there's an opening.

Q Okay. In the example as you said where it is tightly, the -- withdrawn.

In the view, as you mentioned, where the fiber

is tightly touching the coil and the air is flowing on the inside of the coil, if you were to take that structure and rotate the coil 90 degrees so that it would be in your view transverse, would the air have more surface area to contact of the coil than in the -- what you called the longitudinal coil orientation?

A Okay. There's, I think, two versions coming to mind of what you just described. One is I'm taking what looks like in figure 3, this cylinder wrapped around it with a small airflow path down the middle, and I could rotate that entire thing, including a fiber. Is that what you're --

Q No, not including the fiber.

A Okay.

Q So the starting place is Wang as it is with the coil in, as you say, a longitudinal direction touching the fiber so that air only flows down the middle. And my question is, if you were to rotate that coil so that air -- my proposition is that air would flow over more of the coil; instead of just the inside, it flows around the outside also.

Do you agree with that?

A Okay, I think I understand your question. Let me try to understand a little bit more though.

So I -- I think I -- the way that Wang works is

we have this fabric sort of unrolled, and you have to put the heating element in there and then you roll it up. So before I start that rolling and I turn it 90 degrees, when I go to roll that up, the coil is -- I don't see how it's gonna stay straight. It's gonna be coiled up and bent along with the fabric. Probably break.

But in that configuration, it's hard for me to imagine because you -- you're saying I'm -- I'm still touching the -- it doesn't make sense. If I'm still touching the edges of the coil and it's turned, then the airflow down the middle would actually be going left and right rather than up and down. So I don't see how it could get out the top in that configuration. I'm just -- it's hard for me to imagine the structure.

Q Yeah, maybe I need to add the additional clarification. I'm still talking about Dr. Sturges's view of Wang that has a channel down the middle.

A So I'm understanding that, but you also said that it's the -- it's the version where the fiber is touching the outside of the coil.

Q No.

A Oh, okay.

Q In this case it would be touching the ends of the coil or some other -- there would be some other thing.

A Oh, okay. I think I understand now. So there is some sort of other structure that's supporting the ends of the coil, and I've --

Q You can --

A -- rotated it 90 degrees.

Q You can imagine like a light bulb, right? Two -- two long things, two long leads, and then the coil is transverse to that, right?

A Okay, and there's some structure that's holding that in place. In that case, given the same fluid flow, I mean, ultimately this is driven by a person. You know, it's assuming the same kind --

Q All else equal.

A -- of suction stuff.

Q Yeah.

A I think the air would go a little bit more over the coil because the outer edges of the coil are exposed in that case.

Q Uh-huh.

A And so the air would be flowing through there. It would hit the outer edges of the coil and the inner edges of the coil and come out the other side.

The first case is -- my understanding is that the outer edges of the coil are kind of touching the fabric, so the air couldn't really get to those outer

edges.

Q Right.

A So if your question is, can the air touch more surface area of the coil, I would say given all that setup, yes.

Q Okay. And is that something that a person of skill in the art would recognize as a basic principle of fluid dynamics?

A Yes.

Q Can you -- well, maybe we can do it without the figure. Oh, you have the figure in front of you.

In the figure 3 of Wang, the solution holding medium doesn't reach all the way to the ends of the cartridge; is that right?

A That's right. If you mean ends, you mean the top and the bottom, according to this --

Q Yeah.

A -- orientation? Yes.

Q If you were to extend that fiber or use -- withdrawn.

If you were to use a larger fiber that did extend all the way from one end to the other, such a device would be able to hold more liquid, all else equal, than the one in Wang, right?

A Yes.

Q And that would be advantageous, right?
A It would be advantageous in terms of storing more liquid, but it would be disadvantageous in other ways.
Q Okay. All right. Let's look at the Xia, or Xia. I'm going to say Xia because that's how we've been saying it --
A Okay.
Q -- but X-i-a reference. This is Exhibit 1006 in the 160 matter.
A Thank you.
So I was just handed Fang --
Q Oh, okay.
A -- not Xia.
Q My mistake. Let me give you the correct version. This is 1004, Exhibit 1004.
One of these days I will stop stepping on the microphone. Here's 1004, the Xia reference.
Okay. So before looking at Xia, I want to look at the '864 patent. Do you have that handy still, the --
A I still have --
Q -- Exhibit 1001?
A -- the '864 over here, yeah.
Q So let's go to claim 1. Okay. And are you there?

A Yes, I am.

Q And claim 1 states, "A cartridge configured to couple to a power source of an electronic vaporizer, the cartridge comprising."

And just as a preliminary matter, do you view this claim as requiring a cartridge?

A Yes, I do.

Q Okay. And what is a cartridge?

A Well, a cartridge is generally referred to something that's replaceable, and it has something in there that you might want to replace from time to time, like a toner cartridge or an ink cartridge. But there's not just one kind of cartridge, and this kind of industry, you might have a cartridge where you replace the e-liquid. You also might have a cartridge that you replace the -- any other parts, but, for example, the heating element might need to be replaced from time to time.

Those would be the two main things I think that you would have cartridges associated with it in this space.

Q So some of that I think is covered by the rest of the claim, so the heating element, the airflow passageway, I just want to focus on the word "cartridge."

When rendering your opinions, were you applying any particular definition or meaning of cartridge?

A I don't think so. I was just using the sort of plain and ordinary understanding of what a cartridge is in this industry.

Q Okay. And are you able to articulate what that plain and ordinary meaning is?

A Again, I think I said it's basically a replaceable component.

Q Okay. In a replaceable component, you may have, for example, liquid would get -- that gets depleted and must be replaced, right?

A Yes.

Q You may also have components that get replaced even though they don't need to be, for example, electrical leads on a printer cartridge, right?

A True.

Q So let's go to Xia, and let's look at figure 2. And you see in Exhibit 1004, figure 2, there's that component on the right called the generator?

A Yes.

Q And your view is that that is not a cartridge, correct?

A Well, I think it's two cartridges connected together. So it is a -- a cartridge, but actually

there's two cartridges there.

Q But your view is that this is not covered by the scope of the claims that recite a cartridge; is that right?

A That's correct.

Q Okay. And why is that?

A Because my understanding of the claim is it requires a cartridge.

Q Uh-huh.

A Sort of -- it requires a singular housing, and inside of that housing it has to have both the liquid and the heating element. And that's not how the structure works. It's three parts. One part has a housing for the heating element; another one has a housing for the e-liquid part.

Q So the way the generator is -- is assembled is that figure 5 slides over figure 4. Is that right?

A Yes, that's true.

Q So as it's assembled, the housing in figure 5 fully encompasses the housing in figure 4; is that right?

A I wouldn't say fully. There is some overlap there.

Q Okay. What part is not covered?

A I would say the end on the -- the left side. But that -- that housing that comes with figure 5 is an

opening on the left side.

Q Uh-huh.

A So when you slide it over the top, it doesn't go all the way over and around all the components shown in figure 4. And, you know, you can see that better if you look back at, say, figure 2 on the right.

Q Right.

A You can see there's a lot of the other cartridge sticking out it.

Q I think you are referring to the connector, the screw connector?

A Yes.

Q So that's not in figure 4, right?

A Yeah, that's right.

Q So if you just look at the dark lines from figure 4 that you say are housing, that dark line housing is fully within the housing of figure 5 as seen in figure 2; is that fair?

A Yeah, that's correct.

Q Okay.

A But again, the left side of it is not encompassed by the housing. That's -- that was the point I was trying to make. There is some overlap there, but there's that left side which is -- which is not encompassed by housing.

Q When you say "left side," you mean figure 2, of the generator in figure 2?

A Yeah, the left side, I'm -- I'm using figure 2 or 3 or 4, any of the left sides, because I think these figures are consistently shown in the same orientation.

Q But just to be clear, the -- the left end of figure 4 is fully covered by the housing in figure 5; is that right?

A The left end is covered in terms of the top and bottom.

Q Uh-huh.

A But the left -- there is no left side to this housing. I mean, there's a left side, but it's a top and a bottom. It's an open end.

Q Okay. You mean that there's no sort of endcap closing it off?

A That's correct.

Q Okay. But in terms of laterally, the light-colored housing in figure 5 extends laterally left of the dark lines in figure 4 once they are combined?

A Once they are combined, yes.

Q Okay. So let's go to the claim language. Where in the claim language do you see a prohibition that there is some internal, additional, what you call housing from figure 4?

A I don't think the claims are written to have a prohibition. They are -- they're written to have requirements.

Q So why isn't figure 2, which has -- I believe it's polypropylene in figure 5; is that right?

A That's one option, I think, yeah.

Q So why isn't the polypropylene shell plus the screw in figure 2 a housing that meets the claim requirements?

A By "the screw," are you referring now to parts of figure 3?

Q Yes, but it's probably easier to look at figure 2, since figure 3 is a combined connection with the screws together. So the screw I'm referring to is labeled 5. I believe it's connecting conductor 5.

A Yes, I see that 5.

Q Okay. So if you take 5 and the polypropylene housing from figure 5 as combined in figure 2, why isn't that a housing that meets the claim requirements?

A Well, because I think it's two housings, I guess, and the -- the way I'm reading the -- the claim is that there should be a housing, like a singular housing, and that's two housings.

Q So the two housings you are referring to are item 5, the conductor, the connecting conductor, and the

polypropylene housing?

A Yes. Again, I'm not so certain what the extent of 5 is. I'm trying to go along with this, but the structure that I see in -- in figure 3 is this like endcap, and I don't think that's part of the housing. I don't think it's the housing shown in figure 5. I think that's its own housing.

Q Okay. So the -- the basis of your view as to why Xia's generator is in a cartridge with the required housing, is that you think the connecting conductor 5 is not considered part of the same housing?

A Well, that's part of my opinion. Ultimately, I think that we're skipping over figure 4, which shows the housing, and that's the housing that has the heating element in its interior.

So when I look at this as a person of ordinary skill in the art, I see that's a housing for that cartridge, and then I see a different housing for the other cartridge, which is the e-liquid cartridge. So I'm seeing two different housings.

Q Right. But as you said, there is no prohibition on having a second internal housing. So my question is, as combined in figure 2, why is there no housing that meets the claim limitations?

A Again, I think I -- I thought I answered

before, but when I look at figure 2, I'm not seeing one housing. I am seeing multiple housings.

Q And so I guess I'm confused. Are you saying that there is a housing that meets the claims, but there's also a second housing?

A No, I don't think that there is a single housing that meets these claims. I think if you are somehow to combine those multiple housings --

Q Uh-huh.

A -- I think the multiple housings, I think one of them does have the heating element interior, and I think the other one has the e-liquid storage in its interior. So there are housings that -- that have these in interiors; there's just not one housing that has them both.

Q And sorry, why is that polypropylene housing not housing both of them?

A Well, because I think the other housing is, I guess.

Q Well, how --

A I think the other housing is -- is what's housing the heating element.

Q The housing is the outermost structure that contains the device internals, correct?

A Yeah, it's the outer structure around that,

yes.

Q Right.

And in figure 2, the outer structure is the polypropylene shell, not the dark lines on figure 4, right?

A Yes, I admit that that polypropylene shell goes on the outside of -- of, you know, most of it, and I told you there's this open end over there.

Q Uh-huh.

A But what is housing the heating element is that other housing, the one with -- in the darker --

Q Okay.

A -- the steel one. The steel structure is the housing for the heating element, and the polypropylene is the housing for the e-liquid.

Q So the -- you can have a structure that's a housing even if it's not the outermost structure then? For example, in figure 2, generator?

MR. ANSLEY: Objection. Vague.

THE WITNESS: Yeah, certainly I'm aware of a lot of products that have nested housings, like there's a housing for one component, and then a housing is then within some other housing. But I think a person of ordinary skill in the art would look at the inner housing as the housing that's holding its internal components.

Q BY MR. DOKHANCHY: Okay. What would be the housing of the generator?

A I'm not sure the housing has to have a generator. I think it has multiple housings.

Q I think you may have said that backwards.

A The generator is the combination of those figures. Really, it's the combinations of figures 3, 4, and 5.

Q Right.

A So I think the generator has multiple housings that are used to create that assembly.

Q Okay. Can the claimed cartridge have multiple housings?

A I think it could have multiple housings, but it needs to have a singular housing that houses both the heating element and the e-liquid storage.

Q And so the polypropylene shell that is outside of the figure 4 shell, that doesn't house the things inside of the polypropylene shell?

A I mean, I see where you are going here. Yeah, I just don't think that is in the spirit of these claims. I think the housing that's housing the heating element is that internal steel structure.

Q Okay. And do you consider the connecting conductor 5 part of a housing of the generator?

A Not really. I mean, based on figure 4, it looks like that steel tube is what we would consider to be the housing of the heating element.

Q Okay. You're aware that the specification says that the endcaps of the cartridge can be considered parts of the housing?

A I am aware of that, yes. It can or it doesn't have to be.

Q Right.

A That's an option.

Q And so why is that connecting conductor 5 not considered an endcap?

A I'm not sure. I didn't read it to -- to discern whether or not that was an endcap. I don't -- I don't think that was a -- an opinion put forth by Dr. Sturges. Basically, as you know, I'm responding to what he puts forth, so I try to analyze what he puts forth and respond to it. I don't go off and do all sorts of other analysis.

Q Right. But I'm just responding to the opinion you gave, which is, that you don't think item 5 can be considered part of the housing of the generator.

So my question is, in light of the specifications saying that the endcap of a cartridge can be part of the housing, can be considered part of the

housing, why don't you think that item 5 is part of the housing of the generator?

A Again, when I -- again, that's what I'm saying, I didn't go out and do an analysis about all the things that possibly could have been. When I did my analysis of this, I was looking for housings, and I see a housing in figure 4 for the heating element, and it's that steel dark line tube. That's the extent of my analysis. That is the housing. I didn't go off and think about what everything else could possibly be considered a housing. I found that housing.

Q Okay. But are you able to provide an opinion right now on why item 5 cannot be considered part of the generator housing?

A Well, I didn't do that analysis, and so I probably would not feel comfortable unless I read through the patent with that in mind.

Q Okay.

A I'd have to see how that's described, what its functions are, how it's used, how it's assembled, that kind of stuff.

Q Okay. Did you do that analysis with respect to the Fuma prototype?

A The prototype? What's the prototype?

Q The Fuma cartridge.

A Oh, the Fuma cartridge.
Q That you said embodies the claims.
A Yes, I did. I mean, I -- I basically did a limitation by limitation comparison to that Fuma, and in that case I was looking for a housing that --
Q Okay.
A -- that held both of those things.
Q And do you have your declaration with you --
A Yes, I do.
Q -- or in front of you?
Can you turn to paragraph 419.
A Okay.
Q And here is where you are saying why the Fuma device has a cartridge?
A Yes.
Q And actually, maybe it starts on 418, but it's all kind of in the same area.
And you see that, if you go to page 218 of your 160 declaration, on the end of the Fuma cartridge is a threaded connector, right?
A Yes.
Q And that's how it receives power from the battery side, right?
A Yes.
Q Is that threaded connector part of the housing

of the Fuma cartridge?

A Yes, I think that's the part that is electrically connected to the -- to the battery portion.

Q Okay. So if the threaded conducting connector in the Fuma cartridge is part of the housing, why isn't it in the generator of the Xia reference?

A I'm not sure. That's what I said, I didn't do that analysis.

Q Okay.

A Like I said, I did a different kind of analysis, which is responding to Dr. Sturges's opinions.

Q Okay. Is it possible that the threaded conductor 5 in the generator of Xia is part of the housing?

MR. ANSLEY: Objection. Vague.

THE WITNESS: That I just don't know. Again, I wouldn't feel comfortable without doing a proper analysis of that.

Q BY MR. DOKHANCHY: Okay. Does that threaded conductor -- is that an outside structure containing the device internals?

A Just to clarify what we're -- let me pull up the figure again. We're talking about the...

Q The Xia reference.

A Sure. Let me pull that up again. Okay, I have

it in front of me.

So we're looking basically at figure 3, is that what you're --

Q Well, let's look at figure 2 --

A Okay.

Q -- because that's the generator.

A That's the one that's hard to look at. It's so small.

Q It is a little small. That's true.

A All right. I'm looking at that.

Q So item 5, the threaded conducting connector, is that an outside structure of the generator?

A Again, I'm not sure of the full extent of what 5 is in -- in viewing it in terms of this question of whether or not it's a housing. But certainly there's parts of it that are on the exterior; we can obviously see that.

Q Would you say that 5 contains the device internals or is part of containing the device internals?

A Again, that's the part I'm starting to feel uncomfortable without reading exactly how 5 is described and what its function is and what it does.

Q Okay.

A Yeah.

Q Do you want to take a minute to look at that?

A If you want me to.
Q Yeah, let's take a look at it.
A Why don't you remind me of your question so I -- I have it clearly in my mind.
Q Sure. The question is, does the threaded conductor 5 perform the task or part of the task of containing the device internals?
A Okay.
Q So if you look at page 10 of 19 of Exhibit 1004, you start to see the description of how the connecting conductor B6, which is on the battery side, connects to the connecting conductor A5 on the cartridge side.
A Okay.
Q At the bottom of page 10.
A All right. I will review that.
Q So that paragraph and onto the next page should be helpful.
A Just to make sure I'm clear -- you probably reviewed this more recently than I -- the conducting connector A5 is 5?
Q Yeah, A5 and 5. Yeah, it's --
A Okay. I was looking for A5. There is no A5. It's the same 5, right?
Q Good -- good point.

A Yeah.

Q A5 and 5 are the same, as I read it.

A Well, based on those two paragraphs that you directed me to, it appears that the function of the connector is to connect, not really to house. So I would think it's the connector, not the housing.

Q I see.

And so what about in the Fuma cartridge, that threaded conductor that you said is part of the housing there; the purpose there is also to connect, isn't it?

A That's one of the purposes. Although, this structure here I can also see it's -- it's housing as well. It's sort of holding and protecting.

Q Uh-huh.

A So that's why I think there's a -- there's a difference here.

Q Well, looking at figure 2, doesn't that connector form an endcap that closes off and protects the device internals?

A Again, I didn't analyze it to determine whether or not it was acting as the endcap, but if I look at figure 4, quite frankly, it looks like the endcap is the component 8, which is one of those liquid blocking structures in there. That seems like a person of ordinary skill in the art would think that that was the

endcap.

Q So just to clarify, the item 5 is -- doesn't exist in figure 4?

A That's correct, yeah.

Q Okay. I'm just making sure we're on the same page.

As constructed, the generators, if it has an endcap, the outermost part, which would be the endcap, is item 5 on the left side of the generator; wouldn't you agree?

A I would agree that the outermost part on the left side of the generator is that screw connector 5 or A5. But traveling back towards the heater chamber, there is that other structure there that seems like it's the endcap of the heater cartridge. Like it stands on its own, and that's shown in figure 4, and it's got its own endcap.

So that would seem like the endcap -- you keep adding stuff to the end, I admit that, but I think that's what would be viewed as the endcap, if in fact there is an endcap. You know, we have to review what does it -- what's the meaning and function of an endcap, but it looks like it would be item number 8 in figure 4.

Q And in figure 2, would item 8 be the endcap of the generator?

A Again, I'd want to review exactly what endcap is, but I'll go along with the line of questioning.

Q Sure.

A It's not the farthest end, but it's probably the -- 8 is the endcap of the cartridge that has the heater chamber. Whether or not there's another endcap end capping something else, that could be a possibility, but I'd want to review it with that in mind and think about what an endcap is supposed to do and how it functions.

Q Okay. Yeah, my question is about the generator, which is labeled in figure 2.

Do you see that?

A Yes.

Q Is item 8 the endcap of the generator?

A Again, I haven't reviewed exactly what the endcap is supposed to be. I mean, obviously it's a cap on the end.

Q Uh-huh.

A Looking at this and without reviewing what endcap is, it doesn't strike me as the endcap of the generator. It strikes me as the endcap of the cartridge that has the heating element.

Q Okay. Okay. The cartridge of the claims can be a multipiece assembly; is that fair?

MR. ANSLEY: Objection. Vague.

THE WITNESS: The cartridge of the -- I missed part of the question.

Q BY MR. DOKHANCHY: The cartridge of the claims in the '864 and the '881 patent can be a multipiece assembly, true?

A Yes.

Q Okay. And that multipiece assembly -- withdrawn.

We talked about the claim language earlier, and I asked whether the claims preclude having multiple housings, one within the other, and you said no, right?

A That's correct. I don't think there's a -- it's not written like you can't have it.

Q Right. So as long as you find one outside structure containing the device internals that has all the things that the claim requires, that would meet the claim limitations for housing a cartridge, right?

A Yeah, I think so. I mean, that's what we are looking for. We would be looking for a single housing that does that.

Q Okay. And if one housing is outside another housing, the outermost one is the outside one, right?

MR. ANSLEY: Objection. Vague.

THE WITNESS: Yeah, there -- there certainly

could be nested housings, I mentioned that before, and there would be housing that's housing something, like the heating element. That housing could be inside another housing. That's certainly possible.

Q BY MR. DOKHANCHY: And that would be within the scope of the claims?

A I don't think so. I mean, I think the way the claims are written is that we need one housing that is housing or securing or holding inside the required elements, basically the heating element and the e-liquid. So I think there has to be a housing that's housing both of those.

In this case, we're seeing a housing -- we're seeing two different housings that accomplish that.

Q And so the polypropylene shell in the generator of Xia doesn't house the heating element in your view, correct?

A Yeah, I mean, I think when I looked at the structure, I mean, I'm looking at figure 5, and the heating element is not even in there, and I've got the whole housing.

Q Let's look at figure 2 as assembled in the generator of Xia. Your view is that the polypropylene shell around the outside of the generator does not house the heating element, correct?

A That's right. I think the housing is the steel structure that we see in figure 4.

Q And that's under the assumption that only one thing can be the housing for the heating element?

MR. ANSLEY: Objection. Vague.

THE WITNESS: I'm not sure I viewed it that way, that one thing could be the housing. Housing is -- can be made of two parts. Often you have clamshell housings. But I think whatever sort of surrounded, protected was the outer structure of that device internal, in this case we're talking about the heating element, I think that structure would be the housing for that portion of the device internals.

Q BY MR. DOKHANCHY: That is my point. You said it is the housing. That presumes there's only one. So my question is, could the heating element have multiple housings?

A I don't think so. I mean, I think a person of ordinary skill in the art would look for whatever is housing the heating element, and they would call that the housing.

Q Uh-huh.

A And whether or not that that structure, its housing and heating element was put into something else, I, again, don't think they would drop it. They would

still be viewing that -- that external material that holds the heating element, they would view that as the heating element housing. They would acknowledge there could be other housings, but they -- it wouldn't magically change it to some other housing.

Q Okay. So some structure that is internal to another structure could be the housing of the heating element; is that right?

A Yeah.

MR. ANSLEY: Objection. Vague.

THE WITNESS: Yes, as I just explained, if -- if I got -- if I got this component, which is a housing, and inside of that is the heating element, that's the heating element housing, where that is put in the device at some later time, I don't think that changes what the housing of the heating element is.

Q BY MR. DOKHANCHY: And when you're looking at figure 2, say like down the barrel of it, from the side of item 5 -- well, withdrawn.

When you are looking at the generator of figure 2 from the side of item 5, can you see the dark black shell from figure 4?

A From that viewpoint, I don't think so. It seems to be blocked by other pieces.

Q You say in your report that one of your tests

for determining if something is housing is whether you can see it from looking at it, right?

A That could be a useful test, yes.

Q Okay. Is that the only test?

A No. I mean, again, we could imagine a housing being obscured from view.

Q Okay. So then how do I know when I'm looking at something internal, so not the outermost structure but something internal like the black lines on figure 4, and it contains something like the heating element, how do I know if that item is housing for the heating element?

A Well, I think if you pull that part -- portion out and you could hold it and move it around and stuff, and it's holding securely, and it's the structure around the heating element, I think that would be the housing for the heating element.

Q And you've used the term "outside structure," so your definition is the housing is the outside structure containing the device internals. That's what a housing is, right?

A Yes.

Q Can something be both inside structure and outside structure?

A What do you mean by "inside structure"?

Q The opposite of outside structure.

A I think for a given set of internals, you would -- you couldn't do both of those. You'd have to be the outside structure for some of the internals. Again, whether or not that becomes a subcomponent of a larger object --

Q Uh-huh.

A -- that it could then be inside a larger object, but it would still be the external surfaces for the thing we're talking about, the internals that we're talking about.

Q Okay. Is there anyplace where you can say, no, that's too far internal that it's no longer external structure?

MR. ANSLEY: Objection. Vague. Incomplete hypothetical.

THE WITNESS: I think if we were clearly defining the internals that we were talking about. And just make it specific, we're -- we're talking about the heating element.

Q BY MR. DOKHANCHY: Uh-huh.

A Whatever the external structure holding that within its internals, that would be the housing of the heating element. And you could put it deep inside of a product, and it would still be recognized as the housing of that internals. Again, we -- we often see nested

housings.

Q All right. Would you like to take a break --

A Sure.

Q -- or just keep going? Take a break?

A Yeah.

Q Okay. Let's do a five-minute break.

THE VIDEOGRAPHER: The time is 11:39 a.m. We're off the record.

(The deposition was at recess from 11:39 a.m. to 11:47 a.m.)

THE VIDEOGRAPHER: The time is 11:47 a.m. We're back on the record.

Q BY MR. DOKHANCHY: Welcome back, Doctor.

A Thank you.

Q I have Sturges in my mind. Dr. Singhose.

Let's see, could you turn to paragraph 96 of your declaration in the -- in the '864 case, the 160.

A Okay, I've turned to paragraph 96 --

Q Yes.

A -- of the '864.

Q Yes.

A Okay.

Q All right. And your opinion on the VUSE Ciro device is that what is called the positive pin is part of the housing; is that right?

A Yeah.

Q And we can go to other figures if they're more helpful, but on page 45, you have one of the images of the VUSE Ciro.

Do you see that?

A Yes.

Q And you see that the positive pin is -- is that sort of internal structure where the green arrow is pointing in your figure, right?

MR. ANSLEY: Objection. Vague.

THE WITNESS: Yeah, I mean, one side is external to the left side, but then it does -- the structure does go into the cartridge.

Q BY MR. DOKHANCHY: So you can sort of see this better in the next image on page 46. The positive pin is the area in white surrounding essentially the -- the leftmost green part of the passageway; is that right?

MR. ANSLEY: Objection. Vague.

THE WITNESS: Yeah, that's certainly part of it. I'm not sure that it's fully represented, but part of that white -- part of that white portion is the positive pin.

Q BY MR. DOKHANCHY: Let's look at another figure that might help. This is gonna be Exhibit 1014 to the 160 matter, and this is R.J. Reynolds' brief in the Fuma

v. RJR case, Exhibit 1014.

And if you go to page 22 of 52, and you will see an image of the VUSE Ciro, the bottom right numbering. Yeah, it's different page numbering.

A Okay.

Q So the -- it's internal page 15, and it's external page 22.

A Yeah. Okay, I have that.

Q So the positive pin is that gray pin that is within the larger screw, right?

MR. ANSLEY: Objection. Vague.

THE WITNESS: Yeah, I mean, there's lots of gray parts in there, but I -- I think where that positive pin label is going and having a circle, that's certainly part of it. And then -- so part of it is sticking out, you know, exposed to the left, but part of it does go into the device to the right.

Q BY MR. DOKHANCHY: Okay. The entirety of the positive pin is internal to the threaded conductor, both radially and axially in this image, right?

A Okay. Axial meaning up and down basically, is that --

Q I was using axial to mean along the length of the cartridge.

A Oh, okay. Sure.

Q So if you were to lay this down horizontally, the positive pin is within the threaded conductor both vertically and horizontally, right?

A Yes. I mean, all I would do -- sort of to clarify is that there's one end that's open. It's not covered.

Q Right.

A But the other ones essentially are -- maybe that's what you're saying, is that they are covered or obscured. But one end is not.

Q Right. What I am saying is the positive pin doesn't extend laterally past the end of the screw conductor. In fact, it stops short of it laterally, right?

A Yes, I think that's a fair characterization.

Q And then in the vertical direction or the radial direction outward from the center of the -- the central longitudinal axis, the positive pin is also internal in that direction to the screw conductor, right?

A I think given an understanding of internal in the fact that it's recessed below it in those two directions, I would say yes, that's correct.

Q Okay. So why is the positive pin outer structure that comprises, in your view, housing?

A Sure. You just have to turn and look down the

axle, and --

Q Okay.

A -- what you are looking at, the outermost thing that you see is that positive pin. It's not flush, but the rest of it is recessed a little bit in it, but that's exactly the same kind of structure that we see in figure 2 of the '864 patent, is we see, when we look down the end, part of that end of the housing is recessed in. So this actually aligns very well with figure 2 of the '864 patent.

Q So why is the test that -- well, let me ask you this. Is the test that when you are looking down the barrel of a cylinder, a cartridge that's a cylinder, is anything that you can see external structure?

A I don't think anything. There could be like a pinhole, and there are pinholes in these devices, and you could see into it.

Q Uh-huh.

A You could see things. But I think a person of ordinary skill in the art would recognize that's a big sizable surface, and it's the outermost surface, and it is -- it does have the internals inside of it, so they are gonna recognize that as the end portion of the housing.

And again, that comes to us very directly from

figure 2 of the '864 patent. If somebody saw the '864 patent and looked at this, they would be saying, well, this is very similar, and that's identified as housing in the '864, so this would be the housing of this device.

Q Right. I'm -- I'm just trying to understand the if you can see it test, right? So what are the boundaries of that? Is it some things that you can see are external housing or external structure, or everything you can see looking down the barrel is external structure?

A Yeah, I don't think it would be everything. Again, I think if you could peer in through a hole and you were looking and you saw like a shiny component two centimeters in there, that's not gonna be the housing.

Q Okay.

A But certainly, the outermost part of it that you can put your finger on, you can touch, and it's -- it's holding or securing those internal parts, that would be the housing.

Q What's the difference between the hole that you can peer through in your example and the hole in the threaded conductor in the VUSE Ciro?

A Which hole in the threaded conductor are you talking about?

Q So this threaded conductor in VUSE Ciro has a

hole in it, and that's where the positive pin sits, right?

A Yes.

Q And you said there are some things where if you look through a hole and you see that, that's not gonna be external structure, right?

A Uh-huh. Yes, I did say that.

Q So that to me sounds like the positive pin, because you are looking through the hole of the threaded conductor and you see the positive pin. So what's the difference between the one you said is not an external structure and the positive pin which you say is external structure?

A Oh, I think I understand the question.

Yeah, I mean, at some point you have to apply the understanding of a person of ordinary skill in the art about the very nature of housing. The housing is holding these internals, like we talked about, but also it's providing some protection and security. So that screw part from certain directions might be providing that kind of structure and support, but the positive pin is definitely providing that support and structure when viewed from that one direction.

Q Uh-huh.

A Now, if there's a hole in there, and now,

again, I could see far into there, and I'm seeing the internal parts, I don't think the internal part is part of the housing. I think it is what is being housed.

So I think that's how a person of ordinary skill in the art would view housings. It's not like you couldn't -- there's not hole -- sometimes there's holes in housings and you could peer inside, but what you see is not it. But the outermost part that is providing the structure that is holding or securing, that would be the housing.

Q Okay. Is the screw connector housing the positive pin?

A It's hard to tell from this diagram. It looks like the positive pin is being housed -- is not really being housed by it. It is the housing. I think, again, that's the -- what we talked about before, is it's a connector to another part.

Q Uh-huh.

A And you can have these cartridges with housings and you could have other things on the end, like a mouthpiece, for example. So I view it as that. It's -- it's something laid over the positive pin, but the positive pin is definitely part of the housing. Because if you removed it, there would just be a huge opening, and all kinds of stuff could go in there.

Q Is there any structure in this image to the right of the positive pin that you would consider housing?

A Yeah, I mean, the outer shell, the whole outer shell that we're seeing there is the housing.

Q Uh-huh. What about anything internal to the outer shell to the right of the positive pin, for example, this item in blue?

MR. ANSLEY: I'd just object. Not clear what you are -- vague.

THE WITNESS: I see two things that are blue in there. There's a round blue thing and there's --

Q BY MR. DOKHANCHY: I'm talking about the rectangular.

A Okay, the rectangular, mostly rectangular blue thing?

Q Yeah.

A Do we know what that is? I'm not seeing it labeled. I mean, it kind of -- it kind of depends on what it is. But I don't think it's the housing because, again, there's this other steel metallic structure outside of that that is -- that is forming the housing of these internals that we're talking about here.

Q And so why does the positive pin contain or protect, I think you said, the device internals?

A Well, I think if I removed it, there would be a huge opening there, and dirt and grime and all kinds of stuff can get in there. I think without it, you would say that's not -- like it's not completely housing. And when I put that on, it's sort of the end.

Q Okay.

A We talked about these endcaps before, so it does seem to me like it's acting as the end of the housing. They are providing support and protection for the internals.

Q But debris and such can still get in. There is still a hole through the positive pin, right?

A That's true. It's just a much smaller hole. So I'm not saying this is a perfect housing.

Q Okay.

A But if we took that out, there's gonna be a much bigger hole, and it's much more likely that the device internals would get damaged, and corrosion and debris would get in there.

Q So then is there any other component that you think completes the protection of the device internals, given that there's a hole in the positive pin?

A I think that's it. And we have to have holes in these things, I mean, for these products to work. So I'm not saying that the housing is airtight or

watertight.

Q Uh-huh.

A It should just be secure enough so that lint and dirt and all kinds of stuff doesn't get in here, but it still allows a sufficient airflow through the cartridge to perform the function that needs to be performed.

Q All right. You say that the end, as used in the claims, is the extrema of an object?

A Yes.

Q Do you recall that?

Is that extrema three-dimensional, or does it have to only be two-dimensional?

A I mean, I think there's -- when we're talking about real products, it's always a three-dimensional to some extent. There has to -- you can't not consider it three dimension, because the minimum thing to identify is a molecule, which has a third dimension. So it's fundamentally a three-dimensional thing, but it is the farthest away --

Q Okay.

A -- portion of the device on one side of it.

Q Well, there would be a range of distances from the very end somewhere inward towards the center of the cartridge that you would call the end, right?

A That's correct. If you established a -- I think you are referring to a reference frame, like an origin in the middle of this. If we traveled from that origin down to one end, it's definitely not gonna be planar. These ends have interesting shapes. And again, figure 2 is a perfect example of that.

Q Do you have any -- well, let me ask. What -- what sort of boundaries in terms of how far down from the extreme planar end of a cartridge does the, quote/unquote, end of the cartridge extend?

A I would think it would extend a minimal distance, a de minimis amount. Like, you look at the end surface, and it's that plus just a little bit in, because it's, again, a real structure with molecules. But basically it's the extreme surface.

If you are at any point and you could go further out, then you are not at the end. So if you were -- you know, if you went and put your finger on some piece of the device or a pin, and you are able to move further away from this origin, then you weren't at the end.

Q So how is that different from an infinitesimally small two-dimensional plane definition?

A Yeah, well, I think I'm not comfortable with infinitesimally small, because we're talking about real

products and molecules and stuff like that. So there is a third dimension --

Q Okay.

A -- but it is kind of the minimal amount that still is -- is matter that's still plastic or steel, metal, or whatever it is.

Q Is it more than one atom wide?

A I would think it would be like at least a molecule wide or -- or in the case of metals, it would probably be like the last crystalline structure or lattice structure.

Q Okay.

A I mean, I think that would be a fair assessment. I don't -- I don't think a person of ordinary skill in the art would get down to the molecular level and have to make that analysis. They would see it and touch it and feel it and say that's the end. That's as far as I can go away from the origin.

Q Okay. Let's say the housing of this cartridge has a -- let's just say a shell, a metal shell that goes all the way around the outside. Would the end of the cartridge extend towards the middle of the cartridge more than the thickness of the metal of the housing?

A I don't think so unless, again, there was some holes or some undulations or something like that. But if

you are just talking about like a solid rectangular shell, I think it's -- doesn't extend further in than the thickness of that.

Q Okay. All right. I will ask the court reporter to mark Exhibit 2.

(Deposition Exhibit No. 2 was marked for identification.)

Q BY MR. DOKHANCHY: All right. Do you recognize Exhibit 2 as a JUUL pod?

MR. ANSLEY: I will just object to outside the scope.

THE WITNESS: Well, I recognize -- I recognize it as like a slide which has some JUUL pod CAD pictures on it. It's not the actual pod, of course.

Q BY MR. DOKHANCHY: Of course.

A Yeah.

Q Okay. So you see the label "first end" on the first page of Exhibit 2?

A Yes, I do.

Q And so what you just testified is, that first end would not extend in the left image vertically beyond the thickness of that gray-dashed housing; is that right?

MR. ANSLEY: Objection. Mischaracterizes testimony.

THE WITNESS: I'm not exactly sure what you are

referring to. You were -- you were pointing to your picture.

Q BY MR. DOKHANCHY: Sure.

A And I wasn't -- I couldn't quite follow along the description.

Q You see the gray-dashed housing around the outside of the first -- of the JUUL pod as depicted in the first page of Exhibit 2?

A Yes, I do.

Q And I had asked you, does the first end extend toward the center of the cartridge any more than the thickness of that housing? That's what I asked you before, Exhibit 2, right?

A Okay. Sure.

Q And so in your view, the first end may have some thickness, but it doesn't go beyond the thickness of the wall, right?

A That's correct. I think you would go along, and you would identify that wall as the end, and it would have that weird shape. It's not a flat piece. You would come along diagonally, and then you would kind of go back into recess a little bit, and then across, and then you would jet back out a little bit more, go over and then diagonal back up to the side. I think that would be -- I think a person of ordinary skill in the art would think

that's the end.

Q Are you talking about in figure 2 or are you talking about in this image?

A Well, I'm talking about in Exhibit 2, what --

Q Yes.

A -- you are showing me. I was kind of trying to describe without writing on it what -- what --

Q Well, why don't --

A -- the end would be.

Q Why don't you just circle what you think the first end would comprise.

A Okay. Sure.

MR. ANSLEY: I would just object to this line of questioning. It's outside the scope of your declaration.

THE WITNESS: I don't think I can circle it. I'll actually just sketch, you know, what it is. And again, I'm using the -- sort of the basic understanding that you look back up and you establish a origin, and you see how far away you can go from the middle of the cartridge.

Q BY MR. DOKHANCHY: Okay.

A And so -- again, I'm trying to make it sort of clear here. But I think that would be (indicating) the end.

Q Okay. Can I take a look at that?
A Sure.
Q I will give it back to you. Okay.
Is it okay if I label this "first end"?
A Sure.
Q And just take a look at that to see if I -- if I am accurately reflecting your testimony.
MR. ANSLEY: Actually, do you mind if I take a look at it?
THE WITNESS: Yeah. I mean, I think the arrow is not exactly -- it's -- I think it's -- that whole thing is the first end.
Q BY MR. DOKHANCHY: Okay.
A But I'm -- with the understanding, I think you are trying to show sort of a height there, but it's that whole structure that I've written over with a pen is what I would consider the first end.
Q Okay. And you see those notches on the sides of the cartridge?
A Yeah. On the sidewall?
Q Yes.
A Yes, I -- I know those. I know those very well, actually.
Q Are those part of the first end?
MR. ANSLEY: I think I'd just object --

maintain my objection, outside the scope with this line of questioning.

THE WITNESS: I would say that for the most part, they are on the side. I didn't do this analysis before we got here today, but if I did the test where I established an origin and tried to draw a line through there, could I get any further away? Rigorously applying that, maybe part of that curvature is on the end, but I think as a first look at this, you would say those are on the side.

Q BY MR. DOKHANCHY: And so they are on the end or they are not on the end?

A My opinion is, for the most part, I think they're -- they're -- most of it is certainly on the side. I'd have to do a detailed analysis to see if there wasn't a little bit of that that could be considered the end, but it looks like they are on the sides.

Q Okay. So you are not able to say for sure whether the first end extends towards the middle of the cartridge far enough to encompass those notches. Is that?

A That's right. I think it stops before those notches.

Q Okay. All right. And just in case we somehow lose that, could you hold that up for the camera, and can

we zoom in on that?

MR. ANSLEY: Again, I will just object. This seems irrelevant and outside the scope of Dr. Singhose's declaration in this IPR.

MR. DOKHANCHY: I disagree, but fine --

MR. ANSLEY: The prior art --

MR. DOKHANCHY: -- fine to --

MR. ANSLEY: -- (indiscernible) seeks to identify a first end. I don't think the JUUL device has ever been introduced in this IPR, so I do think it's irrelevant.

MR. DOKHANCHY: Okay.

MR. ANSLEY: And if I need to, we just will preserve our motion to strike that.

Q BY MR. DOKHANCHY: All right. Do you agree that the word "end" can be defined as a part or place at or adjacent to an extremity?

A That sounds pretty close to right, yeah. It's definitely at it. I think the -- the part is the adjacent, and we can't go too far away, as we just talked about.

Q So I can't tell if that's a yes or a no.

A Again, it's mostly a yes. I agree with the part where it's at the end. But I think you also said something about adjacent, and I'd want to understand what

you mean by adjacent more. And like I said, we just -- we kind of just talked about this, you can't go very far away before you leave the end.

Q So I just need a yes or no as to the whole thing. And if you disagree with part of it, I would say that means you disagree with the definition.

But my question is, do you agree with the definition of the word "end" as, quote, a part or place at or adjacent to an extremity?

A I would say yes, just as long as we understand adjacent to have some bounds on it.

Q Okay. How does the word adjacent compare to the word proximate in the '864?

A I know that the '864 uses the word proximate. Does it actually use adjacent in the claims?

Q I don't believe so.

A Okay.

Q But my question for you is, do you view one as broader than the other? Are they the same?

A I didn't do that analysis for this patent, but I have done that analysis in the past. So as a general view, I think that adjacent generally means next to and touching.

Q Okay.

A Proximate wouldn't have to be touching.

Q Okay.

A But again, that's from my overall experience, not from focusing on what it may mean in the exact contents of the '864.

Q Okay. All right. So I know we just touched on this, but the '881 claims say a first aperture proximate first -- excuse me. Withdrawn.

The '864 claims say a first aperture proximate of first end. In contrast, the '881 claims say a first aperture on the first end. Right?

A That sounds right.

Q I mean, we can look at it. I'm not --

A Yeah, I believe you.

Q -- trying to test your memory.

A Yeah.

Q What is the difference between an aperture on the first end and an aperture proximate the first end?

A Again, I think there is a difference there. And on -- you would certainly have to be right at it. You know, the aperture has to be -- we would do that exercise where I identify the end, and the aperture has to be right there.

Q Okay.

A Proximate means it could be a little bit away.

Q Okay. And let's look at the '864 patent. So

the '864 says: A housing having an interior, et cetera, et cetera. The housing having a first end and a second end that is opposite the first end. The housing having a first aperture proximate the first end.

Do you see that?

A Yes.

Q And your view is that the housing -- withdrawn.

Your view is that the aperture, to be a first aperture in the claims of the '864, the aperture has to be literally in the housing, right?

A Yeah, it's a little bit weird to talk about aperture in, because the aperture means that the housing is not there. It's a hole, yes. So it needs to be a hole in the housing.

Q Right. So if the hole has to be in the housing, why does the claim then go on to say that the first aperture is not limited to being on the end, but it can be only proximate the first end?

A Sure. Well, we can envision housings with weird shapes --

Q Uh-huh.

A -- where the wall of the housing bends back inside, and so that part of the housing wouldn't be the end because there's another part of the housing that is sticking out a little bit further. And so if the

aperture was in that part of the housing that was kind of bent back inside, that would still be proximate to the end but not on the end.

Q So I'm a little confused, because I thought you said earlier that as in figure 2 of the patent or the JUUL device we looked at, the housing, if it has a curvature or a nonlinear shape, would still be considered the, quote/unquote, end, right?

A That's correct, but we didn't -- we considered a shape that never bent back on itself more than 90 degrees. Okay, but if you -- if you were following this undulating surface and it curved back into itself, let's say 180 degrees, you'd still have the housing there.

Q Okay.

A But there would be another part of the housing that's further away from this origin in the middle, and then the housing could then curl back over and continue to go on. That curled in portion wouldn't be the end, because I can go further away.

Q Okay.

A But it would still be proximate. And so that's the kind of, I think, situation envisioned by this claim.

Q Well, let's look back at Exhibit 2, because I think what you are describing is what happens here on the first end. The gray, you know, external structure, the

plastic of the JUUL pod, as it comes toward the first end goes back into itself 90 degrees, and then across.

Is that what you were talking about?

A Yes, that's correct. That's a 90-degree recess.

Q Okay. And so that part that goes back in towards the middle is not the end, according to you?

A No, that's still the end, because it's the farthest that I can go. And once I go past that, away from the middle part of the cartridge, I'm out in free space.

Q Right.

A And I just keep going and I never run into the cartridge.

But suppose that was curved so far in that I started traveling from the origin, I hit that end. I left the cartridge temporarily, but I keep going in the same direction, and I run into the cartridge again. That's the situation I'm talking about. There could be this recessed feature that is not the end, but it's proximate the end.

Q I'm having a hard time picturing what you are talking about. Could you draw something that depicts what you are talking about?

A Yes, I can.

Q Thank you.
A Okay. So what I'm gonna do is I'll describe what I am doing.
Q Okay.
A The first thing I'm going to do is sort of draw the general shape of what we are looking at in figure 2, so we have some context, this JUUL cartridge. Okay?
I wish I had kind of a thicker marker.
Q Let's see. I can give you a highlighter.
A Okay. I'll do this, and maybe if it's not clear, I'll highlight what I mean.
Do you want me to hold it up or do you want to see it before I hold it up?
Q That -- that works, as long as we can get that, and we will mark it as an exhibit.
A So this is where we have a recess that folds back on itself --
Q I see.
A -- internal. And so this part right here (indicating) would not be the end of it. This would be the end, but this recess is certainly proximate to the end, and you could have an aperture there.
Q So the horizontal part that is sort of akin to where the holes are here in the JUUL pod, is that the end?

A Yes. So this would be part of the end right here (indicating).

Q Uh-huh.

A And you've got over here (indicating), you -- you're not no longer on the end because the end would jump down to here, and this would be the end (indicating). So you would have these recessed features here (indicating) that aren't exactly at the end --

Q Okay.

A -- but they are pretty darn close, and if you had your aperture there, I think it would read on the claim as -- the version of the claim where it's not on it but proximate to it.

Q Okay. So if the aperture were on the sides, that would be covered, in your view?

A Yeah, that's -- this is the kind of structure that I think would -- would -- would read on this claim where it's not exactly on but proximate.

Q Okay.

A But proximate could also be on, I mean.

Q Well, that --

A Yeah.

Q I don't think anybody is disputing that.

A Yeah, yeah.

Q But we're discussing the full scope of the

claims?

A That's right.

Q Okay. Let's --

A Sorry. There you go.

Q Do you mind if I just mark where you said the aperture --

A Could be, yeah.

Q So aperture, proximate, and within claims of '864. And obviously, let me know if that's accurate.

A Sure. And, I mean, this is just one variation. I will just say in another variation, you could have such a recess more right in the center.

Q Uh-huh.

A And I think that's probably what we'd wanna do to read more directly on the rest of the limitations often.

Q Okay.

A Because we have some of those limitations that you know are central and axial.

Q Right. Some of the -- right. Okay, yeah.

But you are not saying that the location of the aperture would make the passageway not central and axial?

A Well, if these are way off to the side and, for example, you only had one aperture off to the side, I think you would now be testing the limitations of a

central airflow passage. You'd probably want this kind of structure basically in the center so when the air went in there, you were -- you were basically in the center to -- for the other limitations.

Q But in that event, if it was in the center, then it would be on the end, right? Because your whole point here is that because it's off to the side, it's proximate but not on the end; if it were a protrusion in the middle, that would be the end?

A Yeah, I'll make you a third drawing --

Q Okay.

A -- to explain it.

Q Okay. Let's -- let's see.

A Yeah. Yeah. Because I was just addressing that one particular limitation.

Q Sure.

A If you want to then practice the other ones, you probably need a somewhat different structure.

Q Uh-huh.

A Well, actually, I'll let you look at it first before --

Q Sure.

A -- I hold it up.

So I think we even need the apertures to be closer to the central if we're gonna try to read on the

other limitations.

Q And so the aperture you're proposing would be here (indicating)?

A Or to the sides.

Q Or to the sides --

A Yeah.

Q -- here (indicating)?

A It's basically still in the middle, but it's -- it's not at the end --

Q Okay.

A -- but it's proximate at the end. But when the air went in there, everyone would consider that air is in the center of the device.

Q I will just draw another arrow there. Is that -- is that accurate?

A Yeah, I think that's --

Q Okay.

A If we're trying to make a version that reads on all the other limitations and stuff like that.

Q Okay. Okay. Can we mark that Exhibit 3, please.

A Are you giving me the thumbs-up? Okay. I don't know if you want it to mark it.

(Deposition Exhibit No. 3 was marked for identification.)

Q BY MR. DOKHANCHY: If it were a -- a simpler design, just say an ordinary cylinder with a flat endcap, could an aperture on the sides be a first aperture of the claims?

A Of the full -- of all the other limitations as well?

Q Yeah, let's just say it's a empty cylinder.

A Yeah.

Q If it's an empty cylinder, you'd agree it has a central and axial airflow passageway, right?

MR. ANSLEY: Objection. Vague. Incomplete hypothetical.

THE WITNESS: I'm trying to understand your question. Let me -- let me read the claims. You're asking me basically to look at the claims here?

Q BY MR. DOKHANCHY: Uh-huh.

A Well, I think the last limitation of claim 1 that says, "Wherein the airflow passage extends centrally and axially from the first aperture to the second aperture," I think that almost precludes an air hole in the side. I think it has to be on the end so that it can -- the airflow passage can come in and be central --

Q So then how --

A -- and axial.

Q How would this bottom image that you said meets

the claims satisfy that, because the aperture is on the side?

MR. ANSLEY: Objection. Mischaracterizes testimony.

THE WITNESS: Well, the aperture that I'm indicating there is at the center, right. The left and right is the sides. It's coming in; it's not perfectly at the center, but I don't think anyone is gonna read the requirement of perfectly in the center.

But that bottom one I did, I put the holes. And as soon as the air gets in there, a person of ordinary skill in the art is gonna consider that to be central. That's in the center of the device.

Q BY MR. DOKHANCHY: Okay. So it doesn't need to be in the literal center because it's not in the literal center?

A Yeah, I don't think you can be exactly in the center --

Q Okay.

A -- on any of this stuff.

Q As long as the air gets to the center?

A Yeah. When it comes in, I think a person of ordinary skill in the art would look at that and say that's in the center, and now it's starting to flow. I'm assuming there's a flow path after this, and it continues

down the center, down the axis. That's the kind of structure that would read on this claim limitation.

Q Okay. All right. Well, let's talk about the central and axial airflow passageway. The claim language is, "An airflow passageway extending centrally and axially," and there's various permutations of it, but can we just shorthand that, the central and axial airflow passageway?

A Okay.

Q So you say that that is an innovative feature of the claims of the NJOY patents, right?

A I think so, yeah.

Q Okay. So in kind of plain terms, you know, why is a tube down the middle innovative?

A Well, one thing that's surprising about that is that a tube down the middle would often result in hot droplets being shot into the person's mouth. And that certainly would happen if you tried to do that with Xia.

So it's part of the innovative feature is that you can do that, but you have to then deliver the vapor in a different way or generate the vapor in a different way. I think that's what people weren't doing. They weren't generating vapor in the way that's described here with this transverse heating element in the airflow passageway and then being able to basically have that go

straight into the person's mouth, because the vapor and droplet generation processes of the other devices at this time would -- would create these large hot droplets, like that Xia describes, for example.

Q The -- you know the Fang device, do you recall that one?

A Yes.

Q That has a horizontal post around which a metal filament is wrapped.

Do you recall that?

A I do recall that structure, yeah.

Q So that wouldn't have this droplet problem that you are talking about, right?

A I'd have to review that again for that issue, but I don't think so. I think it's -- it's trying -- it's trying to do something similar to this.

Q Right.

A I don't think it has the same airflow passageway, though, but that does sound kind of related.

Q So the -- you are saying the problem with a -- with the concept of -- well, an airflow passageway down the middle is very simple. Your -- your point is, if you do it a way that lets droplets into the user's mouth, that's -- you can't -- that's nonfunctional, right?

A That's right. Yes.

MR. ANSLEY: I just object. It mischaracterizes the testimony.

THE WITNESS: Yeah, I think that you've got problems with it. That's certainly one of the problems with it.

Q BY MR. DOKHANCHY: Okay. But a person of skill in the art would know that you don't have to do the droplet method of Xia; you can use a wick that brings liquid to a coil. That's not exactly innovative, right?

A Yeah, I think they would -- they would know they should try to do something different in the droplet. I think coming up with the particular structure that's claimed in '864 wasn't done before. So by the fact that it wasn't done before, that's evidence of innovation right there.

So I'm not saying that the person of ordinary skill in the art wouldn't understand the problem. I think they understand the problem, but getting to the solution is the innovation.

Q But the solution is just have a fiber that brings liquid to a coil? Is that particularly innovative in your mind?

MR. ANSLEY: Objection. Compound.

THE WITNESS: I think it's innovative in the fact that you have that plus the supporting structure for

doing that. And the idea that you can do it in the proper way so that you don't burn the person, that's innovative. Nobody was doing that before.

Q BY MR. DOKHANCHY: Okay. In the Fang device, would there be any burning of any material, any burnt taste?

A I don't have the Fang device in front of me. Maybe I should take a look at it.

Q Yeah, let's --

A You gave it to me earlier so I will pull it up over here. I don't know if you need to move it in to an exhibit or anything.

Q No, it's Exhibit 1006 to the 160 --

A Okay.

Q -- proceeding.

So I can take you to figure 2, and we can look at the spec, but I can explain it in figure 2. So in figure 2, this item, I believe it's 15, is the horizontal part that extends into the liquid storage area, which is crosshatched with X's. It flows horizontally, and that coil 16 is wrapped around the horizontal post.

Do you recall that? If not, we can go to the spec.

A That seems right. I remember that structure, yes.

Q That separates the heating element from the liquid storage medium, correct?

A Certainly to some extent, yes.

Q And there is nothing in Fang that indicates that there would be a burning of the fibrous material anywhere. In fact, I don't think fibrous material is described at all.

A Yeah, I don't recall it addressing that issue.

Q So why doesn't Fang indicate that this concept of a horizontal wick in a transverse coil being used to prevent burning taste, you know, that was known in the art?

A Well, again, I think you -- you actually said it, it doesn't say that the structure addresses the burn -- the burning taste.

We also just don't know how the air is flowing here, right. We don't understand the air inlet. We don't know if it's central or axially.

So the problem is we just don't understand how this structure is working so that a person of ordinary skill in the art would look at this and say, oh, I understand how it's working; let me combine this idea with something else.

But again, I -- I'll go back to the fact that I don't think it's -- it's saying that it's addressing the

burning.

Q Neither are the NJOY patents, as we discussed earlier; the '881 and the '864 don't say that either, right?

A That's true. Yeah.

Q Would a person looking at this structure in figure 2 recognize that that heating element doesn't burn any batting material?

A I think you said there wasn't batting material in here, right, so I don't think it burns batting material.

Q Right.

A I'll go along with that.

Q Okay. And even if there were batting material in that liquid storage compartment on either side, which again, I don't think there is, but let's say that there is, that coil isn't touching that batting material and, therefore, not creating the burning taste; is that fair?

A Yeah, I don't think it's creating the burning taste of the batting material, but this structure was also known to have a problem when all of the liquid ran out, that you would burn the wick itself. And that's why there was -- later on people invented windows to be looking in and seeing how much was left and stuff like that.

So it doesn't completely eliminate the burnt taste, but it does contribute to a reduction of the burnt taste phenomenon.

Q And that burnt heating element problem, is that addressed in the NJOY patents? Or I think you said burnt wick?

A Yeah, the burnt wick, you still have that problem.

I don't think that the -- you said the NJOY patents. I'm gonna say '864.

Q Sure, whatever you want.

A I don't think the '864 eliminates all problems of that. I think it does go a long way to eliminating the burnt taste problem in general.

Q Right. But the one that you say persists in the Fang structure, there's no indication that that doesn't persist in the '864 patent, right?

A Right. I think you could practice the '864 patent and still end up having that sub portion --

Q Yeah.

A -- of the burnt taste problem.

Q Okay. And that's not a thing that the inventors indicated they were concerned with, right?

A Yeah, I don't recall them being concerned with that.

Q And so I believe you -- well, withdrawn.

What are the benefits of a central and axial airflow passageway?

A Well, that's in my report, so we -- we can go -- or my declaration. We can go in there and -- and point it out.

But we were just talking about one where you -- by having that structure and then having the transverse heating element as well, you are reducing the direct contact of the heating element with this batting material or with this carbon -- with this cotton-soaked material. So you are definitely reducing that burnt taste phenomenon. That's certainly one. That's one we were just talking about.

Q Well, let's look at the Xia reference. Do you have that?

A Yes.

Q And if you can go to figure 2. This is one that you say doesn't have a central and axial airflow passageway, right?

A That's correct.

Q So there's no indication that this reference, the Xia reference, would suffer from a burnt taste. There's -- because there is no contact between the heating element and the batting material?

A That's right. I don't think it's gonna have the burnt taste problem that we're talking about, which is the burnt fabric.

Q Right.

A It's gonna have a different burnt taste problem if we don't do this right, which is the large droplets, right. Large hot droplets would obviously be a kind of burnt taste.

Q Why is that?

A Well, because you get hot, large droplets in your mouth, and you would taste it would be hot, and you would have the flavor of whatever the droplets have a flavor of.

Q Well, when you -- when you talked about the burnt taste, you were talking about burning fibrous material?

A That's right. So I'm saying it doesn't have that problem.

Q Okay.

A It would just have another burning problem if you didn't do it right.

Q Sure. So, but your view is that Xia does not have that problem as it is, right? It doesn't have the large droplets problem; it has a solution for that?

A That's right.

Q Right.

So what I am saying is, I asked you what the benefit of the central and axial airflow passageway is, and you said it solved some problems; but this doesn't have a central and axial airflow passageway, the Xia reference, and it also doesn't have those problems.

So my question is, why do you want a central and axial airflow passageway?

A Well, I think that you want it if you want to use the different structure. And quite frankly, this structure of emitting droplets and then heating them up and then trying to reabsorb the large one is very dicey and dangerous. So if you're gonna abandon the structure of Xia, which you probably should, you're gonna go to a different structure that vaporizes at the coil rather than emitting droplets upstream and then heating them.

Given that structure, you immediately have the concern of the burnt taste, because it would be natural to try to put the heating element right up against the fabric, which Wang did.

So in that operating procedure, the '864 patent solves the problem of that structure. But I admit that the Xia has a different structure, a droplet generating process, and it doesn't solve the problem -- it doesn't have that problem, as you just said.

Q I guess the part I'm not understanding is you are talking about the heating element burning the fibers. That seems somewhat orthogonal to the question of, is the passageway central and axial. You could have a heating element that touches the fibers or not touches the fibers. Why does -- what's the relationship between that and a central and axial airflow passageway?

A I don't exactly think the orthogonal, but I will admit that they're two separate questions. But for a number of reasons, and we just talked about one of the primary ones, you wouldn't want to set up your structure to generate a vapor where your heating element was directly touching your batting.

Q Uh-huh.

A Okay. In that case, the '864 tells you how to do it. It says essentially turn it sideways, get it separated from the batting, somehow draw the material towards the heating element, and flow right down the middle. So that's the solution it's suggesting, and it does solve or go a long way to solving the burnt taste problem.

Q But the part that solves it is separating the heating element from the fiber. It has nothing to do with the passageway. So what's the benefit of the straight passageway?

MR. ANSLEY: Objection. Lacks foundation.

THE WITNESS: Well, the -- there's some other reasons why you don't want a passageway right down the middle, is that, again, you could deliver your aerosol to your user without a lot of draw resistance. Like it would be easy to pull through there, rather than some much more complicated path. So that's another benefit of this. It allows an easy draw. It also could be easier to manufacture than something with a much more complicated airflow path.

So I'm not saying the only advantage is to getting rid of the burnt, right? I've listed other advantages in my declaration, and one of them, the easier draw, is certainly in there.

Q And that easier draw is because the air flows more easily down a straight path than a convoluted path. Is that what you are saying?

A That's true.

Q Okay.

A Now, you -- you do want some mixing. I'm not saying you don't want to mix the stuff. You want to have set it up to where the vapor is emitted into the airstream, and the airstream can mix it in and create an aerosol, which means like it coalesces in droplets.

Q Okay.

A But you want those droplets to be small, and you want them to be cooled by the time you get to the user's mouth.

Q Right.

And the notion of easier draw, again, a person of skill in the art at this time would know as a basic principle of fluid dynamics that a straight path has less resistance than a contorted path, right?

A Given all the other variables are held constant, that is true.

Q The '881 and '864 patents don't require air mixing or cooling on their claim terms, do they?

A I don't think so. I don't -- I mean, there's a lot of claims in there, but I don't recall that.

Q Okay. The '864 and '881 patents don't come out and say that the central and axial airflow passageway is innovative or beneficial in such terms, do they?

A As I sit here, I don't recall them using that terminology, that specific description.

Q All right. Why don't we break for lunch.

A Okay.

THE VIDEOGRAPHER: The time is 12:45 p.m. We're off the record.

(The deposition was at recess from 12:45 p.m. to 1:34 p.m.)

THE VIDEOGRAPHER: The time is 1:34 p.m. We're back on the record.

Q BY MR. DOKHANCHY: Welcome back, Dr. Singhose.

A Thank you.

Q During the break, did you talk to your counsel about any of the subject matter, the patents, the NJOY patents, the references, anything like that?

A No.

Q Okay. All right. Let's talk about the central and axial airflow passageway requirement of the claims. And my questions here will refer to all of the claims in the '864 and '881 patent. If you think that there's a difference, please let me know. I think the parties have been treating them the same, but feel free to let me know if you think there's a difference.

A Okay. So just do I understand, I mean, I think most of them use passage of it. Some of them use chamber. So there's that --

Q Sure.

A -- difference. Okay.

Q For the purpose of this, let's treat it the same, the chamber equals passageway.

A Okay.

Q And we can dispute if that's true or not, but let's take that as an assumption --

A Okay.
Q -- for now.
And there is one of them that refers to airflow path that we can carve out. That's claim 9 of -- I think it's the '864, but may be --
A Okay.
Q -- a different one, but just to avoid the repetitiveness of the questions.
So your view is that obstructions are permitted in a central and axial airflow passageway but only small ones; is that right?
A Yes. That's approximately right. I mean, small is kind of -- a little more clearer than that. It's approximately the same as what's disclosed in the '864, which is the heating element.
Q Okay.
A So objects of that size and effect.
Q All right. Well, let's look at the -- well, so to be clear, is it your view that anything larger than the heating element is not permitted within a central and axial airflow passageway?
A I don't think I'm that strict about it in terms of anything a little bit larger, but it should be on the same order of magnitude, the same effect, you know. It shouldn't be massively diverting the airflow path -- the

airflow to some other direction, basically.

Q Okay. Let's -- and is that -- in terms of the size of the obstacle and what's permitted and what's not, is it about the length or some other dimension?

A It would be about the same, what we say is the cross-sectional area to the -- to the -- the cross-sectional area as -- as seen by the airflow.

Q Okay.

A So you, after making yourself going down the airflow and you are hitting an obstacle, what's slowing you down or impeding you or causing you to move a little bit is the cross-sectional area --

Q Okay.

A -- of that.

Q And is it that it can't be much bigger than the heating element, or is it the heating chamber? Or what's the metric?

A I think much bigger than the heating element. That's what the -- I mean, these patents teach you that you can have that. In fact, you have to have that for this whole thing to work.

So the claims are clearly not saying you can't have anything in the way. In fact, it's expecting that you have a heating element there, but it's not expecting an object so large that the airflow is moved massively

into the radial direction or to the outside or anything like that. It's still predominantly straight down the middle.

Q Okay. Let's look at claim 1 of the '864 patent. If you look around column 17, line 39, the relevant claim language here states, "An airflow passageway in the housing, at least a portion of the airflow passageway extending centrally and axially with respect to the housing, wherein the airflow passageway extends centrally and axially from the first aperture to the second aperture."

That's the relevant language, right?

A Yes.

Q Where in there does it say small -- small obstacles are okay and large obstacles are not?

A Well, it doesn't say it in there, but it's actually in the previous limitation where it says -- when it's describing the heating element.

Q Uh-huh.

A And more specifically, it says that it's at least partially exposed to the airflow. So that's telling a person reading this, you have to have something in the airflow, and this heating element has to be in there.

Q Right. So obstacles around the size of the

heating element are permitted, right?

A Yes.

Q Where is the upper bound? Where is the part that says there can be something too big?

A Well, when you stop meeting the requirement of it being centrally and axially.

Q So it's just those words themselves?

A Yeah, I think so. I mean, at some point it gets to be so large, it diverts the airflow passage so much that no person could look at that and say, oh, that's still central and, oh, that's still flowing mostly axial.

Q Okay. Now, is there a difference between the location that the air flows and the airflow passageway itself, or are they one and the same?

A I think there's a difference there.

Q Okay. What's the difference?

A The airflow passageway would be sort of the outer boundaries, like kind of aligned with the walls of where the air could go. And then the airflow is actually where the air goes. Like the air cannot go through the coil metal.

Q Right.

A Right, that's not possible. But the coil metal is still within the passageway.

Q There's no requirement, other than claim 9 that we talked about, for the airflow to be central and axial in any particular place; is that right? All the claims say that the passageway is central and axial?

(Court reporter clarification.)

THE WITNESS: As I recall sitting here, I think most of the requirements are about the passageway. And I think there's just a couple of exceptions that we've talked about that don't use the passageway but use something else related to it, but not exactly the same.

Q BY MR. DOKHANCHY: So in claim 1, for example, there's no requirement that any particular part of the airflow be central and axial; is that right?

A Yeah, I don't think there's a claim on the airflow. Of course, the airflow has to be inside the airflow passageway.

Q Right. But what I'm saying is, you could have an airflow passageway that's central and axial within the requirements of claim 1 where the airflow in any given place may or may not be central, right?

A That's true. Specifically, for example, at around these obstacles. Running into the heating element, you, again, can't flow right through the heating element. You've got to bounce around it.

Q Okay. Do the claims put any restriction on the

size of the heating element?

A I think some of them do, where they talk -- I think some of these claims have a heating element having a maximum diameter or something like that. Some of the dependent claims I think have something like that.

Q What about claim 1 of the '864? Is there any limit on the size of that heating element?

A Not specifically stated in the claim language.

Q Is there any limit on the heating element claim 1 -- in claim 1 in terms of how much it diverts airflow away from the center?

A No, there's no specific requirement like that.

Q Do you have Exhibit 1014 with you?

A What is that?

Q That is the Fuma brief that had the images of the Ciro.

A Yes, I have -- is it JUUL Exhibit 1014?

Q Yes.

A I have that.

Q All right. Okay. So in Exhibit 1014, we were looking at -- it's marked as internal page 15. It's page 22 of 52. It's about halfway through the document.

A (Indicating)?

Q Yeah.

A Okay.

Q And so, again, you recognize this as the VUSE Ciro device?

A Yeah, a representation of part of it.

Q Yeah.

A Yeah.

Q And you know that this is the device that the judge in the Middle District of North Carolina held on summary judgment infringes the '881 patent claims; is that right?

A That's my understanding, yes.

Q And what happens in the Ciro is that air, as indicated by the red lines, enters the side, goes around the positive pin, goes through the middle hole of the positive pin, and then it hits this place that has a circle -- well, three circles in this image on -- on page 22, and at that point all of the air gets diverted away from the center.

Is that fair?

A Yeah, that's pretty much fair. I mean, there is some stagnant air right there at the intersection, probably reciprocates around and stuff like a whirlpool. But yeah, eventually the airflow has to go around the right or left side and then over the -- the next -- the next blue thing, right, is the -- is the heating element, right.

Q And, you know, if you were to look at figure 2 of the '864 patent -- and you can do it or you can visualize it -- that coil does not necessarily divert all airflow in a fully noncentral way, in contrast to the positive pin; is that fair?

A Well, again, this is -- this is just a schematic, and we're actually getting more details about the actual product on this page 15 or page 22, I guess. But remember that that schematic of figure 2 says that that heating element 222 could have a wick, and that would probably block all the airflow through the middle.

Q Right.

A So in that version of the figure 2 embodiment, yeah, I think all the air is gonna -- mostly, almost all the air is having to go around it, not through it.

Q Well, let's talk about the embodiment of figure 2, which I believe you said is covered by the claims with no wick, just a coil in the middle of the passageway.

A Yeah, there -- there are various versions of this that could be claimed.

Q So in that version, the air will flow through the coil and around the coil; is that right?

A Yeah. I mean, generally when we say coil, we mean some open space in there. So yeah, it would -- it would flow through the center, around the top, bottom,

the left and right sides.

Q So in that embodiment, not all of the air through the passageway gets fully diverted to -- well, away from the center; is that right, by the coil?

A That's true. Some just kind of flow straight through.

Q And so the positive pin in the Ciro device diverts airflow more than the coil in the embodiment of figure 2 that we were just discussing, fair?

A I think more in some sense, because it looks to me like you can't flow down through the middle of that.

Q Right.

A And so that -- in that sense of it diverting to the left and right, to the extent that apparently none go right down the middle, I would agree that's in some sense more of a diversion, if that's their criteria.

Q And so the judge found in this case that an obstacle that diverts airflow more than a coil that satisfies the claims in that embodiment of figure 2 still infringes the claims. Is that fair?

A I think you're almost asking me for a legal opinion. I'm not sure I studied this case enough to know that. But it does appear to me that the judge said this obstacle is a little bit bigger than the coil, and I'm still -- he, the judge, is still considering that as a --

a relatively small obstacle that practices these claims. That's my understanding.

Q And the judge's logic in that case was that you need to distinguish the airflow from the structural component that is the airflow passageway, right?

A Again, I believe that was -- I believe that was part of his reasoning.

Q In fact, that was the core of his reasoning, wasn't it?

MR. ANSLEY: I just object. It calls for a legal conclusion.

THE WITNESS: Again, I don't -- I don't know if I can say it's the core. I know that's a component of his reasoning.

Q BY MR. DOKHANCHY: All right. Well, let's look at the order. This is Exhibit 1015 to the 160 matter. Okay. And this is the judge's order regarding summary judgment of infringement in the Middle District of North Carolina.

Do you see that, Dr. Singhose?

A Yes, it's -- I clearly see it's a memorandum opinion and order, and it does appear to be in regards to Fuma's motion for summary judgment --

Q Okay.

A -- for direct infringement.

Q So in your -- let's talk about the -- your view as -- as to the Xia reference. You say that the liquid storage chamber is not an obstacle that is permitted in a central and airflow -- excuse me -- central and axial airflow passageway. Instead, it's a structural component that defines the passageway. Is that right?

A Yes.

Q And if I'm looking at an obstacle, how do I know if it's just an obstacle or if it's a structural component that defines the airflow passageway?

A Well, I think if you look at -- both of those would be objects. Let's call them objects so they're not using the claim language.

Both of those are objects that are in the device. One of those makes a substantial change to the airflow such that the airflow is, you know, no longer central or it would not be viewed as central and axial.

And one of those, a person of ordinary skill in the art would say, yeah, that's an obstacle where basically the airflow is just tumbling around it, and it's sort of a temporary effect that's just, you know, causing some jumbling of the air or some mixing or some heating, which is actually required by these things.

So I think that's the difference is, one is -- is just a sort of a temporary effect that actually is

something that you need, that is the tumbling or the heating. Another one is a substantial change to the airflow path that's -- that's diverting it, and if you looked at it, you are like, that's not central anymore or it's not radial -- I mean, it's not axial anymore.

Q Okay. So it's just sort of a judgment call that you have to look at?

A Yeah, I think it is a judgment call. At some point you have to rely on the person of ordinary skill in the art to -- to make that judgment.

Q Okay.

A But I think they would have guidance on how to do that judgment.

Q So if you can look at page 14 of Exhibit 1015, I'll read some of the judge's rationale here.

A Okay.

Q The judge said, "While the physical structure of the Ciro is not in dispute, RJR contends that the presence of certain obstructions within the Ciro's airflow passageway prevent the air from proceeding in a straight line from one end to the other.

"RJR conflates the airflow's path with the airflow passageway. RJR is correct that the air itself does not flow in a straight path through the Ciro, as it must travel around ... certain obstacles housed within

the passageway. These obstacles include a 'positive pin,' a 'silicon base,' and a 'heating element,' which both alter the air's path as it travels from the base of the airflow passageway to the opposite end. But the Court's construction ... dealt only with the structure of the airflow passageway - not with the airflow's path within that interior passageway."

Do you see that?

A Yes, I do.

Q Nothing in that part of the judge's order said if the air gets diverted more than X amount, then I do consider it no longer a central and axial airflow passageway.

MR. ANSLEY: Objection.

Q BY MR. DOKHANCHY: Correct?

MR. ANSLEY: It calls for a legal conclusion.

THE WITNESS: Yes, there's nothing in that paragraph that says X percent.

Q BY MR. DOKHANCHY: Right.

The distinction that the judge drew was that the path is the path, and the structural component is the structural component. Fair?

MR. ANSLEY: Objection. Vague. Legal conclusion.

THE WITNESS: I actually don't understand that

question.

Q BY MR. DOKHANCHY: Well, basically he's saying, I don't care how the air flows. As long as it has a structural path that's straight, regardless of obstacles, it's a straight airflow passageway.

Isn't that what he's saying?

MR. ANSLEY: The same objection.

THE WITNESS: I don't think he's saying he doesn't care. I don't see that terminology in there. But he is definitely saying that the passageway should be the focus of the analysis rather than the actual path of any individual air molecule.

Q BY MR. DOKHANCHY: All right. And so I think you agree -- well, withdrawn.

The liquid storage medium 12 in the Xia reference, that sits in the middle of the cartridge or what we are calling the cartridge, right?

A Yes, it is in the middle of the cartridge, yeah.

Q Okay.

A It's -- it's actually the part that's central to the cartridge.

Q Right. And so it's purely the size of the liquid storage medium 12 that you think causes it to be a passageway definition and not just a mere obstacle that

the judge said is permitted; is that right?

A It's predominantly the size. I mean, it's just so much bigger, but it's not -- it's not an obstacle also that you would need to perform the functions. Like, you have to have the heating element. You also might have to have some other structure that causes the tumbling and the mixing. It's not doing any required function like that. It's just a huge structure in the way that's causing the substantial change in the airflow such that it really is defining the airflow passageway.

Q And you said it's predominantly the size. Is there anything else besides the size of the tank that you think makes it a passageway definition and not a mere obstacle that the judge says in this case is fine?

A Right, that's what I tried to answer the first part of the question. It's not performing a function of an -- of an obstacle that is required to form this. We -- we have to have the heating element in there. So if the heating element was huge, I think it would still be considered acceptable to be in the airflow passageway because it's -- you have to have that.

So I don't think it's merely the size. It is really large, but also it's -- it's not one of the features placed by these claims within the airflow passageway as in the heating element.

Q Help me understand that. So whether it performs a function that you think is necessary is part of the definition of what an airflow passageway is?

A You said -- your question really was, is that the only reason? And I'm saying it's not the only reason. The sheer size of it is not the only reason, because we could also have a very large heating element.

Q Okay.

A And even if the heating element got really, really large, I would still think that that wouldn't cause a change to the airflow passageway.

So there is some small part of my analysis that is also looking at it and saying it's very large, but also it's not mentioned in the claims as an object that should be in the airflow. As the heating element is mentioned, the heating element is actually required to be in the airflow.

Q Okay. But the liquid storage medium does perform a function in this device, right, in the Xia device?

A Yes, it does.

Q You are just saying it doesn't need to be where it is?

A I'm not sure I'm saying that, but it is creating a function. That function is to hold liquid.

If I go to the claims, the device that holds the liquid is not claimed as being in the airflow passageway.

Quite frankly, it also performs the function of diverting the airflow out to the outer edges so that it can be cooled, and that's also not a claimed feature. So I'm seeing it perform functions, or I'm understanding that it's performing functions that aren't required to be within the airflow passageway.

Q I think you said earlier that diverting the air to the edges to cool it is beneficial; is that right?

A Yes, that is generally.

Q Okay. So it's actually better that it's in the center of the passageway, in your view, to cool -- perform that cooling function?

A I think for this particular structure, certainly we are emitting droplets, and those droplets are getting heated to very hot and large sizes, you need things blocking those from the user's mouth. And I think that that solution holding chamber is helping that by diverting the flow out and around, causing vortexes that allow you to reabsorb the large ones, causing more cooling because you are going on the edge.

So yeah, I think it's -- I think it's a good feature for this particular operating mechanism.

Q Okay. Can you turn to paragraph 496 of your

declaration in the 160 matter.

All right. You've got an image here on page 261 of what's called the VUSE Solo G1.

Do you see that?

A The G1?

Q Yeah.

A Oh, yes. Okay.

Q Does that have a central and axial airflow passageway?

A Yes, it does.

Q And so what about this big obstacle in the middle? Why doesn't that prevent the passageway from being central and axial?

MR. ANSLEY: Objection. Vague.

THE WITNESS: Well, when I look at this diagram, it looks like it has a very -- it may be a large obstacle in terms of the length, but as I said, what's important is the cross section --

Q BY MR. DOKHANCHY: Uh-huh.

A -- whole area, the area that's facing the airflow path. So if we look down the axial of this and we see that, I believe that's the circuit board, if I recall.

Q That's right.

A It's actually not going to be very large in

that point of view. Its cross section is relatively small. Its cross section looks to be roughly the same as the heater wick assembly later down. So they are roughly the same size in terms of their cross-sectional areas.

Q There is nothing in the claims of the asserted patents that require a PC board in the middle of the airflow passageway, correct?

A No, I don't think so.

Q And so when you said earlier that one of the factors is size and the other is -- is this item needed in the airflow passageway, this at least fails the second test; is that right?

A Yeah, I -- I think you don't have to have this in here, but it -- it's so small, and the size is roughly the same as the -- the heater wick combination. I think that this, again, is not defining a new airflow path. It's just kind of a smaller obstruction within it.

Q Okay. And so according to your test, you have one factor kind of that doesn't -- how do I -- how do I ask this? Withdrawn.

According to the two-prong test that you just laid out, this fails one side -- one prong of the test because it doesn't need to be there. The other prong is how much does it divert the air.

So is one of those prongs more important than

the other?
A Yes.
Q Okay.
A The size one is really the dominant --
Q Okay.
A -- thing you should be looking at.
Q Right. And that view doesn't come from anything the judge said in this case; is that right?
A My view is primarily from a person of ordinary skill in the art, but I did read the judge's order, and I agree with it, in that small obstacles, obstacles about the size of the heating element, should not be defining a new airflow passageway. They should just be considered as obstacles within it.
So that is the dominant criteria I'm looking at.
Q So are you aware of anywhere the judge said that small obstacles the size of the heating element are okay because they don't divert the airflow very much?
A I'm not sure of the second part of that, but I think he basically did say small obstacles should -- should not be, you know, redefining the airflow passageway.
Q So I want to compare a -- a statement in your report to the statement that I think you were drawing

from, and so if you go to paragraph 100 of your declaration.

MR. ANSLEY: Did you say 100?

MR. DOKHANCHY: Yes.

THE WITNESS: Okay.

Q BY MR. DOKHANCHY: You say here that, "It is my opinion that the preliminary construction should be clarified to encompass obstacles within the airflow passageway that do not alter the direction of the airflow any more than the heating elements."

Do you see that?

A Yes, I do.

Q And is that the statement that you think mirrors what the judge said about obstacle size?

A Yes.

Q Okay. So if you look at page 16 of Exhibit 1015, we saw at some length -- and there's more that we can read -- that the judge's primary concern was differentiating the passageway from the airflow direction.

A Okay, I'm missing -- I'm in the wrong document. Page 16 of the judge's? Okay, sorry, 16 of the judge's order on summary judgment?

Q Yes.

A Okay. I'm there.

Q We discussed earlier that his rationale, as we read, was his view of the defense that RJR raised, which was that these obstacles define the passageway, was incorrect because they only divert the airflow; therefore, they don't define the passageway.

Do you recall --

A Yeah. It's approximately what he said, yes.

Q And there's a -- there's a difference between what he said here and what you wrote that I want to ask you about.

You wrote, "Obstacles that do not alter the direction of the airflow any more than the heating element are okay." And he wrote, "In addition to a heating element, the Ciro has a positive pin and a silicon base that similarly obstruct airflow. But these obstructions do not alter the direction of the airflow passageway any more than the heating element." You wrote, "It's in the scope of the claims if it doesn't obstruct the airflow any more than the heating element."

And do you see the difference?

A Yes, I do see the difference, yeah.

Q So where are you getting the notion that it's about how much the airflow gets diverted, when his point was that it's fine to obstruct airflow as long as you don't alter the direction of the passageway?

A Again, I'm -- I'm not claiming that I restated the judge's opinion. I took it into account, and I think there's an element there that's correct. But he's not a person of ordinary skill in the art, so I'm adding to that my understanding, and my understanding is what I've expressed in there, where I think that -- I'm going basically beyond what he did a little bit.

Q Okay.

A And I'm envisioning more options than I think he envisioned.

Q Okay.

A And so I'm saying what he said was fine, but I think we should clarify that. And if you have these obstacles, and they are so large that they are really defining a new airflow passageway, then I think that's how we should treat it.

Q Okay. The -- and again, you don't view any limit on the size of a heating element or a wick that would cause -- let me ask a better question. That was terrible.

In your view, there's no wick or heating element large enough to define the passageway such that it is noncentral and nonaxial simply due to the size of the heating element and the wick?

A I'm not sure I did a full investigation of that

issue. I think that what one would commonly expect in terms of the size and structure of the heating element wick, that would be true. Whether you could invent some really weird-shaped and large wick and heating element combination to try to get around this patent, I'd have to see that.

Q Well, let's say that you got a heating element and wick the size of the liquid storage medium 12 in the Xia reference. Does that cause the airflow passageway not to be central and axial?

A I mean, I think at that scale, I'd probably say it is redefining the passageway. That's just a really huge obstacle. I just can't also see how that's functioning in a product. I think you would push that heating element wick to such a large extreme that you wouldn't have a functioning project -- product anymore. Basically, you would get really hot liquid coming out of the person's mouth if you were heating it over that long range and so close to the mouth.

Q Well, to be clear, I wasn't saying it's located where the liquid storage medium is. I'm saying it's the size of it. And further, to clarify, I just mean the width, the amount that it diverts the airflow --

A Okay.

Q -- which is your key consideration.

A Yeah, I think if it gets that large, I would -- I would -- I'd have to say it's actually defining the airflow passageway.

I mean, this actually reminds me of Wang. So if we get to the point of Wang, yeah, I think that that heater and the fiber in Wang is in fact redefining the passageway to go around the outer edges of it.

Q And so if the wick spans the passageway, and the coil is some substantial portion akin to the liquid storage medium 12 in terms of how much it diverts the airflow, that would be outside of the scope of the claims?

A As I understand your question, I would say yes.

Q Okay. And that's even though it's performing the function that it needs to perform in the claims by being in the middle of the airflow passageway?

MR. ANSLEY: Objection. Vague.

THE WITNESS: Yeah, I mean, one of the requirements is the heating element has to be at least partially in the airflow passageway, and I think it is meeting that function, but you're describing to me, just, I think, something very different than was envisioned by the '864 patentors and the claims constructed, and I think you are actually describing almost Wang to me, because Wang is -- it is this big structure where the

storage, the liquid storage is the entire segment, and there is one heating element in the middle.

Now, I know you are suggesting that maybe it's around the outside, but what you are describing to me is something that's fundamentally creating a new passageway. It's not like a minor interruption --

Q BY MR. DOKHANCHY: Okay.

A -- of the flow.

Q And so you don't view it as relevant that it's sitting in the middle as opposed to being on the side, for example, of the passageway?

A I think sitting in the middle is important because it's -- it's blocking the middle. You know, you're impeding the ability of this to be central.

Q Got it.

So if you had an obstacle that was totally on the side, say it's not symmetrical, there's just an obstacle on the side of a cylindrical passageway, does that make the passageway noncentral and axial even though the air could still flow down the middle?

MR. ANSLEY: Objection. Vague.

THE WITNESS: I think I understand what you are saying. You are suggesting that if I'm looking at the cross section, it's not symmetrical. There's just an obstacle on one side?

Q BY MR. DOKHANCHY: Yeah.

A I think if that obstacle was big enough where it extended out to the center, and so the air couldn't really flow in the center anymore, I would say that is not practicing the claims. You essentially have a noncentral passageway.

Q What if the air did still flow down the center, the obstacle wasn't big enough to reach the center of the passageway?

A I think it's probably the critical question. I think if the airflow is still going down the center, you are probably practicing this.

Q Okay. Can you go to paragraph 189 of your report, please -- declaration, I mean.

A Okay.

Q If you go to page 111, you are drawing red arrows and blue arrows for what you're saying is the airflow in Xia; is that right?

A Yes, that's correct.

Q What is it that causes -- if you are going left to right, what is it that causes that first divergence away from the center of the airflow?

A What causes the first divergence is the -- is there's a wall there. You can kind of see the wall in a light color, but you can also see the dark wall of the

liquid guiding mechanism.

So given those are walls, the air can't flow through there, and it can't go into the liquid storage, which is that big white area. So the air has no choice but to go either left or right and go along the outside edge of this device.

Q Okay. Go up to paragraph 127, and it is on page 68.

A Okay.

Q And you say -- so you're addressing Dr. Sturges's propose -- proposed modifications to Xia; is that right?

A Yes.

Q And you say, "Therefore, any modifications -- modifications that remove the vibrating diaphragm 7 or move it out of the airflow path would render Xia inoperable because the heater would not turn on," right?

A Yes.

Q So why couldn't you, as Dr. Sturges proposes, use a traditional suction detection diaphragm?

MR. ANSLEY: Objection. Lacks foundation.

THE WITNESS: Well, I think that is a suction detection diaphragm in some sense. It's --

Q BY MR. DOKHANCHY: It's a vibration detection diaphragm.

A Yeah, which is vibrating because of suction.
Q Yeah.
A So that is -- I don't quite understand your question because that's what it is.
Q Well, let's talk about the kind of more traditional one where there's a diaphragm, and when the user sucks on one end, it's -- the diaphragm senses the air pressure as in, for example, the Wang reference.
Do you -- do you understand what I am saying?
A Okay. I mean, so yeah, there are other kinds of pressure sensors, and one could be a flexible diaphragm that has some kind of resistive element in it, and as you drop the pressure on one side, it flexes out --
Q Right.
A -- and it detects the change in the resistance and it's flexed out, yeah.
Q Right. So I just want to ask about this -- the statement, because you said, "Any modification that removes the vibrating diaphragm or moves it out of the airflow path would render Xia inoperable."
You don't disagree that there are some modifications removing the diaphragm 7, which are those flaps, that would still make Xia operable, right?
A I guess what I'm -- I'm trying to understand

your question, but I'm again referring to here is the proposes -- the proposals by Dr. Sturges, and he says that we can remove these. But this is a vibrating diaphragm, and the patent Xia tells us that it uses a vibrating signal to find out -- to determine whether or not there is suction going on.

So this whole system, the whole integrated circuit and the algorithm on there, is looking for a certain kind of vibration signature.

Q Uh-huh.

A And it can't just be anything. It can't be like if I dropped it, if you just drop the device, that thing would vibrate.

Q Right.

A And so the algorithm knows, I'm not gonna -- I'm not gonna trigger just because you set me down. So they have trained or figured out what this vibration signal looks like when somebody inhales, and that's how the whole system is set up. It uses that, and it also uses a microphone. So if it no longer has that signal, it's not gonna work.

Q It's not gonna work if you don't replace it with anything?

A That's true. It's not gonna work if you don't replace it, but even if you try to replace it with

something, that something has to be giving you essentially the same kind of vibrating signal. And so that's why your popping-out diaphragm generally wouldn't work because it just pops out, and it's a constant change in resistance rather than a vibration, and so you couldn't just put that kind of sensor in there. The algorithm would -- would say, I don't -- I don't know what that is. That doesn't look like inhalation to me.

Q Where are you getting the notion that Xia describes an algorithm that determines certain kinds of vibrations?

A That's in the -- that's -- the circuit diagram for that is actually in figure 6, and it actually says in the text -- and I'm not gonna be able to quote it exactly -- but it says that those signals are converted to a vibrating signal. And those two signals, the microphone and the vibrating diaphragm signal, are used to turn on the heater.

Q Right. The vibrating diaphragms flap. That vibration is sensed by the microphone. It sends an electrical signal that turns on the heater, right?

A Yeah, those two signals, while being related, would be different, and a person of ordinary skill in the art would know that you could use those two different signals to differentiate purposeful inhalation from, say,

dropping it or, say, flying in an airplane where the pressure would change but it wouldn't change in the same way.

That's why these two signals are really important, is they're two different kind of signals, and using that information in that circuit diagram, it can determine whether or not that's a purposeful inhalation or just some other kind of vibration or pressure differential.

Q Right. But a person of skill in the art would know how to replace that vibrating diaphragm and signaling mechanism with a -- I'll call it simpler suction detection mechanism. That would be within the skill set of a person with skill in the art, wouldn't you say?

A Yeah, I'm not totally comfortable with the simpler thing that you said, but a different one. I would agree that a person of ordinary skill in the art would have the ability to conduct an investigation, maybe a very challenging investigation, something like a master's thesis investigation about how to find a new kind of sensor, put it in a new place, look at a new kind of signal, combine that with the microphone that's already there, and come up with a new algorithm. But that wouldn't be straightforward.

That would be, in my opinion, an undue burden or undue experimentation to get that new version to work. Additionally, quite frankly, Dr. Sturges just didn't give me a hint about how I should do that.

Q Well, what's so complicated about it? In the Wang device, it has a sensor on the battery side that senses suction, and then it turns on the heater. Why can't it be that simple?

A Well, it's not Wang, so it's -- it's got a very different operating principle.

Q Okay.

A And I am not sure of all the different ways that you could change it. Again, I'm responding to what Dr. Sturges said, but what he said is not a simple change, and I think that it would require undue experimentation. I just don't know why you would do it because it already functions in this way.

And again, given no explanation about how I would do this, sitting here, I don't exactly know how I would do it. I think I would do a pretty thorough investigation to try to redesign this with new kinds of sensors in new locations.

Q You agree it would be a simplifying change to not have the vibrating flaps and instead just directly sense suction, don't you think?

A I don't understand that, because that is directly sensing suction.

Q No, it's indirectly sensing suction. Suction causes the flaps to vibrate. That's not --

A That's right.

Q That's not sensing suction. That's sensing something caused by suction. So what I'm talking about is you suck, and the air pressure propagates to a diaphragm. That's directly sensing suction.

In Xia, suction causes the flaps to vibrate, and the vibration is -- is detected. It's an intermediate step.

Do you see what I am saying?

A No, I don't, because they are actually essentially the same phenomenon, where a low pressure on one side of a membrane causes that membrane to move.

Q Uh-huh.

A And I think you're envisioning a case where it just moves one time over and just pops out due to low pressure, and so the signal coming off of the resistance in there would just be something like a ramp or a step change from one value to another, and so in some sense that's easier. But if I have these flaps that are going back and forth, I'm seeing the same kind of signal, a change in resistance, but it's going up and down and up

and down and up and down, so it actually has the same information. And the fact that it went up, that means that I have less pressure. But the frequencies at which it would flap actually gives me additional information about like how much suction.

So that actually gives me more information, and because of that more information, it might actually be easier for me to detect purposeful suction, and like I said, an accidental or incidental change in the suction.

So I don't view it as simpler. In fact, when I have sensors, I think a sensor that gives me more information is sometimes easier to use than a sensor that gives me less information.

Q Yeah, I'm not asking about what's easier to use. You're injecting these notions of need to detect accidental versus real.

For example, Wang doesn't talk about any of that, right? Wang has a simple suction detect -- detection diaphragm that when a user sucks on the device, it detects that and sends an electrical signal to the -- to the heating element, right?

A I thought we were talking about Xia.

Q I am talking about a change that you could make to Xia, to use a simpler device as in Wang.

A Okay.

Q So my point is, if you were to dispense with the flaps and dispense with the complicated algorithm, you could instead simply have a diaphragm that detects suction and turns on the heater when that happens, couldn't you?

A Yeah, I think you could do that, and you would probably have a lot of false positives. It would probably turn on when you didn't want it to or it might require an inordinate amount of suction, right? It's a -- it doesn't perform as well detecting suction.

Whenever you have two sensors working together to detect a phenomenon, you're certain to get a better performance than if you just had one sensor. This is called redundancy, and we just know that's a really good idea.

Q Have you ever seen a real-life product in the e-cigarette space that uses the flaps as in Xia to create vibration from suction and then detect that?

A I can't recall examining a real -- like a commercial product that does that. I don't -- I don't recall doing that.

Q Okay. So no company or product that you are aware of has adopted the Xia style suction detection mechanism, correct?

A Not that exact structure, but there's been a

lot of work that's gone into properly detecting suction. It's a very important phenomenon, and that is Xia's solution to it.

Q But nothing with the flaps that are numbered 7 or anything like that in any of the products that you've seen on the -- in the market in the e-cigarette space; is that fair?

A I mean, I've seen a lot -- so I'm going through my mind and thinking of all the different kinds of pressure sensors. It's a pressure sensor. I just can't remember one that's exactly an annular flap like that, but there are certainly related sensors which are trying to do the same thing, which is detect these pressures and distinguish them from accidental or purposeful fluid flows.

Q Okay. So in that vein, is -- withdrawn.

Can manufacturing and selling more inexpensive products be advantageous to a retailer or a manufacturer?

A Yes, under certain conditions, certainly.

Q And could a manufacturer decide to use a simpler design even if there are certain drawbacks to its functionality?

A Yes.

Q And could a manufacturer decide to use a cheaper design, a design that's cheaper to manufacture,

even if it performs worse?

A Yes. That sounds like you are describing Microsoft.

MR. ANSLEY: Shots fired.

MR. DOKHANCHY: Yeah, wow.

Q BY MR. DOKHANCHY: And do customers sometimes prefer cheaper products even if they provide a worse user experience?

MR. ANSLEY: Objection. It calls for speculation.

THE WITNESS: I'm not sure they would prefer it, but they would definitely buy it. You know, they have to balance that trade-off to where -- their money versus what they're getting out of it.

So I don't know if they prefer it in terms -- they don't prefer the performance because you just defined it's worse, but they prefer making that choice with their money.

Q BY MR. DOKHANCHY: Yeah, I guess I'm thinking of voting with your wallet.

A That's right.

Q I guess I'll ask it a little more clearly then. Do customers sometimes opt to purchase cheaper, worse performing products?

MR. ANSLEY: The same objection.

THE WITNESS: Yes, I think they do.

Q BY MR. DOKHANCHY: And are you aware of the proliferation of cheap, disposable e-cigarettes in the marketplace today?

A I'm generally aware that there's that option.

Q Do you have a view whether they perform equally well to the more flagship products from NJOY and JUUL?

A I haven't performed that kind of analysis.

Q Okay. Are you aware that several of those -- withdrawn.

Are you aware that it's generally seen as a problem in those devices that they may leak or liquid may get into a user's mouth?

A I don't -- I don't know the specific problems associated with those, like, discount versions.

Q Okay. Some of the dependent claims recite a larger second aperture than the first aperture.

Do you recall that?

A Yes.

Q If you were to start with an e-cigarette with apertures of the same size, first aperture and second aperture of the same size, and you have a given airflow rate for a given suction force, if you then increase the size of the second aperture, you'll get greater airflow through the passageway; is that right?

A Given all other things stay the same, yeah, you are essentially decreasing the flow resistance by opening up the aperture size.

Q And a person of skill in the art at the time would know that as a matter of fluid dynamics?

A Yes.

Q Why is it not an obvious change to -- or is it an obvious change to a cartridge that has same size apertures, to increase a second aperture to get better airflow?

A I mean, I think you -- the thing is, is that you would get the same effect, that is, a decrease in resistance if you opened up the first aperture larger, right, or you could open up the internal passageway a little bit. So there's literally an infinite number of ways to decrease the flow resistance.

So a person of ordinary skill in the art would have to search through all those and try to figure out what the best or the optimal for them to do. So I don't think it's obvious. I think you'd have to do some tests to see, given the structure I have, and I do want to decrease the resistance, what's the best way to do this?

One drawback with making the second or the output aperture larger is that you are going to get more contamination coming in through the mouthpiece. So

there's just a bunch of engineering trade-offs there, and it doesn't jump out to me as there's one thing that's obvious to do.

Q Certainly one of the first things you would think of is, if you want less resistance is, bigger apertures and/or bigger passageways, wouldn't you say?

A Yeah, but I wouldn't choose the output aperture to be larger because I would be concerned with contamination.

Q Okay.

A If in fact I made my prototype and it had too much draw resistance and I'm like, I want to make this a little easier, which isn't always the case; sometimes you actually wanna make it harder to draw.

Q Right.

A I would first say, well, let me keep the output aperture the same size and let me go inside and change the internal pathways a little bit more, so I keep that protection against debris coming in through the breathing hole.

Q But if the apertures are the same size, don't you have a sort of pinch point problem where if the middle is bigger, you are not gonna be getting much better airflow, are you?

A Having looked at the internals of these

devices, I think that often the pinch points are inside. Pinch points being the parts that contribute most to the draw resistance, going around corners --

Q Right.

A -- and going through fibers and around heating elements. That's actually what is probably creating a larger draw resistance than just the input and output apertures.

Q That wouldn't be true, though, if you have a central and axial airflow passageway, right?

A I think it would be -- I think the percentage of the resistance in that sign might come more from the first and second apertures.

Q Okay. Let's take a ten-minute break.

THE VIDEOGRAPHER: The time is 2:33 p.m. We're off the record.

(The deposition was at recess from 2:33 p.m. to 2:46 p.m.)

THE VIDEOGRAPHER: The time is 2:46 p.m. We're back on the record.

MR. DOKHANCHY: All right. I pass the witness for any redirect.

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EXAMINATION

BY MR. ANSLEY:

Q Dr. Singhose, I have a few questions. Just bear with me while I get a little organized here.

Okay. So Dr. Singhose, thank you for your time today so far.

Have you -- do you recall being asked questions about JUUL Exhibit 1004, which is the Xia reference?

A Yes, I do.

Q Okay. And do you recall being asked questions about your views on why the housing for the atomizer is different from the housing for the liquid storage in Xia's device?

A Yes, I do.

Q I want to ask you a few questions and try to understand and clarify your view on that.

Do you also recall testifying that the claims require a cartridge that has a housing? And if you'd like to look at the '864 patent, please feel free to do so.

A Yes, the cartridge does comprise a housing.

Q Okay. And so the claims require a cartridge that has a housing; is that correct?

MR. DOKHANCHY: Objection. Leading.

THE WITNESS: Yes. I mean, the preamble says,

a cartridge configured, blah, blah, blah, the cartridge comprising a housing.

Q BY MR. ANSLEY: Okay. All right. So in your opinion, in going back to Xia and focusing your attention to Xia's generator, how many cartridges are there in Xia's generator?

A Well, it has two cartridges.

Q Okay.

A A cartridge for the heater element, the heater portion, and another cartridge for the e-liquid solution.

Q And does the cartridge for the heater portion have a housing that is required -- or a housing?

Let me just stop there. Let me reask that.

Does the cartridge for the heater portion have a housing?

A Yes, it does.

Q And what is that housing?

A That housing -- what is shown in figure 4 is dark lines, and I believe in the text it's described as a -- as a metallic, like a cylinder or a metallic housing that goes around that.

Q And can I direct your attention to paragraph 112 of your report. It's on page 57. There's a figure there, and could you please explain what you are identifying in that figure?

A The figure there is -- well, it's the figure from this patent kind of exploded and broken into three parts. And on the left side is the power source part that has the matter in it, and then the middle part is the atomizer cartridge, and I've labeled it reusable atomizer. I relabeled it reusable because it does need to be changed -- or it doesn't need to be changed very often, compared to the right side, which is the liquid storage cartridge. That's the part that has to be changed every time the e-liquid is depleted.

Q Okay. And looking at -- focusing your attention on the reusable atomizer -- and you can also look at Xia. I want to ask about component label 8, which is the liquid blocking plate.

A Yes.

Q Okay. Now, is component 8, the liquid blocking plate, as you have depicted on page 57 of your report, is that the leftmost structure in which you've identified is the reusable atomizer cartridge?

A No, it's not.

Q What is the leftmost structure?

A The leftmost structure is the connector with the screw threads on it.

Q Okay. And is component 8, is that the first end of the reusable atomizer that you've identified on

page 57 of your report?

A No, it's not.

Q Okay. And so I may have asked this, but the reusable atomizer housing, what is -- I'm sorry, the reusable atomizer cartridge, with respect to that, what is the housing of that component?

A Well, the housing would be the outer structure that contains the internal components that's shown there.

Q In looking at the second cartridge you have identified, the liquid storage cartridge, does it have its own housing?

A Yes, it does.

Q And so how does -- is there -- let me ask it this way. Is there -- actually, no, I don't need to ask that.

Do you recall also discussing today how Fang can reduce the likelihood of burnt taste?

A Yes, I do.

Q Okay. And if you could turn to Fang, which is Exhibit 1006, I'd like to direct your attention to figure 1.

A Okay.

Q And do you recall discussing the heating element that is presented there in Fang in connection with your opinions on how Fang can reduce burnt taste?

A Yes.

Q Okay. Is Fang's heating element located in the cartridge portion of Fang's device? And if you need to refer to your report, please do.

A No, that's in the -- that's in the -- sort of the bottom part with the battery and everything else, so that the -- the cartridge part is the part above that that has the e-liquid in it.

Q And according to the claimed inventions of the '864 and '881 patents, where is the transverse heating element located, in the cartridge or another portion of the e-cigarette?

A Well, for the '864 claims, that transverse heating element needs to be in the cartridge, not down in the other body part of the device.

Q And looking at Fang again, do you see -- well, actually -- I'll stop there.

So I will pass the witness.

FURTHER EXAMINATION

BY MR. DOKHANCHY:

Q We can stay on paragraph 112. The thing that you've labeled Reusable Atomizer, that figure, that doesn't exist like that in -- in the Xia reference, right?

MR. ANSLEY: Objection. Vague.

THE WITNESS: Well, it does exist, but it doesn't -- I've pulled it apart to make it clear. You're right, that's part of the other figure.

Q BY MR. DOKHANCHY: Yeah, what I'm saying is, the thing that you've depicted in the red-dashed box that's labeled, according to you, Reusable Atomizer, that figure does not appear like that in any of the figures of Xia, right?

A Well, I -- I think it does appear in figure 1 or 2, but I pulled it out. I've pulled it apart there.

Q Yeah, you manipulated the image to separate two things that are shown as one unit in figure 2, and that's the generator, right?

MR. ANSLEY: Object. Object to vague.

THE WITNESS: That's right. I took -- I think it actually was figure 2. You could do it from figure 1, but I think I used figure 2, and I did pull the generator apart to make the two components more obvious.

Q BY MR. DOKHANCHY: Okay. There's nowhere in Xia that says there's a reusable atomizer portion and a liquid storage portion, correct?

A I don't remember that exact terminology. I don't think it describes it in that way.

Q Okay. Xia never says the atomizer is reusable,

correct?

A Again, I don't remember it using those exact words.

Q How about any similar words to convey the same concept?

A Well, I think the specification as a whole, when you read it, you realize that the liquid storage cartridge is pulled on and off and replaced. And I think one understands that the atomizer stays there and is not replaced every time.

Q Where does Xia say that?

A Well, I'm not sure it -- again, I'm not sure it says that. That's why I said when you read the specification, you look at the figures. For example, figure 5 is clearly teaching that that part can just be pulled off and replaced, and you would push it back into place.

Q By the same logic, figure 4 shows that that part can be pulled off from figure 3. So why are you combining part of figure 3 and part of figure 4 and not including figure 5?

A Well, I think understanding how this operates, you would understand -- well, if you understand how these vaporizers work, you understand that the liquid is used up faster than the functionality of the -- the heater.

So you would know that you make a product, you would need to pop off and push back on the liquid storage, but you wouldn't need to replace the heater that often. You could because it's screwed on, right. It does show like a more permanent connection on that side, which is you are screwing it on and you're -- that indicates that you are keeping it on it for longer. And the other cartridge is simply like a snap foot -- a snap fit or a press fit connection.

Q So why isn't that the case in modern cartomizers, that the heating element doesn't go bad before the liquid runs out, right?

A I think when you throw away these cartridges, like the JUUL cartridge, you probably could have used the heater for quite a bit longer, but they've made a very cheap, inexpensive heating element in there, and they've made the calculations, and they may be able to make it cheap enough so it's economical to throw it away every time, but I'm pretty sure you could use that longer.

Q What indication do you have in Xia that the coil is more expensive than the JUUL heating element?

A Well, the structure that goes along with it is essentially more complicated. There's the mechanism that transfers the liquid, the liquid transfer mechanism, and then you have the secondary liquid transfer mechanism,

and you've got the liquid blocking wall. You've got a very different structure that's trying to be set up to emit these droplets into the airflow. That's a more complicated and difficult thing to achieve than the other route that we were just talking about.

Q I believe you testified to this before, but that -- that liquid storage chamber 12, that's open on the left end, right?

A Yeah. When you first get these cartridges, it's open so you can slide it on or snap it on to the -- the atomizer cartridge that's already there attached with the screw connector.

Q Okay. And -- and no part of Xia says, keep the atomizer, take off that cartridge and replace it, the cartridge that you've labeled the liquid storage cartridge, right?

A Yeah, I don't think it says that in words. I think it explains that to me in that structure. Again, the fact that we screw on the one, which is like a much more permanent connection and -- that the cartridge for the heating element, just to make it clear, you screw that on, and the other one you just slide on and off. That tells a person of ordinary skill in the art, oh, this one is replaced more frequently and more easily than the one that I have to screw on.

Q The only attachment and detachment Xia ever describes a user doing is that connector A5 can be connected by the user to the other connection on the power source B6, correct?

A That I don't know. But if you say that's the only textual description, I would agree with -- I would -- I would say that sounds reasonable, that's the only textual description of it.

Q And so the only description of two components being attached or detached are, as seen in figure 2, Xia says that a user can connect the generator to the controller by screwing it and likewise replace the generator by unscrewing it, correct?

A That I don't know, but that could very well be the only textual description of it. But if you're looking at this and you see figure 5, and you see the shape of that cartridge and how you have a flat end, and you see it in figure 2, you can see that it's been pressed in, and that flat edge has been deformed so that the -- the liquid carrying material 12 is abutting number 11, so it can be transferred on. You know that's being attached on and pulled off, by looking at those figures. You understand how it works.

Q And who's to say that's not attached on by the manufacturer as opposed to the user?

A I don't know. I mean, it just seems kind of weird that you would make this structure so it could be pulled on and off real easy like that and then the user couldn't pull it off. I think the user would pull it off. There's -- if you look at the structure, like figure 2, there's nothing like locking in with a screw. There's no snap fit connectors. That's the representation that we would expect to have a cartridge slide on and slide off.

And, you know, quite frankly, I've just seen products like this, and this is how they work; you slide them on and slide them off.

Q So in order to be secure, doesn't that polypropylene shell in figure 5 need to be affixed in some way?

A Yeah, it's press fit on there. I mean, the user pushes it on with a certain amount of force, and that pushing-on force is larger than the force that you would just apply sucking on it normally.

Q You don't see any snap fits or anything on the polypropylene shell in figure 5, do you?

A That's correct. That's why it's -- that's why it's a slide, a friction fit is what we'd call that.

Q Okay. Does the Xia reference say that the connector in figure 3 is connected to the left end of

figure 4 before figure 5's polypropylene shell is fitted over figure 4 in the manufacturing process?

A I don't think it describes the manufacturing process, that I recall.

MR. DOKHANCHY: Okay. No more questions, pending any more redirect.

MR. ANSLEY: No more questions.

MR. DOKHANCHY: Thank you, Dr. Singhose.

THE VIDEOGRAPHER: This concludes the video deposition of Dr. William Singhose. We are off the record at 3:03 p.m.

THE REPORTER: Does anybody need a rough?

MR. DOKHANCHY: I will take a rough.

MR. ANSLEY: I will take a rough.

MR. DOKHANCHY: And expedited Tuesday would be great.

THE REPORTER: Did you want expedited as well?

MR. ANSLEY: Yeah, I will take whatever he gets.

(The deposition concluded at 3:03 p.m.)

CERTIFICATE OF REPORTER

STATE OF GEORGIA)
)
COUNTY OF DEKALB)

I, Marcella Daughtry, a Certified Reporter in the State of Georgia and State of California, do hereby certify that the foregoing deposition was taken before me in the County of DeKalb, State of Georgia; that an oath or affirmation was duly administered to the witness, WILLIAM SINGHOSE, PH.D.; that the questions propounded to the witness and the answers of the witness thereto were taken down by me in shorthand and thereafter reduced to typewriting; that the transcript is a full, true and accurate record of the proceeding, all done to the best of my skill and ability;

The witness herein, WILLIAM SINGHOSE, PH.D., has requested signature.

I FURTHER CERTIFY that I am in no way related to any of the parties nor am I in any way interested in the outcome hereof.

IN WITNESS WHEREOF, I have set my hand in my office in the County of DeKalb, State of Georgia, this 29th day of October, 2024.

Marcella Daughtry

Marcella Daughtry, RPR, RMR
GA License No. 6595-1471-3597-5424
California CSR No. 14315

JUUL Labs v. NJOY, LLC
J11752897

DECLARATION UNDER PENALTY OF PERJURY

I declare under penalty of perjury that I have read the entire transcript of my deposition taken in the above-captioned matter or the same has been read to me, and the same is true and accurate, save and except for changes and/or corrections, if any, as indicated by me on the DEPOSITION ERRATA SHEET hereof, with the understanding that I offer these changes as if still under oath.

Signed on the_____day

of _____20__.

_____
WILLIAM SINGHOSE, PH.D.

DEPOSITION ERRATA SHEET
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Signature:_____

WILLIAM SINGHOSE, PH.D.

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Signature:_____

WILLIAM SINGHOSE, PH.D.