1 UNITED STATES PATENT AND TRADEMARK OFFICE
2 BEFORE THE PATENT TRIAL AND APPEAL BOARD
3
4
5 MERCEDES-BENZ USA, LLC,
6 Petitioner,
7 vs. Case Nos.: IPR 2023-01026
IPR 2023-01027
8 IPR 2023-01034
9 YECHEZKAL EVAN SPERO,
10 Patent Owner.
11
12
13 The Video Recorded Deposition of MATTHEW TURK, Ph.D.,
14 Taken at 150 West Second Street, Suite 400N,
15 Royal Oak, Michigan,
16 Commencing at 9:44 a.m.,
17 Thursday, June 13, 2024,
18 Before Leisa M. Pastor, CSR-3500, RPR, CRR.
19 Veritext Job #6740991
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Royal Oak, Michigan
Thursday, June 13, 2024
9:44 a.m.

MATTHEW TURK, Ph.D.,
was thereupon called as a witness herein, and after having first been duly sworn to testify to the truth, the whole truth and nothing but the truth, was examined and testified as follows:

VIDEO TECHNICIAN: Good morning. We are going on the record. The time is now 9:44 a.m. on Thursday, June 13, 2024.

This is Media Unit No. 1 in the video-recorded deposition of Matthew Turk in the matter of Mercedes-Benz USA, LLC, versus Spero, filed in the United States Patent and Trademark Office before the patent trial and appeal board, Case Nos. IPR 2023-01026, IPR 2023-01027, and IPR 2023-01034.

This deposition is being held at 150 West Second Street in Royal Oak, Michigan 48067.

My name is Nicholas Houslander from the firm Veritext Legal Solutions and I am the videographer. I am not authorized to administer an oath, I am not related to any party in this action, nor am I financially interested in the outcome.

1 Counsel and all present in the room and
2 everyone attending remotely will now state their
3 appearances and affiliations for the record. If there
4 are any objections to the proceeding, please state
5 them at the time of your appearance, beginning with
6 the noticing attorney.
7 MR. HUGHES: Scott Hughes on behalf of
8 Mercedes-Benz USA, LLC, and I'm with Hogan Lovells US
9 LLP.
10 MS. SHAH: Sangeeta Shah on behalf of
11 patent owner Spero with Brooks Kushman.
12 MR. HUGHES: And with me is Joe Raffetto
13 also from Hogan Lovells on behalf of Mercedes-Benz
14 USA, LLC.
15 VIDEO TECHNICIAN: Court reporter, please
16 swear the witness.
17 COURT REPORTER: Please raise your right
18 hand.
19 MATTHEW A. TURK, Ph.D.,
20 was thereupon called as a witness herein, and after
21 having first been duly sworn to testify to the truth,
22 the whole truth and nothing but the truth, was
23 examined and testified as follows:
24 EXAMINATION
25 BY MR. HUGHES:

Q. Okay. Good morning, Dr. Turk.
A. Good morning.
Q. Can you please state your full name for the record.
A. My name is Matthew Alan Turk.
Q. And do you understand that you are being deposed today in connections with declarations you submitted in three IPR proceedings, correct?
A. Yes, correct.
Q. And for the record, those three IPR proceedings are IPR 2023-01026, IPR 2023-01027, and IPR 2023-01034, correct?
A. That sounds right.
Q. And IPR 2023-01026 and 01027 are related to US Patent No. 10,894,503, correct?
A. Yes.
Q. And IPR 2023-01034 is related to US Patent No. 11,208,029, correct?
A. I believe so, yes.
Q. If I refer to the patent ending in 503 as the '503 Patent, will you understand that?
A. Yes.
Q. And similarly, if I refer to the patent ending in 029 as the '029 Patent, will you understand that?
A. Yes, that's fine.
Q. Okay. Do you recall that you were recently deposed in

some additional IPR proceedings that Mercedes filed?
A. Yes.
Q. And those were IPR 2023-01039 and 01040, correct?
A. Probably. I don't remember exactly, but that sounds right.
Q. Do you remember they were in relation to a patent ending in 551?
A. Yes, I do.
Q. And that '551 Patent is related to the '503 and '802 Patents, correct?
A. Yes, that's right.
Q. Okay. And some of the same prior art references that were at issue in that proceeding are at issue here as well, correct?
A. That's right.
Q. For example, the Alden reference among others?
A. Yes, that's correct.
Q. Okay. And you understand that you are under oath today, correct?
A. Yes, I do.
Q. Is there anything that would prevent you from testifying truthfully and accurately today?
A. No, there's not.
Q. Okay. Before we get started, I know from before you've been deposed many times, but I'd just like to

go over a few ground rules for the deposition here.

If you don't understand a question that I ask, please ask me for clarification on it. Your counsel may object, but you still need to answer the question unless you're specifically instructed not to.

We should avoid talking over each other. I'll try and let you finish your answers before I ask a question, and if you would, you know, let me finish the question before you answer, we can hopefully make it easier for the court reporter here.

In answering questions, please don't nod or use hand gestures. We do need an audible answer so the court reporter can transcribe.

Does all of that sound fair to you?

A. Yes, it does.

Q. All right. Now, you are currently president of Toyota Technological Institute at Chicago, correct?

A. That's right.

Q. Remind me, are you employed by any other entities right now other than Toyota Technological Institute?

A. I'm an emeritus faculty, emeritus professor at University of California, Santa Barbara, so I'm not sure if that counts as employment. It's really former employment, so I think otherwise, no.

Q. So other than the Toyota Technological Institute and

being an emeritus professor, do you take on other consulting work, such as this kind of expert witness work?

A. Sometimes I do.

Q. And is that expert witness work outside of your employment by the Toyota Technological Institute or your role as an emeritus professor?

A. Yes, it's outside of those things.

Q. What percentage of your time do you spend on expert witness consulting as compared to, for example, employment with the Toyota Technological Institute?

A. I don't know how to quantify that, or at least I haven't quantified that to my recollection, but it's generally a small amount.

Q. Small amount meaning a few hours here or there or more limited number of engagements?

A. I think both would be fairly accurate.

Q. Okay. Now, here you recall you prepared a declaration, or multiple declarations, for these proceedings; is that right?

A. That's right.

Q. How much time do you typically spend on declarations when you are retained as an expert witness?

MS. SHAH: Objection, vague.

A. I don't know if there's a typical time. It probably

varies a lot, but I would say usually it is some number of weeks.

BY MR. HUGHES:

Q. When you say some number of weeks, do you mean you're working on this for some number of weeks or you're working over a period of a few weeks?

A. I mean over a period of some number of weeks.

Q. About how many hours do you think you spend on a -- preparing declarations when you're retained as an expert witness?

A. I don't think I have a good estimate of that. I'm not sure.

Q. Is there a range you can give?

A. Not that I feel confident about off the top of my head, no.

Q. Okay. But you typically spend, you know, at least a few hours, maybe over 10 hours?

A. Again, I don't know how many, but I -- I spend time over typically a period of some weeks.

Q. Okay. What's the longest amount of time, you know, in hours you've ever spent to prepare an expert declaration that you can recall?

A. I don't recall.

Q. And do you recall the shortest amount of time you may have ever spent preparing an expert declaration?

A. No, not specifically.
Q. Do you recall any kind of estimate for any declaration you've given about how many hours you've spent on it?
A. No, I don't recall any estimates.
Q. Okay. So for your deposition today, what did you do to prepare?
A. I reviewed my declarations. I reviewed the materials that I considered in preparing declarations. I met with Ms. Shah, and that's about it.
Q. When you say you reviewed the materials, are those the materials that were cited in your declarations?
A. Yes.
Q. Did you review any other materials?
A. I reviewed my own notes. I don't recall any materials outside of those things cited that I reviewed.
Q. And how did you select the materials that you reviewed to prepare for your deposition?
A. I selected them -- I selected things that I thought were relevant, and the things cited in my declarations are clearly the most relevant, so I guess that's how I selected them.
Q. And again, did you review any materials that are not discussed in your declarations?
A. I think I mentioned my own notes, but besides those, I can't recall any right now that I did.

Q. Okay. And you mentioned that you met with Ms. Shah in preparing, did you meet with anyone else?
A. I don't think so.
Q. And when did you meet with Ms. Shah?
A. I believe we met yesterday and Sunday and maybe one time last week.
Q. Okay. And for how long did you meet?
A. Probably about an hour yesterday, probably about a couple hours Sunday, and probably about a couple hours last week, but I don't remember the exact meetings and times specifically.
Q. Okay. And you mentioned that you also review your notes. Were those your notes from preparing the declarations?
A. They're the notes that I have kept throughout my involvement in this case.
Q. So does that include notes on the references that you used in preparing the declarations?
A. I have notes on all kinds of things related to those cases, probably including the references.
Q. And do those notes include anything from your preparation sessions?
A. I probably did take notes during preparation sessions.
Q. Do you have any of those notes with you today?
A. Not in the room.

Q. Do you have any other materials with you in the room today?
A. No, I don't.
Q. Okay. So as we discussed earlier, you're being deposed with respect to these declarations that you submitted in the IPR proceedings, right?
A. That's right.
Q. About how many hours did you spend preparing your declarations for the '503 Patent IPRs?
A. I don't remember.
Q. Any estimate?
A. Not any estimate that I'd be comfortable with.
Q. One hour? two hours? more than that?
A. Again, no particular estimate that I'd be comfortable with.
Q. And what about for the '029 Patent, do you recall how many hours you spent preparing that declaration?
A. I don't.
Q. So it could have been one hour?
MS. SHAH: Objection, mischaracterizes the witness' testimony.
A. I don't recall how long it was.
BY MR. HUGHES:
Q. And you can't recall if you spent more or less than one hour on it?

A. I can recall that I spent more than one hour on it, yes.
Q. What about more than five hours maybe?
A. Since I don't recall the amount, I don't want to guess on various numbers, so I'll just say I don't recall.
Q. Okay. And for your declarations, who drafted them?
A. Depending on what you mean by drafted, the initial words were based on discussions, extensive discussions I had with attorneys on this case. There may have been phrases and segments that I originally penned and phrases and segments that attorneys I was speaking with proposed.

The first relatively full draft, or the not full, but the first at least skeleton of the draft was probably drafted by the attorneys, but we went back and forth extensively through the words and through the concepts of the declaration so that the final version is -- are my words and my opinions.

Q. What do you mean by a skeleton of the draft?
A. We did not start with a full declaration; so by skeleton, I mean, you know, less than full and perhaps substantially less than the full, final declaration.
Q. About how much of the declaration do you think you personally drafted?

MS. SHAH: Objection, vague.

A. So what do you mean specifically by "drafted"?
BY MR. HUGHES:
Q. How much of it did you physically write or type yourself?
A. I don't know the amount, and I'm not sure I could guess the amount, but probably the typical process is that we would discuss things, I would comment on things, we'd come up with proposed wording and the attorneys would write them down in the draft and then I review that.
Q. Okay. And what did you rely on in preparing the declarations?
A. The materials that are listed in the declaration.
Q. And how did you receive those materials? Did you find them?
(Off the record at 10:03 a.m.)
(On the record at 10:03 a.m.)
MR. HUGHES: So are we back on?
COURT REPORTER: Yes.
BY MR. HUGHES:
Q. Okay. So the question was, how did you receive those materials that are listed in your declaration?
A. May I take a look at my declaration so I can see that list?
Q. Just generally, do you recall asking for certain

materials or were they provided to you?
A. Well, without seeing the list at the moment, I think, in general, most of the things were brought to my attention. I would have to look through it to be sure of that.
Q. Well, is there anything that you recall specifically asking for?
MS. SHAH: Objection, vague.
A. I don't recall if I asked for anything.
BY MR. HUGHES:
Q. Okay. Do you recall if there was any materials that you wanted to see that you did not get a chance to review?
A. There was not.
Q. Do you have any staff that works for you when you're an expert, for an expert witness?
A. I think once or twice I have, but generally, no.
Q. For these proceedings, did you have any staff work with you?
A. No, I didn't.
Q. So it was just yourself?
A. That's right.
Q. Now, when you prepared your declarations, you mentioned some legal principles in those; do you recall that?

A. I do, yes.
Q. For example, do you discuss anticipation?
A. Yes, I do.
Q. And obviousness?
A. Yes, I do.
Q. Okay. And you also recall that you gave a definition of a person of ordinary skill in the art, or I may refer to that as a PHOSITA?
A. Yes, I remember that.
Q. And in your declarations, you say that you interpreted the claims in the prior art as a PHOSITA would have at the time of the patents; is that right?
A. Yes, that's what I attempted to do.
Q. Okay. And is it fair to say that the same words used in different claims of a patent should be interpreted the same way?
MS. SHAH: Objection, calls for legal analysis.
A. I don't think that this is something that I opined on in my declaration, but you're asking me as a general principle?
BY MR. HUGHES:
Q. Yes. If you see the same word in different claims of the same patent, is it fair to say that that would be interpreted the same way?

MS. SHAH: Same objection.

A. I'm not a patent attorney or an expert in that, but off the top of my head, I would say it may depend on context.

BY MR. HUGHES:

Q. What do you mean by context?

A. Context generally means the other aspects, other things around the thing of interest, so other -- other words, what that claim is saying.

Q. When you say thing of interest, are -- do you mean the claim term?

A. I was describing the context, and you're asking me this about words in a claim, so the terms there are certainly part of the context, yes.

Q. Okay. In the '503 and '029 Patents, the systems described can detect and identify things like other vehicles, right?

A. Generally, yes.

Q. Okay. So those systems can detect other vehicles driving on a road near a vehicle equipped with a system from the patents, right?

MS. SHAH: Objection, vague.

A. Could you repeat that, please?

BY MR. HUGHES:

Q. Yeah. So the systems in the patents could detect

other vehicles driving on a road near a vehicle equipped with those systems, right?

MS. SHAH: Same objection.

A. I'm not sure how to answer that in general. If you want to point me to a specific part of the patent, or a claim or teaching, I'd be happy to comment on that.

BY MR. HUGHES:

Q. For example, in oncoming vehicles, can the systems detect and identify oncoming vehicles?

A. I think in general in those patents they are intended to be able to do that.

Q. And they use things like camera sensors to do that, correct?

A. They do, yes.

Q. So what if there were a billboard of a car on the side of the highway, could the system recognize that as a vehicle?

MS. SHAH: Objection, vague.

A. You're asking me if the system in the '501 or '029 Patent could recognize a billboard as a vehicle?

BY MR. HUGHES:

Q. If a billboard had a -- let's say there's a billboard advertising another car dealership and it had a big picture of a car on it, could the system recognize that as a vehicle?

MS. SHAH: Objection, calls for speculation, vague.

A. I don't know offhand. It's not something I've analyzed for that, those patents.

BY MR. HUGHES:

Q. Okay. So you're not -- you're not sure if the system could recognize a picture of a vehicle as a vehicle?

A. As I said, I've not analyzed this or thought about this for those patents.

Q. Well, what's your thoughts now from what you've seen in the patents and how they're describing the system to work, is that something you think that it could do?

MS. SHAH: Asked and answered.

A. I'd have to look at those patents with that in mind and analyze them, which I have not done, so I'm not sure.

MARKED FOR IDENTIFICATION:

EXHIBIT 1

10:11 a.m.

BY MR. HUGHES:

Q. Okay. I'm going to mark as Exhibit 1, this is the '503 Patent. Do you recognize this?

A. Yes, I do.

Q. And is this the '503 Patent that's at issue in one of these -- in two of these proceedings?

A. Yes, it is.
Q. Okay. And you were saying you would need to look at this to see if you thought it may determine something, you know, a picture of a car on a billboard, I'm sorry, strike that.
You were saying you need to look at the '503 Patent to determine if it may recognize a picture of a car on a billboard as a vehicle, right?
MS. SHAH: Objection, mischaracterizes the witness' testimony.
A. I believe I said I'd have to look and analyze the patent, yes.
BY MR. HUGHES:
Q. Okay. Would you like to take a little bit of time to do that now?
A. Happy to try. I'm not sure how long it will take.
MS. SHAH: I'd also like to maintain my prior objections to this question.
BY MR. HUGHES:
Q. So Dr. Turk, while you review, you're familiar with the '503 Patent, right?
A. Yes, I am, actually.
Q. And have you read the '503 Patent in its entirety?
A. Yes, I have.
Q. And when's the last time you read the '503 Patent in

its entirety?

A. I don't recall. It's been a while since I read every word of it in one sitting.

Q. And how long is a while?

A. I don't recall.

Q. Have you read anything so far to inform your answer to the question that was asked?

A. Yes, what I've been reading helps me to form an answer. I don't know what it is yet.

Q. Is there anything in particular you're looking for?

MS. SHAH: Objection, vague.

A. I'm looking for things that would inform the answer to your question.

BY MR. HUGHES:

Q. So with your familiarity of the '503 Patent, and having read it in its entirety before, you can't say whether the system may recognize something like a billboard picture of a car as a vehicle?

MS. SHAH: Objection, asked and answered. Same objections as before.

A. As I think I said before, I -- that's not a question that I've thought about specifically, or analyzed specifically, so I'd have to do that analysis to -- to answer that question accurately.

BY MR. HUGHES:

Q. For the system to recognize things as a vehicle, would you expect it to only be able to recognize things that are actual vehicles?

MS. SHAH: Objection, vague.

A. I believe that's what the '503 attempts to do, yes.

BY MR. HUGHES:

Q. When you say it attempts to do that, could it ever be wrong?

MS. SHAH: Objection, calls for speculation.

A. Most systems can be wrong at times but I've not analyzed this patent specifically with that question in mind.

BY MR. HUGHES:

Q. When you say most systems, what do you mean?

A. I mean most systems.

Q. What types of systems, like those described in the '503 Patent?

A. I just mean most systems.

Q. What, is there a particular kind of system?

A. No.

Q. So any -- any system at all, or is there a certain type or class of system that we're talking about here?

A. That was a general statement, not a specific technical statement about any particular system.

Q. Okay. Okay. And you still have with you the copy of the '503 Patent, correct?
A. Yes. Do you want me to continue this or --
Q. That's okay. Unless you have anything else you'd like to add to your answer right now?
A. No, I don't.
Q. Okay. Now, you've read the claims of the '503 Patent, correct?
A. Yes, I have.
Q. And those claims are directed to vehicle headlight systems, right?
A. Yes, they are.
Q. And the claims don't specify any certain type of vehicle, do they?
A. I don't recall them specifying any type of vehicle.
Q. Okay. So the vehicle that was recited in the claims could be a car, right?
MS. SHAH: Objection, calls for a legal conclusion.
A. As I recall, I don't recall it specifying specifically what kind of vehicle, so I suppose it could be.
BY MR. HUGHES:
Q. So if there was headlights on the car, could that be the vehicle in the claims?
MS. SHAH: Objection, vague, calls for a

legal conclusion.

A. I don't know that I've analyzed what kinds of vehicles or if there are any limitations on any kind of vehicles these could apply to, but off the top of my head, it seems like they could apply to a car.

BY MR. HUGHES:

Q. What about a boat?

MS. SHAH: Objection, calls for speculation, legal analysis.

A. I have never considered whether a boat could be described as a vehicle or not, so I'm not sure.

BY MR. HUGHES:

Q. An airplane? helicopter?

MS. SHAH: Same objections.

A. I've not considered before if an airplane or helicopter could be considered a vehicle, so I'm not sure.

BY MR. HUGHES:

Q. Can you turn to column 53, lines 17 to 18 in the '503 Patent. Do you see where this says, in figure 15, a headlamp 270 of a land, sea, or air vehicle is shown in front view?

A. Yes, I see that.

Q. Having read that, can you now answer whether a boat can be the vehicle recited in the claims?

MS. SHAH: Objection, calls for a legal analysis. Also objection, vague.

A. So this seems to be describing the vehicle in figure 15 as possibly being a land, sea, or air vehicle. I'm not sure in this context how that relates to the claims, so I'd have to look at that as a separate question; so I'm not sure what those lines imply necessarily about the claim.

BY MR. HUGHES:

Q. You're not sure whether figure 15 relates to the claims of this patent?

MS. SHAH: Asked and answered.

A. Yeah, I -- that's not a correct summary of what I just said.

BY MR. HUGHES:

Q. Well, if you can look at that description in figure 15 and see if that informs your answer on whether a boat, for example, could be the vehicle in the claims.

MS. SHAH: Objection, calls for a legal conclusion.

A. I've just not considered before now exactly what the implications are of that sentence to all of the claims, so I'm just not sure offhand.

BY MR. HUGHES:

Q. So you've never considered what the vehicle might be

that's recited in the claims?

MS. SHAH: Objection, calls for a legal conclusion.

A. I don't recall what I've considered regarding the discussion of vehicles in the claims.

BY MR. HUGHES:

Q. And having reviewed the '503 Patent, can you say whether an airplane can be a vehicle --

MS. SHAH: Objection.

BY MR. HUGHES:

Q. -- cited in the claims?

MS. SHAH: Objection, asked and answered, calls for a legal conclusion.

A. This is something that I don't think that I opined on in my declarations, and not something that I particularly thought about, to say that it is, so I'm just not sure.

BY MR. HUGHES:

Q. And looking at the claims, you see, for example, claim 1 recites a vehicle headlight system.

A. Yes, I see that.

Q. So you're not sure what the scope of vehicle is as used in that claim?

MS. SHAH: Objection, asked and answered, calls for a legal conclusion.

A. I take it as meaning a vehicle, and again, I don't think I opined on that particular question in my declaration, and haven't thought otherwise about this, at least recently, so I'm just not sure.

BY MR. HUGHES:

Q. And you recall the other independent claims similarly recite vehicle headlight systems, like, if we look at claim 20, for example?

A. I see that.

Q. And if you look at claim 26, do you see the limitation utilizing one or more sensors of a vehicle?

A. I see that.

Q. So again, claim 26 is also referring to a headlight system of a vehicle in general, correct?

A. A headlight system of a vehicle, yes.

Q. And same with claim 37?

A. Yes, vehicle is mentioned in many of these claims.

Q. Just for completeness, independent claim 59 as well?

A. It also mentions a vehicle, yes.

Q. And claim 65 similarly mentions one or more sensors of a first vehicle. This is also talking about vehicles, correct?

A. That's correct, a vehicle is in lots of these claims.

Q. Okay. Now, these claims talk about vehicle headlights, right?

MS. SHAH: Objection, asked and answered.
A. Yes, these vehicle headlights are mentioned.
BY MR. HUGHES:
Q. What is your understanding of lumen output?
A. In general, or with respect to a particular claim?
Q. In general.
A. In general, it's related to the amount of light energy source it puts out.
Q. And how is lumen output usually calculated?
A. Usually it's not calculated, it's measured.
Q. How is it measured?
A. There are measuring devices engineers and others use to measure lumen output.
Q. And what types of devices are they?
A. I don't recall specifically what the devices are called or what people tend to use.
Q. What units is lumen output measured in?
A. I always have to go back to my photometry notes to remember the details of all the various photometric-related quantities and measurements and units and such, and I don't -- I don't have those on the top of my head at the moment.
Q. You can't think of any units that relate to lumen output?
A. I can, but as I said, I don't have the details with me

that I often use to distinguish among the many different photometry or radiometry-related terms and measurements and units and such, and so I won't speculate without that as a reminder.

Q. So you said you can't remember some, can you give me an example of what you can remember?

A. Specifically some what?

Q. You said that you can think of some units that relate to lumen output, can you give some examples of the ones you're thinking of now?

A. Well, some examples of these kinds of units are candelas, joules, and other energy measurements, and these are often units of time, units of 2-D space, units of 3-D space. There are a number of different things like -- like seconds or meters or square meters or cubed meters, steradians that come into play and sorts of measurements.

Q. You mentioned candelas, what are candelas?

A. A unit of measurement related to light energy, but like a lot of these things, I always go back to my table of notes for these sorts of measurements because there's a lot of them, and to make sure I get them right, I always refer to my photometric and radiometric quantity tables, and I don't have those with me right now.

Q. Did you look at any of those tables or notes in preparing your declarations?
A. I don't recall if I did or not.
Q. Now, looking at the claims of the '503 Patent, those don't specify any specific lumen output for the claimed vehicle headlight systems, correct?
MS. SHAH: Objection, calls for a legal conclusion.
A. Looking through them quickly now, I don't notice any particular lumen output specifications there.
BY MR. HUGHES:
Q. And in preparing your declarations, do you ever -- do you remember reviewing any claims that had a specific lumen output in them?
A. I don't.
Q. And the claims of the '503 Patent also don't specify that the vehicle headlight systems must comply with any government standard or regulations, do they?
MS. SHAH: Objection, calls for a legal conclusion.
A. I don't believe they mentioned that. I don't think I've ever seen a patent that does mention such government standards, but inventors would be aware of it if such standards exist.
BY MR. HUGHES:

Q. So in the '503 Patent claims, there's no recitation of any government standard or regulation, correct?

MS. SHAH: Objection, asked and answered.

A. I believe I just answered that.

BY MR. HUGHES:

Q. So there's not any recitation of any government standard or regulation, correct?

MS. SHAH: Same objection.

A. I believe that's what I just answered.

BY MR. HUGHES:

Q. So if we can go back to claim 1 of the '503 Patent, that's in column 95, claim 1 recites a plurality of light clusters; do you see that?

A. Yes, I do.

Q. Okay. Claim 1 doesn't specify the types of light sources that the clusters are made of, right?

MS. SHAH: Objection, calls for a legal conclusion.

A. The question if it specifies the type of light sources?

BY MR. HUGHES:

Q. That's right. Claim 1 doesn't recite any particular claim of light source, does it?

A. I don't believe it does.

Q. And claim 1 also does not limit the number of light

clusters, does it?

MS. SHAH: Same objection.

A. I don't believe claim 1 limits the number of sources, no.

BY MR. HUGHES:

Q. So there could be two light clusters, right?

MS. SHAH: Objection, calls for a legal conclusion.

A. It seems that a plurality of light clusters could include item 2.

BY MR. HUGHES:

Q. Okay. So there could be two light clusters each comprised of an LED; is that fair?

MS. SHAH: Objection, calls for a legal conclusion.

A. I'm not sure that I've analyzed all of the possible ways of interpreting that phrase in claim 1 and probably have to look in the specification of the patent to -- to see if anything in there informs that question; so I'm not really sure.

BY MR. HUGHES:

Q. Okay. Can you look at claim 2? Do you see where that says wherein at least one of the light clusters comprises?

A. Yes, I see that.

Q. So claim 2 is reciting limitations about one of those light clusters, right?

MS. SHAH: Objection, calls for a legal conclusion.

A. That seems to be a reasonable explanation for what it's doing.

BY MR. HUGHES:

Q. And if we go into column 96 where we see, for claim 2, we have at least one of the light clusters comprises, do you see where it says one or more light-emitting sources?

A. No. Which line is this?

Q. Column 96, line 5.

A. And you're just asking do I see where it says one or more light-emitting sources?

Q. Yes.

A. Yes, I do see that.

Q. So claim 2 recites that at least one of the light clusters comprises one or more light-emitting sources, correct?

A. I think you're reading that correctly.

Q. So claim 2 recites that a light cluster can be one light source, correct?

MS. SHAH: Objection, calls for a legal conclusion.

A. I haven't considered before just now if that is an accurate conclusion or summary of that, so I'm not sure.

BY MR. HUGHES:

Q. So where claim 2 says that a light cluster can comprise one light-emitting source, you're not sure if one light source could be a cluster?

MS. SHAH: Objection, asked and answered. Again, calls for a legal conclusion.

A. What I said I was not sure of is the summary you stated in that last question about claim 2, which was not just the words of claim 2 but, in my understanding, a conclusion from claim 2.

BY MR. HUGHES:

Q. Reading claim 2, could one light-emitting source be a light cluster?

MS. SHAH: Objection, calls for a legal conclusion.

A. That's not a question I've thought about or analyzed with respect to this claim, so I have to think about.

BY MR. HUGHES:

Q. So you're not sure about the scope of claim 2?

MS. SHAH: Objection, asked and answered, mischaracterizes -- well, asked and answered.

A. What I'm saying is that I've not considered that

specific question regarding claim 2.

BY MR. HUGHES:

Q. And reading just those few lines of the claim right now, you can't answer whether one light source would be a light cluster?

MS. SHAH: Objection, asked and answered. The question, again, calls for a legal conclusion.

A. I'd say, again, this is something that I have not specifically analyzed that I recall. I don't think that I have an opinion on it in my declaration, and just off the top of my head, I don't particularly want to conclude something that I'm not sure about.

MS. SHAH: Maybe we can take a break here. Does that work? We've gone about an hour and a half. And just for forecasting purposes, what do you want to break at, like, 12:30 or 1 for lunch?

MR. HUGHES: I'm good with whatever works best for you.

MS. SHAH: I mean, I just want to get everything kind of coordinated.

COURT REPORTER: Do you guys want to go off the record?

MS. SHAH: I'm sorry, yes.

VIDEO TECHNICIAN: We are going off the record. The time is 10:15 a.m.

(Recess taken at 10:59 a.m.)

(On the record at 11:14 a.m.)

VIDEO TECHNICIAN: We are back on the record. The time is 11:13 a.m.

BY MR. HUGHES:

Q. Okay. Dr. Turk, do you still have the '503 Patent in front of you?

A. Yes, I do.

Q. Okay. Can you go back to claim 1 again.

A. Okay.

Q. Now, claim 1 doesn't recite that the plurality of light clusters are LEDs, right?

A. I don't see LEDs in there.

Q. What other types of light sources could the light clusters be?

MS. SHAH: Objection, calls for a legal conclusion.

A. I'm not sure that I've thought about that or analyzed that particular question, so I'm not sure.

BY MR. HUGHES:

Q. Could they be incandescent lights?

MS. SHAH: Objection, calls for a legal conclusion.

A. Again, I'd say since I've not analyzed this, I wouldn't want to speculate on what it could or

1 couldn't be.
2 BY MR. HUGHES:
3 Q. When you analyzed claim 1 and you see that unique
4 source -- sorry, when you analyzed claim 1 with the
5 light cluster, you didn't consider what the light
6 cluster may be?
7 MS. SHAH: Objection, vague, calls for a
8 legal conclusion.
9 A. I may well have at the time but I don't have a -- I
10 didn't express it -- an opinion on that in my
11 declaration and I'm not sure that I have an opinion
12 off the top of my head.
13 BY MR. HUGHES:
14 Q. Can you go to column 17 on the '503 Patent, and do you
15 see light -- if you read through lines 10 through 20
16 there, this is discussing the term "light source,"
17 correct?
18 A. Yes, it is.
19 Q. And do you see where it says the term light source
20 should be understood to include light-emitting diodes
21 of all types, light-emitting polymers, semiconductor
22 dies that produce or emanate light in response to
23 current, organic LEDs, electrode luminescent strips,
24 and other such systems?
25 A. Yes, I see the sentence.

Q. And do you see the sentence that follows, it says incandescent and discharge light sources are also included, correct?
A. Yes, I see that sentence.
Q. So having read that, could an incandescent light be the light sources of a light cluster?
MS. SHAH: Objection, calls for a legal conclusion.
A. So are you asking me in general or in the context of claims 1 and 2?
BY MR. HUGHES:
Q. In the context of the claims.
MS. SHAH: Objection, vague, and again, calls for a legal conclusion.
A. In general, I'm not an expert in claim interpretation, and this is not a question I've particularly analyzed and thought about lately.
BY MR. HUGHES:
Q. And you said you did review these claims from the point of view of a PHOSITA, correct?
A. I did, yes.
Q. So from the point of view of a PHOSITA, would an incandescent light be a light source?
MS. SHAH: Objection, asked and answered, calls for a legal conclusion.

A. A PHOSITA is not necessarily an expert in claim interpretation either, so there could be technical questions about light sources, which in my view is different than interpreting exactly what a claim means; so again, I'm reluctant to specify what I think the correct interpretation of the claim is.

BY MR. HUGHES:

Q. So a PHOSITA wouldn't be sure what these claims mean?

MS. SHAH: Objection, mischaracterizes the witness' many testimony.

A. That's not what I said.

BY MR. HUGHES:

Q. So what does this claim mean to a PHOSITA? This claim term. Sorry.

MS. SHAH: Objection, calls for a legal conclusion.

A. In terms of what?

BY MR. HUGHES:

Q. Light source. Let's just say light source. Well, the exact word -- yeah, light-emitting sources.

A. So the PHOSITA thinking about that term would bring in the knowledge that person has from education, experience, and such, and the full patent to determine what is intended by a particular term.

Q. And we just looked at column 17 of the patent, right?

A. We did, yes.
Q. And that mentioned incandescent light when it was talking about what can be a light source?
A. It did there, yes.
Q. And it mentioned discharge light in talking about what can be a light source?
A. Yes, it does there.
Q. What is a discharge light?
A. I don't recall the details specifically. I tend to think of discharge light as a technology where energy is built up, and in discrete moments of time, the energy is disseminated, but again, I don't recall the details of it.
Q. So having read column 17 there, in your view, would a PHOSITA understand that the light sources in the claims can be an incandescent light?
MS. SHAH: Objection, asked and answered, calls for a legal conclusion.
A. I would say how the -- how that phrase "light sources" is used in the claims is not by itself what a PHOSITA is an expert at, or knowledgeable about; so I'm still reluctant to opine on the terms in the claims just in general.
BY MR. HUGHES:
Q. Would a PHOSITA be knowledgeable about the claims of

the patent?

MS. SHAH: Objection, calls for a legal conclusion.

A. Are you asking me in general?

BY MR. HUGHES:

Q. Yes, in general.

A. Any PHOSITA?

Q. A PHOSITA as you've defined it in your declaration.

A. I guess not if that PHOSITA has not read the patent.

Q. What do you mean by that?

A. You asked me -- I think you asked me if a PHOSITA would be knowledgeable about the claims and I don't think a PHOSITA would be if a PHOSITA had not read this patent.

Q. What about the limitations cited in the claims, for example, would a PHOSITA be knowledgeable about light-emitting sources?

A. That sounded like two different questions to me. Do you mean the technical topic of light-emitting sources or do you mean the claim limitations?

Q. Let's say the technical topic of light-emitting sources.

A. In general, yes, I think a PHOSITA in this case would be knowledgeable about light-emitting sources.

Q. And if a PHOSITA read column 17 which discussed

incandescent light and discharge light, would that PHOSITA be able to form opinions on whether those are a light-emitting source?

A. I think so, yes.

Q. And what would -- in your understanding, would a PHOSITA consider them to be light-emitting sources?

A. Incandescent and discharge light sources.

Q. Yes.

A. Yes, it can. Yes, I believe so.

Q. Can we turn to claim 20 in column 97. Just let me know when you're there.

A. I'm there.

Q. Okay. And do you see the beginning of claim 20 says a vehicle headlight system comprising one or more headlights affixed to a vehicle, each headlamp, including at least three directional light sources aimed at different angles relative to the vehicle.

Do you see that?

A. Yes, I do.

Q. Okay. Claim 20 does not specify what those type of light sources are, correct?

A. I don't see any such specification there, correct.

Q. And claim 20 doesn't recite that the light sources are LEDs, correct?

MS. SHAH: Objection, calls for a legal

conclusion.

MR. HUGHES: Counsel, I've been kind of letting you go on the speaking objections but I'm not quite sure what asking him whether the claims recite particular words is a legal objection.

MS. SHAH: It's not a speaking objection to say it calls for a legal conclusion. You can disagree with me as to the objection, but it's not a speaking objection.

MR. HUGHES: But again, I think sometimes I'm asking him to tell me if the claim recites particular words, and I don't know what legal conclusion there may be from whether or not specific words are written in the claim; so I'm just asking him if the words are there.

MS. SHAH: That's fine, if you're asking him simply to the words, that's no issue, but a lot of times that is not the...

MR. HUGHES: Okay.

A. I don't see the word LED in claim 20.

BY MR. HUGHES:

Q. Okay. And if we can move on to claim 26 at the top of the page, do you see where -- if we go down towards the bottom of that claim, do you see the limitation beginning with determining a control strategy?

A. I do, yes.
Q. And that's -- excuse me, that says determining a control strategy for controlling one or more directional light clusters, correct?
A. Yes, it says that.
Q. And the claim doesn't recite what those -- what the lights are in those light clusters, right?
MS. SHAH: Objection, calls for a legal conclusion.
A. I don't see that it says anything about that.
BY MR. HUGHES:
Q. Okay. And claim 26 doesn't recite any maximum number of directional light sources, correct?
A. I don't see a maximum listed in this claim.
Q. Okay. And do you see the word LEDs in those -- in that claim anywhere, or LED?
A. No, I don't see the word LED or LEDs there.
Q. Okay. Can you go to claim 37 in column 100. Let me know when you're --
A. I'm there.
Q. Okay. Do you see the second limitation, a plurality of light clusters arranged into one or more of the headlights and capable of illuminating subsections of a field of view with different illumination characteristics?

A. Yes, I see that.
Q. And this claim, like the others, just recites light clusters in general, right?
MS. SHAH: Objection, vague.
A. I'm not sure what you mean by just light clusters.
BY MR. HUGHES:
Q. Does it specify what the lights or the light clusters have to be?
MS. SHAH: Objection, calls for a legal conclusion.
A. I don't see any words in the claim that do that, no. I don't -- I'm not sure if the specification -- I don't recall if the specification describes that specifically or not, but I don't see those words in the claim.
BY MR. HUGHES:
Q. Okay. And we don't see the words LEDs or LED in the claim either, right?
A. That's correct, I don't see those in there.
Q. Okay. And if you can just take a look at claims 59 in column 102, and 65, and let's start with claim 59. Claim 59 recites at least three directional light sources, correct?
A. Yes, I see that phrase.
Q. Okay. And nothing in claim 59 indicates what type of

light those light sources have to be, right?

MS. SHAH: Objection, calls for a legal conclusion.

A. I don't see any specific words in 59 that do that. Though, again, I'd want to look through the specification to understand if that provides context that would be important here.

BY MR. HUGHES:

Q. And last independent claim, if you can go to claim 65, that's also -- begins in the beginning of column 102; do you see that?

A. Yes, I do.

Q. And this claim recites, I think if we go on to column 103, do you see where it says determining control instructions?

A. Yes.

Q. For controlling one or more directional light sources, including in the adaptive headlight system?

A. Yes, I see that.

Q. Okay. So where it says one or more directional light sources, this could be just one light source?

A. I'd say the phrase one or more directional light sources implies to me that it could be one but, as with some other questions, I would say that's my technical opinion, not necessarily my legal

1 understanding of the claim.
2 Q. Okay. So from your technical understanding, where you
3 see one or more directional light sources, that could
4 be one light source?
5 A. I would say the phrase itself out of context, or
6 absent any particular context, can be interpreted like
7 that, yes, but a particular claim, I'm not sure. I'd
8 have to -- I'm not sure for a particular claim.
9 Q. Okay. And claim 65 does not use the word LED or LEDs,
10 does it?
11 A. No, it does not.
12 Q. Okay.
13 MS. SHAH: Just for the record, I have to
14 object to the line of questioning associated with
15 claim interpretation by this technical expert.
16 BY MR. HUGHES:
17 Q. Okay. Can you go back to claim 1 in column 95 of the
18 '503 Patent, please.
19 Okay. In claim 1, do you see the
20 limitation that begins with a logical controller,
21 including a processor?
22 A. Yes.
23 Q. And it says that, if we go down a little bit, wherein
24 the processor is configured to process the one or more
25 algorithms and the sensor data to determine an

illumination?
A. Yes, I see that.
Q. And do you see where it says that this reduces illumination to reduce glare in a subsection?
A. Yes, I see approximately those words.
Q. And earlier, you see that there are one or more algorithms, right?
A. I see that it recites a memory storing in one or more algorithms, yes.
Q. And then do you see where it says the processor is configured to process the one or more algorithms and the sensor data?
A. Yes, I see that.
Q. Does claim 1 include any particular steps of the algorithm?
MS. SHAH: Objection, calls for a legal conclusion.
A. Which algorithm are you referring to?
BY MR. HUGHES:
Q. The one or more algorithms recited in the claim. Does the claim recite any particular steps for those algorithms?
A. I don't see any steps there specifically, no.
Q. And does the claim recite any particular way that the sensor data must be processed?

MS. SHAH: Same -- same objection, it calls for a legal conclusion.

A. I don't recall if there's relevant context in the specification to this, but I don't see anything in the claim language here, no.

BY MR. HUGHES:

Q. So in -- there's no claim language on the particular steps for processing the sensor data, right?

MS. SHAH: Objection, mischaracterizes the witness' testimony, calls for a legal conclusion.

A. I don't see any words in this claim that list particular steps, no.

BY MR. HUGHES:

Q. Okay. So in interpreting this as a PHOSITA, could any algorithm that can reduce illumination in a subsection, would it be your opinion that that would fall in the scope of this claim?

MS. SHAH: Objection, calls for a legal conclusion.

I'm sorry, let me just -- are we -- are you going to have a whole series about claim construction? Because then we're going to get the judge on the phone. This is not admissible. He's a technical expert. He is not here as a patent attorney to provide opinions on claim construction.

So I've given you latitude, but clearly this last 45 minutes is inadmissible. So tell me how much more you're going to do, if this is what the day's going to be, we might as well get the judge on the phone.

MR. HUGHES: I'm not asking for his claim construction. I'm asking his --

MS. SHAH: You say that but that is essentially what you're asking him. POSITAs do not trigger claims.

MR. HUGHES: I'm asking him whether under his interpretation these things would fall under the claim --

MS. SHAH: Scott, you are asking him claim construction questions disguised as a PHOSITA. He's a technical expert. Like I said, we can keep going down this path and we'll get the judge on the phone. Just tell me, is this literally what we're going to do for the next couple of hours?

MR. HUGHES: We're not going to do this for the next couple hours. What we're asking him here is his interpretation of how he interpreted these claims.

MS. SHAH: He's a technical expert.

MR. HUGHES: That's right.

MS. SHAH: This is a technical expert

deposition. You're asking him very pointed questions about the meaning of claims. That is outside the scope of his declaration, it is outside the scope of what is permissible here for this deposition, and I'm asking you, I have repeatedly made continuous objections because you're asking him to provide legal conclusions as to what claims mean.

MR. HUGHES: We can go to his declaration and take a look.

MS. SHAH: That would be much better.

MR. HUGHES: Okay.

This will be Exhibit 2, right?

COURT REPORTER: Yep.

MR. HUGHES: I'm going to mark as Exhibit 2 the second declaration of Matthew Turk from IPR 2023-01026.

MARKED FOR IDENTIFICATION:

EXHIBIT 2

11:44 a.m.

MS. SHAH: Do you have another copy?

MR. HUGHES: I do. There you go.

MS. SHAH: Thanks.

MR. HUGHES: I did bring four of everything.

MS. SHAH: Perfect.

BY MR. HUGHES:
Q. Okay. And can you go to paragraph 64 on page 52 of this declaration.
A. Okay.
Q. And in this you were giving your opinion, under heading, on proposed claim construction, correct?
A. Yes.
Q. And in paragraph 64, you opined that to properly evaluate these claims, I understand that the claims -- that the terms of the claims must first be construed, right?
A. That is my understanding based on what -- based on my discussions with the attorneys I'm working with.
Q. Okay. And then you further opine, saying, in my opinion, the claims of the '503 Patent do not include any terms that require specific construction, right?
A. Yes.
Q. And you say, instead, each of the claims includes terms that an ordinary artisan would understand according to their claim and ordinary meaning, right?
A. That's right.
Q. Is that the standard you used in interpreting these claims?
A. It's a standard I used in my -- in all of my analysis.
Q. And in the questions asked today, are you applying

what your understanding of the claim ordinary meaning is to the terms of the claims?

MS. SHAH: Objection, compound.

A. You're asking me in the questions that you have asked me today am I understanding it that way? Just want to be clear what you're asking me.

BY MR. HUGHES:

Q. Well, you said, in your opinion, the claims of the '503 do not include any terms that require specific construction. Instead, each of the claims includes terms that an ordinary artisan would understand according to their claim and ordinary meaning, correct?

A. Yes.

Q. And is that the understanding that you're using in answering the questions today?

A. I think in general, yes. I'm not sure exactly what that means for every question you've asked me, but it seems that that's the case, yes.

Q. Okay. In the '503 Patent, what is a directional light source?

MS. SHAH: Objection, vague.

A. I don't recall if the patent defines that specifically. If it does, can you point me to where it might do that?

BY MR. HUGHES:
Q. So if you look in your declaration at paragraph 51 on page 44, do you see where this says the added controllability offered by breaking the total light output --
COURT REPORTER: I'm sorry, you're kind of turned away --
MR. HUGHES: Right, sorry.
COURT REPORTER: -- and I'm kind of having a hard time hearing you.
BY MR. HUGHES:
Q. Yeah. The added controllability offered by breaking the total light output up into discrete digital specifically aimable and dimmable elements which can be addressed by control electronics to affect intensity, spectrum, and spacial distribution of intensity and spectrum yields a lighting fixture versus lamp of unparalleled performance?
A. Yes, I see that.
Q. What is a specifically aimable element?
A. I don't recall if the patent defines that specifically and I don't know if I have a succinct definition off the top of my head, but I tend to think of it as a source that would have quite a different effect, depending on its orientation.

Q. What do you mean by orientation?
A. The direction at which it's pointed.
Q. So if different lights were pointed in different directions, would they have different aimings?
A. I think it would depend on a few factors, including how different the directions were.
Q. How different would directions need to be for you to consider them to have different aimings?
A. I don't know that I have a particular quantification in mind for that.
Q. Okay. But are you saying if they're very close to each other they may have -- have the same aiming? For example, if you used a compass and they're both generally pointed north, you might say they have the same aiming?
MS. SHAH: Objection, vague.
A. It would have to be more than just north in that example, but if we were measuring the direction and we found the -- the measure to be -- two different measures to be quite similar, I would perhaps say they have the same aiming.
BY MR. HUGHES:
Q. Okay. Do you recall you discussed things like the direction, intensity, you know, and beam spread of the lights.

A. Possibly. Can you point me to where you're referring?
Q. So, for example, in claim 20, if we go back to claim 20 of the '503 Patent, oh, I'm sorry, I read that incorrectly.
If we go to claim 2, I'm sorry, at the end.
A. Sorry, is there a question?
Q. The question is, in the context of these patents, what is a light source characteristic?
MS. SHAH: Objection, vague.
A. In the context of claim 2 of the '503, I would say a light source characteristic includes at least one of direction, intensity, beam spread, spatial light distribution, or spectral light distribution.
BY MR. HUGHES:
Q. Okay. And different things can change the light characteristics of a light, right?
A. In general, yes.
Q. Including maybe even how the light source is made?
MS. SHAH: Objection, vague.
A. That doesn't -- that -- I'm trying to understand the question. It doesn't make sense to me how something is made is -- is a thing of the past and not directly relevant to modifying the characteristic in the present; so I think these are two different things.
BY MR. HUGHES:

Q. I wasn't asking about a modifying characteristics, just characteristics in general.

For example, can you make a light source so it has a certain intensity?

A. Light sources are made with different intensities.

Q. Yes.

A. If that's what you're asking.

Q. And then there are things that can -- there are things that can modify the characteristics of a light source, right?

MS. SHAH: Objection, vague.

A. Generally there are, yes.

BY MR. HUGHES:

Q. And can a phosphor modify light source characteristics?

A. Are you asking a dynamic modifications, something that happens at a particular point in time that can change? Is that what you mean?

Q. Just in -- well, let's start with what is a phosphor?

A. In general, a phosphor is a material that is typically used in some sort of display technology that can affect the color or spectral characteristics of a source.

Q. And how does it do that?

A. Through its chemical and physical properties.

Q. What are some of the chemical properties?
A. I don't really know how to describe chemical properties of a phosphor offhand.
Q. Can you use a phosphor with significant LED?
A. Did you say with an LED?
Q. Mm-hmm.
A. To do what? I'm not sure what the question is referring to.
Q. If we go to column 20 of the patent -- Okay? -- do you see where it says, in about the first line there, the first full sentence, the light from an LED or group of LEDs of red color operating with an LED of blue and green color impinging on an object would appear to the viewer as white light?
A. Yes, I see that.
Q. And then if we go a little bit down around line 9 to 10, a white LED comprises an emitter in the blue spectrum covered with a phosphor which fluoresces in yellow, such that the combined output appears white.
A. Yes, I see that.
Q. So can phosphors be used to cover LEDs?
A. Yes, they can.
Q. And how do they do that?
A. I don't know details of how they're done. They're somehow deposited on the surface of the LED, I

believe.
Q. Okay. Does the phosphor change how it works depending on -- or sorry, before that, is there any power that's sent to a phosphor?
MS. SHAH: Objection, vague.
A. In general?
BY MR. HUGHES:
Q. Yes.
A. I think there may be phosphors that are powered in some ways but I don't recall for sure.
Q. Okay. Does a phosphor change how it works depending on power sent to it?
A. I would give the same answer. There may be, but I don't recall.
Q. Okay. What light sources are phosphors used with?
A. Do you mean in general or the context of this patent?
Q. Just any examples you can give.
A. Well, in some areas, like in televisions or in computer screens, light is sent to phosphors that can come from a number of different light-producing technologies.
Q. And like we saw in the patent, they can be used with LEDs?
A. They can, yes.
Q. What about incandescent lights?

A. What about them specifically?
Q. Can you use phosphors with incandescent lights?
A. I believe that has been done in some display technologies.
Q. Okay. And then we were talking earlier about modifying light source characteristics; do you recall that?
A. Yes.
Q. And there's other kind of elements you can use to modify light source characteristics, right?
A. Other besides phosphors?
Q. Yes.
A. Yes.
Q. Would one of those be a light guide?
A. Depending what someone means specifically by the light source characteristics, possibly.
Q. What is a light guide to you?
A. I don't recall offhand much detail about light guides, but they affect the direction or range of directions of light transmission.
Q. And how do they do that?
A. I don't recall specifically offhand.
Q. Can you give any examples of a light guide, for example, what materials they might be made from?
A. I don't have any examples off the top of my head right

now.
Q. Okay. And you said in your view light guides affect the direction or range of direction of light transmissions; is that right?
A. I think that's what I said. Again, I don't recall the details of light guides, but that's just a general sense.
Q. What do you mean by range of direction?
A. I mean not a single direction but potentially multiple directions.
Q. Okay. You wouldn't need any control circuit to send power to a light guide, would you?
A. I'm not sure. I'm not sure if there are light guides that are powered or not.
Q. Are you aware of light guides that do not need power?
A. I expect there are light guides that do not need power, but again, I don't recall the details of light guides very well off the top of my head.
Q. Okay. What is a variable light-modifying element?
MS. SHAH: Objection, vague.
A. As a general term?
BY MR. HUGHES:
Q. Yes.
A. It's a light-modifying element that can change its modifications.

Q. What do you mean by change its modifications?
A. Change the thing that it's modifying at different points in time.
Q. When you say change the thing that it's modifying, what is the thing?
A. It depends, it depends on the details and I think just a general hypothetical question, so I don't know.
Q. So if we say a light-modifying element is modifying light, would you understand that?
A. That sounds redundant to me but I guess I'd understand it.
Q. What else could a light-modifying element modify?
A. In general? In the abstract? I suppose a light-modifying element could modify specific aspects of light.
Q. Like what aspects of light?
A. In general, out of any particular context, it could modify, for example, the intensity of light.
Q. Okay. And what about color of light?
A. Again, in general, without any particular context, that would seem to fit that phrase, yes.
Q. And direction of light?
A. Same answer for that.
Q. Okay. Would a variable light-modifying element, let's say we have one that's modifying direction, okay?

A. Okay.
Q. If it's a variable light-modifying element, could it change the amount of direction that it shifts the light?
MS. SHAH: Objection, vague.
A. As a general question, and without any particular context, I just don't know. It all depends on the details and what -- what one would mean in a particular situation.
BY MR. HUGHES:
Q. Okay. What about a static light-modifying element, what would that be?
A. Can you give me an example of that used in my declaration or the patents?
Q. Well, in your experience, is there anything that you would consider to be a static light-modifying element?
A. Well, the phrase, again, absent any particular context, could be used, I suppose, to describe something that modifies light and is not moving, as opposed to, for example, a dynamic or a moving light-modifying element.
Q. So static in that situation being the light-modifying element itself is stationary?
A. That's what I meant by it, yes.
Q. Okay. What about a light-modifying element whose

1 properties don't change, could that be a static
2 light-modifying element?
3 A. In general, I'm not sure that I've thought about that,
4 so I don't know.
5 Q. Okay. And what about a lens, can a lens be a static
6 light-modifying element?
7 MS. SHAH: Objection, vague, incomplete
8 hypothetical.
9 A. I suppose people could refer to a lens as that.
10 BY MR. HUGHES:
11 Q. If I have a fixed lens, could I modify its properties?
12 MS. SHAH: Objection, vague.
13 A. It seems like a very general question, but I'd say it
14 seems like almost certainly you could, for example,
15 you could paint it black.
16 BY MR. HUGHES:
17 Q. Okay. And if you did paint it black, that would alter
18 its light-modifying properties, right?
19 MS. SHAH: Objection, vague.
20 A. It seems like if someone did that it would, yes.
21 BY MR. HUGHES:
22 Q. And would you consider that changing the
23 light-modifying element?
24 MS. SHAH: Objection, vague, incomplete
25 hypothetical.

A. This seems like sort of an odd situation and I'm not sure how I would really consider it.

BY MR. HUGHES:

Q. Okay. In general, if a system can change the physical properties of a light-modifying element, would you consider that light-modifying element to be variable or static?

A. I'm not sure that I've thought about this question before and it may depend on details, so I'm just not sure.

Q. So if a system can change the physical properties of a light-modifying element, would you consider that to be variable?

MS. SHAH: Objection, incomplete hypothetical.

A. Is that the opposite of what you had just asked before?

BY MR. HUGHES:

Q. Yes. I'll repeat.

Do you agree that if something's variable it can change?

MS. SHAH: Objection, vague.

A. In general, that seems to be a sensible characterization, but how to apply that to any particular situation I think might depend on the

details.

BY MR. HUGHES:

Q. Okay. And for a light-modifying element, if you can change that, would that be varying the light-modifying element?

MS. SHAH: Objection, vague, incomplete hypothetical.

A. I could imagine someone calling it that, but whether that would be an appropriate term in a particular technical situation, I think it depends on the details.

BY MR. HUGHES:

Q. Okay. If we can go to claim 2 in columns 95 to 96 of the '503 Patent --

MR. HUGHES: Sorry for not -- didn't have it open, I'm sorry.

MS. SHAH: No, that's okay.

BY MR. HUGHES:

Q. Okay. Do you see where claim 2 recites one or more light-emitting sources, each having a variable light source characteristic dependent on power?

A. Yes.

Q. Okay. And then do you see the claim says alter said light source characteristic via power control?

A. Yes, I see that.

Q. And this is referring to the variable light source characteristic dependent on power, right?
A. By this, do you mean the said light source characteristic?
Q. Yes.
A. Again, I'm not an expert in interpreting claims, but that would be my understanding of that language, yes.
Q. And then going a little further in the claim, do you see where it says there are one or more light-modifying elements provided in the path of the light emitted from at least one of the sources?
A. I see those words, yes.
Q. So you would understand you could have a light modifier in front of a light source -- right? -- in general.
A. In general, outside of any particular context, that's right, yes.
Q. Okay. And if I have a light-modifying element, and when I say the path of the light source, I mean the path of light being emitted by that light source; do you understand that?
A. I think so.
Q. If there were -- if it were only, so if I have a light-modifying element in the path of just one light source, it would only modify a characteristic of that

one light source, right?

A. I think, as a general question, outside of any particular context, that sounds right to me.

Q. Okay. So if there were multiple light sources and the light-modifying element was only in the path of one of them, it wouldn't modify the light source characteristics of the others, right?

MS. SHAH: Objection, incomplete hypothetical.

A. So in general, I don't recall right now how much you've already specified about this hypothetical light-modifying element, but in general, the light-modifying element may not have to be in the direct path of the light source.

So I'm not sure I'd agree with what you just said. Though again, all of this is, in my view, kind of hypothetical, so much would depend on a particular context.

BY MR. HUGHES:

Q. Would some of the light from a light source have to be incident on a light-modifying element for it to modify that light?

MS. SHAH: Objection, vague, incomplete hypothetical.

A. Well, if we're including elements that can modify

light, for example, by changing their power coming to the light source, or something like that, then modification can be done without the light impinging on the modifier.

BY MR. HUGHES:

Q. So something that changes the power to a light source, would you consider that to be in the path of the light source?

MS. SHAH: Objection, vague.

A. I suppose something like that could be or couldn't be, depending on the particular situation.

BY MR. HUGHES:

Q. How could it be?

A. You put it there, I guess.

Q. If you put something in the path of the light, wouldn't you expect it to block the light?

A. I would think so, yes.

Q. So is there a situation where you would put the power source for a light into the path of the light?

A. Well, this is your hypothetical, not mine, so I don't know if I would do that.

Q. Now, if we're talking about a light-modifying element that modifies light after it's been emitted from a light source, okay?

A. Okay.

Q. And again, we said we have multiple light sources but this light-modifying element is only in the path of one of them.

A. Are you saying that's what this claim says or that's your hypothetical?

Q. In my hypothetical. Yeah. If the only light that's incident is one of the light-modifying elements from one of those light sources --

A. Understood.

Q. -- it wouldn't modify any characteristics of the other light-modifying elements, would it?

MS. SHAH: Objection, calls for speculation, incomplete hypothetical.

A. The way that you're describing that hypothetical situation to me, I feel that's what you mean, yes.

BY MR. HUGHES:

Q. If we go back to claim 2 of the '503 Patent, and do you see the limitation around line -- this is line 10 in column 96?

A. Yes.

Q. Do you see at the end there's -- I'll just read the whole thing. This says one or more light-modifying elements provided in the path of light emitted from at least one of the lights -- of the sources, further controlling the light source characteristics, right?

A. I see that.
Q. And this uses the term light source characteristics plural, correct?
A. I see that, yes.
MR. HUGHES: Okay. So we are going into Exhibit 3 now, correct?
COURT REPORTER: Yes.
MARKED FOR IDENTIFICATION:
EXHIBIT 3
12:29 p.m.
BY MR. HUGHES:
Q. Okay. So I've handed you what's going to be marked as Exhibit 3. This is a copy of US Patent Application Publication No. 2003-0137849.
Do you see that?
A. Yes, I do.
Q. And the inventor on this is Alden, correct?
A. That's right.
Q. If I refer to this as the Alden reference, will you understand that?
A. Yes.
Q. Or just simply Alden?
A. Yes, that's fine.
Q. Okay. Do you recognize Alden?
A. Yes, I do.

Q. And this was one of the prior art references that you considered in your declarations, correct?
A. That's right.
Q. Okay. Can we turn to figure 5 of Alden. Let me know when you're there.
A. Okay.
Q. And do you see element 121 in Alden?
A. Yes, I do.
Q. And 121 is a lens, correct?
A. Yes, it is.
Q. And that -- and then also looking at figure 5, you see element 119?
A. I do, yes.
Q. That is a lighting element, correct? And if the -- you can look at a paragraph 47 of Alden as well, which describes figure 5.
A. Yes, it's described as a light element.
Q. Okay. And there's multiple light elements shown in figure 5, correct?
A. Yes, I believe there are nine.
Q. That we can see in the figure here?
A. Yes, I believe there are nine in the figure.
Q. Okay. So this lens, 121, modifies the light from these lighting elements, correct?
A. Yes, I think so.

Q. And in fact, Alden describes that this lens focuses the light, and I'm reading from paragraph 47 towards the bottom, such that light from each lighting element goes into a specified portion or portions of the headlight distribution area, correct?

A. I'm sorry, where is this again? Oh, I found it. Yes.

Q. Okay. And do you see in figure 5, one up towards the top, there's a reference numeral 125?

A. Yes.

Q. And 125 is an example of one of the sectors of the light distribution area, correct?

A. It's a little unclear to me whether 125 refers to the full sector or the topmost ray, but in general, it's referring to that light, yes.

Q. If we can go back to paragraph 47 towards the bottom, a few lines up, do you see the sentence starting element emitted light, 125?

A. Yes.

Q. And that indicates that element emitted light, 125, is an example of the element's light being directed into one sector of the light distribution area.

In the illustration, the 125 from 119 falls across a 15-degree section of the headlight distribution area.

Do you see that?

A. Yes, I see that.
Q. Okay. So looking back at figure 5, if only element 119 were illuminated, the only light we would see is in that 15-degree segment of 125, correct?
A. Well, sort of. One of the problems with this figure is that it's labeled here and mentions in the specification that it's a 15-degree segment, but that's not how it would actually work given -- given the source and lens situation, but I do see that, yes.
Q. So what -- if only element 119 is on, so do you agree that there would be light in segment, in the segment that's labeled 125, correct?
A. Yes.
Q. Would there be any light in, for example, the very bottom segment as represented in figure 5?
A. A little bit, yes.
Q. Would you expect the light there to be of less intensity than the light measured in segment 125?
A. It depends where you measure it.
Q. If I'm measuring at the very bottom and I have -- or even in the middle, and I have the lens here, would you expect the light in segment 125 to have a higher intensity than in other areas?
MS. SHAH: Objection, compound.
A. Where in the segment are you measuring?

BY MR. HUGHES:
Q. At the ends of the segments as shown on the page.
A. Okay. So you measure there, then yes, it would be quite different.
Q. Okay. So if there would be a different intensity measured at the end of segment 125 than, for example, some of the segments in -- at the ends of the segments in the middle or towards the bottom?
MS. SHAH: Objection, compound.
A. In a situation that only element 119 is lit, is that what you mean?
BY MR. HUGHES:
Q. Yes.
A. Then yes, that's how I understand it.
Q. Okay. And if there were no lens 121 present, then the light from 119 would not be focused into sector 125, would it?
MS. SHAH: Objection, incomplete hypothetical.
A. In that situation, there would be light from 119 in sector 125 but not only in sector 125.
BY MR. HUGHES:
Q. It wouldn't be focused into sector 125 like we see in the figure, right?
MS. SHAH: Objection, vague.

A. It would be different than the figure.
BY MR. HUGHES:
Q. If there was -- if we took the lens out of this figure here, the light from 119 would spread across more of the area, wouldn't it?
A. Yes, it would.
Q. And so if there were no lens, then the light to 125, if we measured the intensity, again, that would be lower than if the lens were there, right?
MS. SHAH: Objection, vague.
A. You're talking about measuring at the end of segment 125?
BY MR. HUGHES:
Q. Yes.
A. Most likely that would be the case if nothing else changed.
Q. And similarly, if we remove the lens, we would get a different intensity measurement on light in, for example, the ends of some of the middle segments than we do with the lens present, correct?
A. Yes, the lens affects the path of light that goes through it and it's going to affect, therefore, the measurements you make further down the line.
Q. Including measurements for intensity of the light?
A. Most likely, yes.

MR. HUGHES: Just want to check with you on timing. I can start a new one. You said 1:00 for lunch?

MS. SHAH: I mean, if this is more of a natural break for you, I think food is here.

MR. HUGHES: I wouldn't mind a little break right now.

MS. SHAH: Okay.

VIDEO TECHNICIAN: We're going off the record. The time is 12:40 p.m.

(Recess taken at 12:40 p.m.)

(On the record at 1:36 p.m.)

VIDEO TECHNICIAN: We are back on record. The time is 1:36 p.m.

BY MR. HUGHES:

Q. Dr. Turk, do you still have a copy of I believe what was marked Exhibit 3, Alden, in front of you?

A. Yes, I do.

Q. Okay. Can we turn to paragraph 5 of Alden. Let me know when you're there.

A. Okay.

Q. Okay. In paragraph 5, Alden says that its headlight system can stay on high beam in all sectors which do not contain a motor vehicle and can currently go on low beam only in those sectors which do contain a

1 motor vehicle, correct?
2 A. You'll have to point me to where you're looking. This
3 is paragraph 5? So were you reading specific words or
4 just summarizing? I'm looking for those words.
5 Q. So it says that it can -- let me give you the exact
6 line here. Give me one second. Sorry, paragraph 6.
7 I read the wrong number. And do you see the last
8 sentence there? It says the result is that the
9 present headlight can stay on high beam in all sectors
10 which do not contain a motor vehicle and can currently
11 go on low beam only in those sectors which do contain
12 a motor vehicle.
13 Do you see that?
14 A. I see that sentence, yes.
15 Q. Okay. And if you can go to paragraph 25 of Alden.
16 A. Okay.
17 Q. Do you see towards the bottom of 25 it says, so the 31
18 comprising a means to detect?
19 A. Yes.
20 Q. And if we go up a little bit earlier in the paragraph,
21 31 is a first vehicle, correct?
22 A. Yes.
23 Q. And that first vehicle is the vehicle with Alden's
24 illumination system, correct?
25 A. Yes.

Q. Okay. And do you see where paragraph 25 says that the headlight system can provide a burst intensity of illumination in a sector where, and then it says 33 is detected while concurrently providing a second intensity of illumination where no vehicle is detected?
A. Yes, I see that.
Q. And if we look at figure 1, 33 is another vehicle in front of the vehicle with the headlight system, correct?
A. Yes.
Q. So in these paragraphs of Alden, it's saying that its headlights provide one intensity where there is an oncoming vehicle and a different intensity where there -- where no vehicle is detected, right?
A. It's describing the two different kinds of sectors where those things are happening, yes.
Q. And one of those sectors is a sector where another vehicle has been detected, correct?
A. Yes, that's correct.
Q. And the other sector, as it says in paragraph 25, is where no vehicle is detected, correct?
A. I don't see that it refers to that as a sector, but that is the -- the other area, yes.
Q. All right. Do you see in the beginning of paragraph

25, the second sentence, says a first vehicle emits a low-beam illumination in a first headlight distribution sector while concurrently emitting a high-beam illumination in a second headlight distribution sector?

A. Yes.

Q. So again, the second headlight distribution area is where no vehicle is detected, correct?

A. Yes, I think that's right.

Q. Okay. And can you turn to paragraph 28 in Alden. Let me know when you're there.

A. I'm there.

Q. And paragraph 28 is describing figure 4 of that reference, corrects?

A. Yes, it is.

Q. And if you can take a quick look at figure 4, this is a flowchart describing the logic of the process in Alden, correct?

A. That's how it's described, yes.

Q. Okay. And if we look at the first sentence of paragraph 28, Alden clarified that figure 4 illustrates a flowchart describing logic of the process described in figure 3, right?

A. That's what it says, yes.

Q. Okay. Now, if we look at this, and we go through,

first it says a user-controlled switch, 87, gives the user the ability to select whether the system is in an auto mode on, or manual mode off. If the system is off, the user controls the headlights via a manual dimmer switch.

Do you see that?

A. Yes, I see that.

Q. And that's just saying that if the user doesn't want the system to automatically do this flow process, it can choose no and manually dim the lights; is that correct?

A. I think that's a reasonable interpretation, yes.

Q. If auto mode is on, though, then the system is going to file -- follow the flow logic of figure 4, correct?

A. I think that's the intent. I think figure 4 doesn't actually accomplish what the intent seems to be in the specification, but I think that's the intent.

Q. So do you agree that when that's on, the system is going to use the auto mode?

A. I think that's the understanding, yes.

Q. Okay. And do you see in that sentence, when the system is on, and the headlights are on, the CPU checks the status of each perspective sector, 89, of the light sensors.

Do you see that?

A. I see that. Though I don't think the flowchart matches that.

Q. Well, if we -- if we go to the flowchart at 89, that indicates, if we're looking at box 89, that indicates that it's checking is threshold light present at A1L sensor position, right?

A. That's right.

Q. And then at 91, it's checking is threshold light present at A2L to XYL sensor positions, right?

A. If it ever gets to 91, that's what it should do there, yes, but the problem is that it most of the time won't get there.

Q. When you say won't get there, what do you mean?

A. In a flowchart, you have decision points and you go in one direction or another when presented like this; so the first question is, is the threshold light present at A1L? I would presume. I think any person of ordinary skill in the art looking at this would presume that would be the top left-hand corner, the first sensor position, or at least one of the corners, and the intent after that would be to go along the rows or along the columns.

Most likely, in most situations, the answer to that first question's going to be no, in which case it will follow the -- the flow arrow to the right of

that box and end up in what's labeled as memory.

The only place it can go from there is the box that says compare left map to right map, and then from there, doing things like calculating distance and headlight dim zones and such.

So if the very first sensor position is not above threshold, it will never check with the others and will never compile the left and right maps, and so this just would not work at all, and I think that's almost always the case, that that very first sensor position would be under a threshold.

Q. So your -- your position is that if the first sensor does not have light above a threshold, the whole process stops?

A. It doesn't stop, it continues to follow the flowchart.

Q. Okay. Now, you see where in paragraph 28 it said when the system is on, and the headlights are on, the CPU checks the status of each respective sector of the light sensors?

A. Yes, and that's what I was just describing, the flowchart does not match that.

Q. Do you see the arrow that comes down to 91?

A. From 89?

Q. Yes.

A. Yes, I do.

Q. And then there's also an arrow from 91 to the same memory?
A. Yes, I see that.
Q. So isn't that showing that the check of threshold light at the 91 sensor positions is also going to memory?
A. If you get to 91, it will also do like it did in 89, it will check to see if the amount is above threshold, and it will go one of two directions after that check, either down to 93 or to memory.
Q. In your -- so again, if we look back at 28 of Alden and following the flowchart we just talked about, it can go to 91 and check those positions, right? Do you see in paragraph 28 where it says, likewise, the amount of light received by each sector of the left sensor sectors A2L through XYL is stored in memory in a left iterative process, 91?
A. I see where it says that, yes.
Q. Isn't that indicating that the system performs that process, 91, in an iterative manner?
A. It is described that way and, again, that's not how the flowchart actually works.
Q. Okay. But you agree that the flowchart does show process 91, correct?
MS. SHAH: Objection, vague.

A. Yes, it does show 91 and, like I described the -- like I described, 91 asks the question and then it will go either down to 93 or over to memory.

BY MR. HUGHES:

Q. Okay. Looking at paragraph 28, again, it does the same thing for the right sensor, correct?

A. Did you say right sensor?

Q. Right sensor, yes.

A. It's described in similar way to the right sensor, yes.

Q. Okay.

A. Sensor array, not sensor.

Q. And Alden further discloses in paragraph 28, and it shows in figure 4, that a left sensor map and a right sensor map will be compiled.

Do you see that?

A. I see where paragraph 28 mentions that, yes, and as I described, I think most of the time it won't happen according to the flowchart in figure 4, but yes, I see that in the paragraph.

Q. And then that same paragraph further describes that the CPU is going to compare the right map to the left map to determine the distance and intensity of each object sensed in a calculating process, correct?

A. Yes, I do see that and I think most of the time there

will be no data in these maps to compare according to the flowchart, but yes, I see that.

Q. And the paragraph states, if we go on to the next sentence, a triangulation process is used to determine distance of each object.

Do you see that?

A. I do see that, yes.

Q. And those objects are where there was light above a threshold, correct?

A. I think the intent of Alden is for it to be more than just that, but it does include that, yes.

Q. So if we, for example, if we look at figure 4 and we, you know, look at what are labeled as boxes 89, 91, 93, and 95, do you see those?

A. Yes, I do.

Q. Those boxes ask is threshold light present, correct?

A. Yes, that's what they ask.

Q. And then do you see in box 105 it says calculate distance to each threshold object?

A. I see that, and the missing part here is there's nothing here that describes what a threshold object is compared to a thresholding sensor position; so there's some ambiguity there.

Q. Okay. If we look at figure 4, and we're talking about paragraph 28, the process then, after the

triangulation process, do you see where we are? We're kind of down towards the middle, the bottom of paragraph 28 now. This is about where step 107 is.

A. Yes, I see 107 there.

Q. Okay. And it -- it indicates that the location of objects is used to calculate which zones of each headlight need to be dimmed in a calculating headlight dim zone's process, 107.

Do you see that?

A. I do see that, yes.

Q. And this process is done by the CPU, correct?

A. I think that's the presumption here.

Q. Okay. And towards the end of paragraph 28, Alden says that the light sent to the sensed vehicle location is dimmer than the light sent to all other areas of the headlight distribution area, correct?

A. Yes, I see that.

Q. And the all other areas would be where there's no sensed vehicle; is that correct?

A. I'd say where there's no sensed light above thresholds that is somehow determined to be from a vehicle, but there's no description of that process in Alden.

Q. And these areas would be high beam, correct?

MS. SHAH: Objection, vague.

A. Which area specifically?

BY MR. HUGHES:
Q. The light. So we have light sent to a sensed vehicle location is dimmer than the light sent to all other areas. Do you see that?
A. Yes.
Q. And these all -- so is it fair to say that these all other areas would be switched to high beam?
A. I'm trying to remember when Alden uses the phrase high beam, but in general, that's the intent, or at least the maximum amount.
Q. If we look at -- if we go to figure 4 itself, do you see box 109?
A. Yes.
Q. Do you see where that says switch other segments to high beam?
A. Yes, I see that.
Q. And those other segments would be segments where there was not light above the threshold, correct?
MS. SHAH: Objection, vague.
A. Well, I think the description of Alden is not just about light of a threshold but somehow determining an object and the dim zone around that object; so it's more complicated, I think, than what you said.
BY MR. HUGHES:
Q. Okay. Now, the -- so the dim zone around the object,

that's going to be the light that is, like, dimmed or we see in figure 4 switched to low beam, correct?

A. I think that is the intent, yes.

Q. And then in the areas, the other segments, those are going to be the ones where there was no detected light and that are not included in that, I think as you described, at the area around the headlights.

A. I think that's true.

Q. And Alden describes that that area around the headlights, which is also dimmed, is the area where, for example, the driver of the vehicle would be.

MS. SHAH: Objection, calls for speculation.

A. Are you talking the dimmed area?

BY MR. HUGHES:

Q. Yes.

A. I believe that's the intent.

Q. If you -- if we go to paragraph 27, just as an example, do you see the first full sentence it says the 75 area is significantly larger than the headlight dots?

A. Paragraph 27?

Q. Yes. Oh, I'm sorry, the first full sentence on page 3. I apologize.

A. I'm there.

Q. Okay. Does this inform your answer where this says the 75 area is significantly larger than the headlight dots that were initially received, and it goes on to say, because the CPU has made assumptions about the space that may potentially be occupied by the driver of the sensed vehicle?

A. Does it inform my answer to what?

Q. Is that what you -- when you said area around the vehicle, is that what you were referring to?

A. Yes, there's no detail in Alden about how that area might be determined, but I think that is the intent.

Q. Okay. Okay. So if we can stay in figure 4, you see we were looking at 109, and you agree that this indicates that the system is going to switch requisite headlight segments to dim and switch other segments to high beam, correct?

MS. SHAH: Objection, vague.

A. I agree that those are the words there, but I -- I don't think it's a fully accurate characterization, because most of the other segments will be on high beam anyway, so they don't need switching to high beam.

BY MR. HUGHES:

Q. So if a sector was on low -- well, let me go to the end.

Do you see the very last sentence in paragraph 28, the process then begins again, so as to be responsive to changing environmental conditions in realtime?

A. I see that, yes.

Q. And do you also see the -- I'm ahead of box 109 in figure 4 on the left, there's an arrow that goes back up to the first step, 89, checking if the threshold light is present?

A. Yes, I see that.

Q. So if during one iteration of this process there was a vehicle or, you know, there was an object, a threshold object detected in one of the sectors, you agree that would be set to dim, correct?

MS. SHAH: Objection, vague.

A. I believe that is the intent, yes.

BY MR. HUGHES:

Q. Okay. And so when the system then repeats the steps in realtime, the system's going to check again to detect for threshold objects, correct?

A. It's going to start the whole process again, which includes that, yes.

Q. Okay. And so it's going to recalculate headlight dim zones for detecting threshold objects, correct?

A. There's no information in Alden, I don't believe,

about when the process begins again, if it is keeping around any information from the past; so I'm not sure whether it necessarily calculates them from scratch or not.

Q. Okay.

A. But the intent is, I believe, to calculate these dim zones every time through.

Q. And the dim zones could change depending on changes in the detected light in realtime, correct?

A. Yes, that's correct.

Q. So is it fair to say that some LEDs may be dim -- dimmed one time through and then switched to high beam the next time through?

MS. SHAH: Objection, calls for speculation, incomplete hypothetical.

A. I think the process described here allows for that possibility, yes.

BY MR. HUGHES:

Q. So for example, if one zone was determined to have a sensed vehicle in it, it would be switched to dim, correct?

A. I would not say that the whole segment would be switched to dim, but some individual elements that were not already dimmed should be switched to dim.

Q. So lighting elements that are emitting light into that

area where there's a sensed vehicle would be dimmed, correct?

MS. SHAH: Objection, vague.

A. I think that's the intent, whether it's actually doing this for a vehicle or just to nonvehicle lights is another question, but I think that's the intent.

BY MR. HUGHES:

Q. And if later in the process in that same sector there's no longer any sensed vehicle, then they would be switched to high beam, correct?

A. So did you say later in the process?

Q. In another iteration of the process.

A. In another iteration.

Q. Of the process.

A. I think the intent is that any of the lighting elements in that situation you just described would be switched.

Q. Okay.

A. But not the whole segment necessarily.

Q. What do you mean by the whole segment?

A. Well, we're talking about segments, or the flowchart talks about switching segments in box 109, and what I'm saying is that's not necessarily what's happening. We've been talking about switching individual elements.

Q. So it can be more than one element you're saying that's going to a separate sector; is that what you're saying?
A. That's not what I said, but I think that's -- I think that's reasonable.
Q. Okay. And in the context of figure 5, we were talking about these lighting elements can be LEDs, correct?
A. I believe figure 5's lighting elements are intended to be LEDs.
Q. Okay. So in this realtime area process, it's fair to say that some LEDs over time may switch from low beam to high beam, correct?
A. Well, depends on whether we're talking about the flowchart at figure 4 or the text. As I've described, I think with the -- if the flowchart of figure 4 is actually the process, then nothing would ever get switched.
Q. Well, looking at the process as described in paragraph 28, you would agree that over time some of the lighting elements may switch from low beam to high beam; is that fair?
A. I think that's the intent described in that paragraph, yes.
Q. And similarly, some things that were high beam may switch to low beam, correct?

A. Some lighting elements, yes.
Q. Okay. So I think you still have in front of you I believe what was marked Exhibit 2. That was your declaration for IPR 2023-0126.
A. Yes, I do.

MARKED FOR IDENTIFICATION:
EXHIBIT 4
2:08 p.m.

BY MR. HUGHES:
Q. So I'm now handing what's been marked as Exhibit 4. Do you recognize this as a copy of your second declaration in IPR 2023-01027?
A. Yes, I do.
Q. Does it look to be a complete and accurate copy?
A. As far as I can tell you, yes.
Q. Okay. Can you turn to paragraph 65 of your declaration for the 01027 IPR, and that is on page -- page 52.
A. Yes.
Q. And can you turn to paragraph 65 in your declaration for the 01026 IPR as well. That is on also page 52.
A. Yes.
Q. Okay. And do you see in paragraph 65 of both you are talking about the plain meaning of two words, "turn" and "curve." Is that correct?

A. That's correct.
Q. And you have the same -- or paragraph 65 of the 01027 is the same as paragraph 65 of 01026, correct?
A. Yes, that's correct.
Q. Okay. So first you discuss what you consider the plain meaning of the word turn, correct?
A. That's right.
Q. And there you state that the plain meaning of a turn is a, quote, change of direction when moving, end quote. Correct?
A. Yes.
Q. And your source for that was Google.com?
A. Yes.
Q. What do you mean by change of direction?
MS. SHAH: Objection, calls for speculation.
A. I mean that the direction changes.
BY MR. HUGHES:
Q. What is a direction?
A. I don't know that I have a great, succinct definition off the top of my head, but in general, I think of it as an indication of orientation.
Q. Could you determine direction using a compass?
A. Do you mean specifically in the context of the '503 Patent or in general?

Q. I'm asking in the context of your plain meaning of a turn being a change of direction when moving.
A. I would say that's not a -- using a compass probably wouldn't be a practical way for many specific situations, but I think probably one could use in some situations.
Q. Even if you don't use a compass, per se, would compass headings indicate direction?
A. Compass headings are intended to indicate some sort of direction --
Q. Okay.
A. -- but there are different ways of considering direction, whether -- how many dimensions, what the use of it is; so it's not necessarily a -- it may depend on the situation.
Q. Okay. If a -- if in a vehicle the compass heading for which compass direction that vehicle's traveling in changes, would that indicate a change in direction?
MS. SHAH: Objection, calls for speculation, incomplete hypothetical.
A. I think, depending on the context, the answer might differ. In some contexts, it may be that within a certain range, one considers a single direction there that characterize that full range. In other settings, one might want to be very precise, in which case any

compass change might indicate a different direction; so I think it depends.

BY MR. HUGHES:

Q. So for example, if you're driving and a road, you know, bends around to the right and the compass heading changes from north to northeast, would that be a change in direction?

A. I would consider that overall a change in direction.

Q. Okay. So also in paragraph 65, you then discuss the meaning of a curve; do you see that?

A. Yes, I do.

Q. And your opinion was that the plain meaning of a curve is, quote, continuously bending line without angles, end quote, correct?

A. That's correct.

Q. And you are referring to dictionary.com as your source for that?

A. Yes, and I'd say both of these quotes and sources are meant to indicate, not to limit, that is, not meant to say that's the only way of describing a turn or a curve, but yes, that is my source.

Q. Okay. What do you mean by continuously bending line?

A. Generally a line that continuously bends and doesn't have specific angles.

Q. Can the degree of curvature change on a curve?

A. How are you defining degree of curvature?
Q. So can the amount of curvature, let's say relative to a direction straight ahead, change on a curve?
MS. SHAH: Objection, vague.
A. Curvature has a -- at least one specific mathematical definition, and it has, I would say, more general definitions. So do you mean the specific mathematical definition of curvature?
BY MR. HUGHES:
Q. At what -- I guess which definition of curvature are you using here for the plain meaning of the term?
A. I don't think I use the word curvature, do I?
Q. I'm sorry, curve.
A. Okay. So that's different.
Q. Are you referring to a mathematical definition of curve here?
A. No, I was referring to -- you asked about curvature and I was asking about the mathematical definition of curvature.
Q. In paragraph 65 where you discuss the meaning of curve, is that a mathematical definition?
A. No, that's intended to be a plain meaning.
Q. So you continue in paragraph 65 and you say by their plain meanings alone, a curve lacks the angle, quote, or yeah, the curve lacks the angle that facilitates

the change of direction required for a turn.

Do you see that?

A. I do, yes.

Q. Where in your definition of turn is there a mention of an angle?

A. The word angle does not show up in what I quoted there.

Q. Can one make a turn by steering a car in a curve?

MS. SHAH: Objection, vague.

A. Well, if you're using the plain meaning of curve in that question, as I'm quoting here, I suppose one could make a turn doing that if it's a very large, broad curve, but that's not the kind that we typically ever see on the roads; so I'm not really sure what that would mean in context of this declaration.

MR. HUGHES: I'm now going to hand you what we're going to mark as Exhibit 5.

MARKED FOR IDENTIFICATION:

EXHIBIT 5

2:21 p.m.

BY MR. HUGHES:

Q. And do you see that this is a copy of a reference with a publication number of WO-0101038?

A. Yes.

Q. And do you see the inventor first name is Harbers on

this?
A. I don't think that's the inventor's first name.
Q. I'm sorry, the first named inventor on this.
A. Yes, I do see that.
Q. Yes. Do you recognize this?
A. Yes, I do.
Q. And this is one of the prior art references that you opined on in your declarations, correct?
A. Yes.
Q. Okay. If I refer to this as Harbors, will you understand what I mean?
A. Yes, I will.
Q. Okay. So you agree that Harbors is directed to vehicle headlamp systems, right?
A. Yes, it is.
Q. And do you agree that Harbers discloses using LEDs as light sources for the vehicle headlights?
A. Yes, Harbers discusses LEDs.
Q. For example, if we go to page 8 of Harbers, if you look at the paragraph around line 10, this talks about light sources composed of LEDs, correct?
A. Light source in figure 2, yes.
Q. Yes. And do you see, if we look at the configuration in Harbers towards -- towards the end, do you see there's a figure 1-B?

A. Yes.
Q. And do you see this figure has kind of different arrows and lines coming out of the headlights of the vehicle?
A. Yes, I see that.
Q. And if we go to page 7 of Harbers, that indicates that those are, you know, looking at, for example, lines 1 to 3, that those are indicating light beams originating from the light source of the headlamp that are subdivided into four beam segments. Do you see that?
A. Yes, I do.
Q. Okay. And so if we look at that figure, you would agree that each beam segment is going into kind of a different portion of the overall headlight beam, correct?
A. Some are going to the same portion, but in general, they go to a range of portions.
Q. When you say some go to the same portion, are you referring to the overlap between some of the segments that start with a 6 and some of them that start with a 7?
A. I was actually thinking about some of the 6s that go to the same and some of the 7s that go to the same.
Q. Which one of the 6s go to the same?

A. Well, for example, what's labeled just 6, that's kind of a relatively wide beam, leaving the left headlight, left from our perspective, and what's labeled as 6 double prime is a narrower beam and some of the rays from both of those beams will go to the same places in the world.

Q. And then the two of the other beam segments there would be 6 prime, and 6 prime, I guess triple prime?

A. That's correct.

Q. And those are going to different sectors than 6 and 6 double prime, correct?

A. I don't recall offhand if Harbors uses that term, sectors, but they seem to be going to different parts of the space in front of the vehicle.

Q. If we look at, for example, page 7, about line 6, for example, the second beam segment, 6 prime, is comprised of a light beam which is directed towards the edge of the road or shoulder of the road, for example, correct?

A. Yes, I see that.

Q. Okay. And if we go down to line 15 on page 7 of Harbers, this indicates that the light beams may also be composed of more than four beam segments, for example, five or more beam segments having different spatial distributions and/or different spectral

characteristics, right?
A. I see where it says that, yes.
Q. So if we go back a little bit in Harbers, page 5, do you see in the first full sentence on page 5 indicates that you can have spectral characteristics of the light beam generated by the light source dependent upon the position in the light beam.
Do you see that?
A. It doesn't specifically say that you can do that. I think the sentence is essentially if you do that, then the following will happen.
Q. And if we look at the end of that, this paragraph is indicating that the intensity should be maximal in the center of the light beam, correct?
A. Sorry, where? Where is this?
Q. Around line 6.
A. Yes, I see that.
Q. And the center of the light beam would be kind of what's going more directly forward of the vehicle, right?
A. There's a range, according to the figure, but more or less forward of the vehicle, yes.
Q. And on page 5, Harbers talks about on axis versus off axis. Do you see that around lines 8 and 9?
A. Yes, I see that.

Q. And then it talks about that, again, starting around line 21?
A. It does.
Q. Do you agree that on axis and off axis refers to different parts of the overall light beam?
MS. SHAH: Objection, vague.
A. It's unclear to me specifically what parts means, but I do think that's what Alden is trying to communicate here.
BY MR. HUGHES:
Q. You mean Harbers?
A. Sorry, you're right.
Q. Okay. Harbers.
What is the -- now, the on axis, what is referred to as the on axis part of the beam, that's the part of the beam, if we look at figure 1-B, that would be going more forward, correct?
A. Or the center of the beam is on axis?
MS. SHAH: Objection, vague.
A. I don't recall Harbers defining these concepts, on axis and off axis, but offhand, I would expect on axis to be close to the center of the beam as you just described.
BY MR. HUGHES:
Q. And Harbers, for example, line 5, it says the

intensity of light emitted by a vehicle headlight/lamp decreases as a function of the position in the light beam, i.e., the intensity is maximal in the center of the light beam and gradually decreases in the direction of position situated at larger distance from the center of the light beam.

Do you see that?

A. I do, which is part of why I think these are not well defined terms in Harbers, in terms of on and off axis. It's described here as being gradual.

Q. And the next sentence it says, the intensity of light for on axis viewing is relatively much higher than for off axis viewing, correct?

A. Well, specifically it says for the so-called off axis viewing, which again, I think it's another indication of not a clearly-defined term.

Q. Still with Harbers, distinguishing between the on axis and the off axis, you agree Harbers discloses providing different light intensity in different parts or segments of the headlight beam, correct?

MS. SHAH: Objection, vague.

A. I don't recall if I have made that opinion, so I'd have to think about that a little bit.

BY MR. HUGHES:

Q. If we go back to figure 1-B, so do you see segment,

for example, 6 double prime?
A. Yes, I do.
Q. Okay. Now, you agree that would -- that segment is going kind of in the center of the overall light beam, correct?
A. I'd say it's approximately that way, yes.
Q. And 6 prime, like we talked about, is defined as approximating directed towards the edge of the road, correct?
A. Yes, I think it was defined -- described that way.
Q. On page 7, about line 6?
A. Yes.
Q. And something directed towards the edge of the road would not be the center of the beam, correct?
A. Of the overall headlight beam?
Q. Yes.
A. In this diagram, it would not.
Q. Okay. So is it fair to say that you can have a different intensity of light in what's shown as 6 prime as compared to 6 double primed?
MS. SHAH: Objection, calls for speculation, vague, and incomplete hypothetical.
A. I don't recall if Harbers sets any constraints on the intensities of these different segments or parts of them, so I'm not sure what the relationship is likely

to be, but I imagine it could be different.

BY MR. HUGHES:

Q. If we look at page 7, around line 15, Harbers indicates that the light beams, these beam segments have different spatial distributions and/or different spectral characteristics, right?

A. I see that, yes.

MR. HUGHES: Okay. I'm going to -- Exhibit 6, please.

MARKED FOR IDENTIFICATION:

EXHIBIT 6

2:38 p.m.

BY MR. HUGHES:

Q. Okay. You've been handed what's been marked as Exhibit 6 and this is US Patent No. 4970628.

Do you see that?

A. Yes.

Q. And do you see the name at the top of this is, I believe I'm pronouncing this correctly, Bergkvist?

A. Yes.

Q. Okay. If I refer to this as Bergkvist, will you understand that?

A. That's fine.

Q. And do you recognize this document?

A. Yes, I do.

Q. Is this one of the documents that you reviewed in providing your declarations?
A. Yes, it is.
Q. And if we look at even just the abstract of Bergkvist, this reference is directed to a vehicle headlamp, correct?
A. Yes, it is.
Q. And in Bergkvist, if we look at the abstract, and maybe the beginning of column 2, the summary of the invention, this is directed to including an ultraviolet light source in a vehicle headlamp, correct?
A. Yes, that's correct.
Q. And if we look at column 1, around line 60, do you see where it says if it were possible for a vehicle to transmit ultraviolet light, it would render the painting of road signs, roadside demarkation posts, etcetera, with a fully or partially DayGlo paint more viable than is now the case from a road safety aspect?
A. I see those words. I'm trying to recall what the "it" is in terms of if this were possible, it would render, but yes, I see these words.
Q. Okay. And so you understand ultraviolet, correct? What is ultraviolet?
A. Ultraviolet light is light -- is generally defined to

be of higher frequency than visible light, and particularly within a range of frequencies, from just below visible light to higher -- sorry, just above visible light to higher.

Q. Okay. And in this column 1 there it was talking about road sides, roadside demarkation posts, and a DayGlo paint, is that -- does UV light or ultra violate light interact with those things in a certain way?

MS. SHAH: Objection.

A. You're asking me in this document here or in general?

BY MR. HUGHES:

Q. Is there a difference?

A. I don't think the patent here describes all possible interactions; so yeah, there can be a difference.

Q. Okay.

A. Just trying to understand your question.

Q. What happens when UV light is incident on a road sign, for example?

A. It would depend on the how the road sign is made.

Q. What if the road sign had, for example, DayGlo paints like are mentioned in Bergkvist?

A. I think if the wavelength of the light and the DayGlo paint used were matching properly, then the light would be reflected off the sign.

Q. And would it be reflected as visible light?

A. It could be.
Q. So if we look at column 4 of Bergkvist, for example, around line 4, this says the ultraviolet light activates DayGlo paints and consequently objects which are painted with such paints, or which incorporate DayGlo inks or coloring substances, will be illuminated when located within the light lobe of the ultraviolet light.
Do you see that?
A. I see those words, yes.
Q. When it says the driver will -- and then the next sentence says the driver of a vehicle will observe such objects despite said objects being located in an area not irradiated by visible light.
Do you see that?
A. Yes, I see that.
Q. So do you agree this is indicating that with UV light you can -- it will activate DayGlo paints such that they will then be illuminated and give off visible light, correct?
A. That is a possibility.
Q. If they didn't -- they will do something so the driver can observe them, correct?
A. What was the first part of that?
Q. The reference says that the driver of the vehicle will

observe such objects, correct?

A. Yeah, in the case that this is accomplished correctly, then yes, they can.

Q. Now, you mentioned earlier the difference between UV light and visible light. Can someone see UV light?

A. Actually, it's a little complicated. If the energy is high enough, and it's in a wavelength range pretty close to what's considered visible light, then it is possible.

Q. In general, and as we see here in column 4, it says the lights of the vehicle, 1, will not dazzle the driver of the vehicle, 5, while objects 6 and 7, which are located outside the light lobe of the dimmed beams on the vehicle, will be illuminated for the driver of the said vehicle.

I know that's a lot. I think we need to turn to figure 1, yes, figure 1, and take a look at that.

So do you see in figure 1 we've got a vehicle, it looks like there's a vehicle labeled 2 that has some light, 1, coming out of it towards the bottom?

A. I thought one was labelling the road.

Q. If we look in column 4, it says, Thus in the case of the figure 1 example, the lights of the vehicle 1,

will not dazzle the driver of the vehicle 5.
A. It's a little confusing because earlier 1 is referred to as the road surface, column 2, line 40.
Q. And do you see where that says a car, 2?
A. Yes.
Q. Yeah. So do you agree where maybe it says vehicle 1 in column 4 it would be really mean vehicle 2 there?
MS. SHAH: Objection, calls for speculation.
A. Well, it says vehicle 1, so that's a little confusing.
BY MR. HUGHES:
Q. Okay. If we go to column 4, lines 15 to 20, do you see here that it says the ultraviolet light in a dipped beam load will assist the driver in noticing objects within the dipped beam load more readily. These objects may, for instance, be road signs or pedestrians wearing clothes which carry DayGlo colors.
Do you see that?
A. I do, yes.
Q. And this reference indicates that it's the use of the UV light which is going to help the driver to more readily observe those objects, correct?
A. In combination with DayGlo-coated clothes, yes.
Q. So for any object, for example, that will have DayGlo paint, it will help to more readily observe them?

A. It can, yes, with the constraints that I mentioned earlier, that as long as things are matching properly, in terms of wavelength and response and such.

MS. SHAH: Would this be a good breaking point?

MR. HUGHES: That's fine. We can take a break.

VIDEO TECHNICIAN: We are going off the record at 2:49 p.m.

(Recess taken at 2:50 p.m.)

(On the record at 2:57 p.m.)

VIDEO TECHNICIAN: We are back on record. The time is 2:57 p.m.

BY MR. HUGHES:

Q. Can you turn back to Exhibit 4, this was your second declaration for 01027, and if you can turn to page 141.

A. Okay.

Q. Do you see paragraph 267?

A. Yes, I do.

Q. And there you referenced detecting a preceding vehicle, i.e., taillights?

A. Yes.

Q. So is a preceding vehicle a vehicle that's in front of you and traveling in the same direction or in the same

lane?
A. That's how I understand it, yes.
Q. Okay. And have you had experience driving in traffic at night with a lot of cars in front of you?
A. Yes, unfortunately.
Q. Would you ever turn on your high beams in that situation?
MS. SHAH: Objection, calls for speculation.
A. I wouldn't prefer to but there may be times where I -- I would, or have, because I need to see something.
BY MR. HUGHES:
Q. If you didn't want to cause glare for all of the other vehicles in front of you, you would want to keep your headlights on low beam everywhere, correct?
MS. SHAH: Objection, calls for speculation, incomplete hypothetical.
A. You're saying if that was my only objective, not causing glare?
BY MR. HUGHES:
Q. Yes.
A. If that was my only objective, then I might even want to turn my lights off, but low beams would be reasonable, perhaps, also.
Q. Okay. What is the intensity of a taillight?

A. I don't know offhand.
Q. Any idea generally what it might be?
A. No, I do not have a good idea.
Q. Any range?
A. No, I don't have a good guess at that right now.
Q. And what about the intensity of a headlight, do you know what that would be?
A. I don't have a typical intensity range or measurement on the top of my head, no.
Q. But you opine that taillights usually appear dimmer than headlights, right?
A. Can you remind me where I opined on that?
Q. Yes. We were just looking at page --
A. 141?
Q. If we look at page 141 into 142, you say taillights across two -- so if we go to the top of page 142, do you see where it says the taillights would appear much dimmer than headlights?
A. Yes, I do see that.
Q. Okay. So one -- so you do agree that the intensity for a taillight is going to be different for -- than the intensity of a headlight, correct?
A. I think in most cases that's correct.
Q. Okay.
MR. HUGHES: Are we at 7 now?

COURT REPORTER: Yes, we are.

MARKED FOR IDENTIFICATION:

EXHIBIT 7

3:02 p.m.

BY MR. HUGHES:

Q. Yeah, it's a different one.

Okay. I'll hand you what's been marked as Exhibit 7. This is a copy of reference WO 0204247. Do you see that?

A. Yes, I do.

Q. And the first inventor name on this one -- or the first named inventor is Braun; do you see that?

A. Yes.

Q. If I refer to this as Braun, will you understand?

A. Yes.

Q. Okay. And do you recognize this reference?

A. Yes, I do.

Q. And it's also a reference you reviewed in preparing your declarations, correct?

A. In at least one of them, yes.

Q. Okay. So if we look at Braun including, you know, the figure on the front page in the abstract, you agree that Braun is directed to a vehicle headlamp system, correct?

A. Yes.

Q. And if we turn to page 7 of Braun, and if we look at lines 8 to 10, Braun's discussing the use of a 3-D range camera, correct?
A. Yes.
Q. And Braun discloses using this camera in its vehicle headlamp system, right?
A. I believe so, yes.
Q. Specifically Braun discloses that its 3-D range camera is for... sorry.
If we look at that, the 3-D range camera comprises a gated photo surface having pixels and collecting optics that collects light from the scene and images that collective light on the photo surface, correct?
A. I do see that, yes.
Q. Okay. And if we can turn now to page 17, and if you go to about line 11, this is also talking about the 3-D range camera, correct?
A. That is discussed here, yes.
Q. Okay. And do you see it says that 3-D range camera, 62, comprises a photo surface, 64, such as a CCD or CMOS light-sensitive surface having pixel, 66?
A. Yes, that's generally referred to as CMOS.
Q. Okay.
A. Yes.

Q. And that light surface is shown, for example, that the photo surface, 64, is shown, for example, in figure 2? Or figure -- if you look at the top right of the figure, there's a 60, and then by that is a 664 reference?

A. Yes, I see that.

Q. Okay. So is it fair to say that Braun's camera comprises of photon detector array?

MS. SHAH: Objection, calls for speculation.

A. Did you say photon detector array?

BY MR. HUGHES:

Q. Well, yeah, photon detector, or photo diode type array.

MS. SHAH: Same objection.

A. It seems to indicate that it can, but not necessarily.

BY MR. HUGHES:

Q. Would you agree it could at least include CCD or CMOS, correct?

A. It does include CCD or CMOS as possibilities in the line you read, yes.

Q. Okay.

A. But I'd like to add, actually, to finish that answer, that having CCD or CMOS, or whatever kind of array, is very different from shineality (ph.) in a 3-D range

camera, as with a video camera, but again, to answer your question, it does list that component here, yes.

Q. Okay. Okay. I'd like to go back to the Alden reference which was introduced as Exhibit 3, and if we can turn back to figure 5 of Alden?

A. Okay.

Q. And you recall we discussed earlier this shows that light output segments from the different lighting elements, 119, shown in the figure, correct?

A. Yes, it does -- yes, it does.

Q. And we can kind of see the total headlight output would be all of the different lines shown coming out from multiple different elements, correct?

MS. SHAH: Objection, calls for speculation, vague.

A. The output would include all rays within that range depicted by those lines.

BY MR. HUGHES:

Q. And those are made up of the light output from each LED, correct?

A. That's correct.

Q. And each LED projects light into a certain sector of that overall headlight output, right?

MS. SHAH: Objection, vague.

A. It's a little complicated because the way this is

shown, and described. It seems that only one of the LEDs would actually be at the focal length to the lens. That one would produce light as described by the lines for its associated segment. All the others would be a little bit out of focus, essentially, with respect to the lens, because they're not at the same focal distance, and so these are approximates. They're not precise definitions of segments of the light coming from the LEDs.

BY MR. HUGHES:

Q. With the LEDs and the lens, each LED is going to be directed light into a certain area of the beam, right? For example -- I'll stop there.

A. The light of a given LED can't go just anywhere, so it will be directed within a certain range, but what I'm saying is it won't be necessarily specifically what's depicted as a segment here.

Q. When all of the LEDs are activated on high beam, then the overall output would be fully illuminated in high beam, right?

MS. SHAH: Objection, vague.

A. If I understand your question, I think it's correct just by definition. If they're all intended to be high beam, then the combination will be high beam.

BY MR. HUGHES:

Q. Okay. What if only three of the LEDs are activated on high beam? For example, the one label 119 and the two next to it, would the light -- the overall light output look different?
A. And the others are what?
Q. Low beam.
A. Low beam. It would not look different from this diagram because the diagram's not showing the intensity of the beams.
Q. Okay. But with the understanding that some are high-beam intensity, some are low-beam intensity, that the beam would look different if only three of them were activated on high beam as compared to all of them, right?
A. Do you mean look different to an observer out in the world?
Q. Yes.
A. Then I presume that would be true.
Q. And if we look at, for example, one -- element 119, that one is directing light, like we talked about earlier as shown on figure 5, into the 15-degree segment identified as 125, right?
A. Sort of. The problem here is that this is not actually a 15-degree segment. It's a constant width, swath. I don't know if there's a better word than

that.

So the way this figure is drawn and explained actually conflicts with some other things that are said about it, for example, this description of 15 degrees.

Q. If we, kind of looking at this figure, if -- if just 119 and the two next to it were on high beam, and the others are dimmed, we would expect that, to see the high-beam light in kind of what's shown towards the top of figure 5, correct?

A. I think that's a correct interpretation.

Q. And if now if we go and the lighting element kind of opposed from 119 went all the way towards the top of figure 5, if that one and the one next to it were high beam, and the others were all low, we'd expect to see the high-beam light towards the, what, the bottom of the figure as shown, correct?

A. In both of those cases there would be some mixing, but in general, that's correct.

Q. Okay. I'm now going to show you what we're going to mark as Exhibit 8.

MARKED FOR IDENTIFICATION:

EXHIBIT 8

3:17 p.m.

BY MR. HUGHES:

Q. And this is US Patent No. 6049749. Do you see that?
A. Yes.
Q. And the name on this patent is Kobayashi?
A. Yes, I see that.
Q. Do you recognize this document?
A. Yes, I do.
Q. And this is, again, a reference that you considered in providing your declarations, right?
A. Yes, it is.
Q. Okay. And you agree that Kobayashi is also directed to a vehicle headlamp system?
A. Yes, it is.
Q. And you agree that Kobayashi is directed towards kind of, as discloses in the abstract, aiming the light from the lighting device based on information about a road profile?
A. In general, yes.
Q. For example, if we look at figure 10 of Kobayashi, do you see the vehicle identified by K?
A. Yes, I do.
Q. And if we look at kind of there's a legend down in the bottom right-hand corner, it says direction of irradiation point; do you see that?
A. Yes.
Q. And there's a kind of double circle at the bottom that

says most appropriate irradiating position; do you see that?
A. Yes, I do.
Q. And those are different than kind of the dotted line arrow that says direction of vehicle body access, right?
A. Yes, I see that.
Q. And the direction of irradiation point is the direction of illumination from the headlights, right?
A. It's at least the desired direction.
Q. When you say desired direction, what do you mean?
A. Well, Kobayashi uses mechanical means to potentially change direction, and I don't recall offhand if this patent says anything about precision to which it is able to achieve that desired position; so it might be -- desired and actual might be different.
Q. Okay. If we look at -- if we go to -- if we go to column 14, about line 53, do you see this at the beginning of description figure 10?
A. Okay.
Q. And this is talking about an example with a curved road; do you see that?
A. Yes.
Q. And towards the bottom it says, in accordance with the vehicle speed, the most appropriate irradiating

position at the front of the road is determined and the irradiating direction of the headlamp is controlled; do you see that?

A. Sorry, just trying to find the words. What line was this on?

Q. This is around line 63. In accordance with the vehicle speed, the most appropriate irradiating position at the front of the road is determined and the irradiation direction of the headlamp is controlled; do you see that?

A. I do see that.

Q. And then if we go on to column 15, we see in kind of the third line there, it says, an arrow and a solid line directed from the front portion of the vehicle to the double circle is an irradiating direction of the headlamp; do you see that?

A. I do see that.

Q. So there, irradiating direction means the direction the headlamp is going to be shining light, correct?

A. I think it's the intended direction determined, as you read on line 65. Whether it actually is that exactly in practice I think is a different question.

Q. Can we look back at figure 10 again?

A. Yes.

Q. And do you see in vehicle K, the first position is

designated A; do you see that?
A. Yes.
Q. And then ahead of that, the road curves, I guess if the vehicle's advancing forward, we would say the road is curving to the left here; do you see that?
A. Yes.
Q. And then at position B, the road is or the vehicle is kind of in the middle of that curve; do you agree?
A. Somewhere around there, yes.
Q. At position A, you agree that the vehicle has not yet reached the road curve yet?
A. It looks like it hasn't.
Q. And when it's at position A, the direction of the irradiation point and the most appropriate irradiation point are not straight ahead of the vehicle, correct?
A. That's correct.
Q. They're off to the left in the direction of the curve?
A. That's correct.
MR. HUGHES: Let me just take about a 5, 10-minute break.
MS. SHAH: Okay.
MR. HUGHES: I think I may be winding down here.
VIDEO TECHNICIAN: Going off the record. The time is 3:25 p.m.

(Recess taken at 3:26 p.m.)
MARKED FOR IDENTIFICATION:
EXHIBIT 9
3:37 p.m.
(On the record at 3:37 p.m.)
VIDEO TECHNICIAN: We are back on the record. The time is 3:37 p.m.
BY MR. HUGHES:
Q. So I think you have in front of you what's now been marked as Exhibit 9.
A. Yes.
Q. And this is a copy of US Patent No. 11,208,029, right?
A. That's right.
Q. And this is patent to Spero?
A. That's correct.
Q. And this is the patent that's at issue in IPR 2023-01034, correct?
A. That's right.
Q. Do you recognize this patent?
A. Yes, I do.
Q. And you've reviewed this patent before?
A. I have, yes.
Q. Have you read it in its entirety?
A. Yes, I have.
Q. And you're familiar with the contents of the '029

Patent?
A. In general, yes.
Q. And you're familiar with how the '029 Patent describes its headlight system works, right?
A. Yes.
Q. In the '029 Patent, what sensors are used to control the headlights?
MS. SHAH: Objection, vague.
A. I'd like to go to my declaration if I can to remind myself of that. I don't have that one in front of me.
BY MR. HUGHES:
Q. You don't recall any sensors in the '029 Patent that are used to control the headlights?
A. Well, what I said is I'd like to go to the declaration to remind myself of the full answer.
MARKED FOR IDENTIFICATION:
EXHIBIT 10
3:40 p.m.
BY MR. HUGHES:
Q. And you have what's been marked as Exhibit 10. Do you see this as a copy of your second declaration in IPR 2023-01034?
A. Yes, I do.
Q. Okay. And is this a complete and accurate copy of your declaration?

A. It looks like it is.
Q. Okay. So the question was, what sensors are used to control the headlights?
MS. SHAH: Same objection.
A. To my recollection, I believe there are both camera and noncamera sensors, but I'm not remembering the details of them or finding them in my declaration right now.
BY MR. HUGHES:
Q. What would the camera sensor be used for?
A. With -- with these three long patents and long declarations, I'm just not recalling the details of that right now. If you point me to a place in the patent, or in my declaration, I'd be happy to comment on it.
Q. So what about the noncamera sensors that you mentioned, what -- what are they used for?
A. Well, they're used, at least in part, in controlling a second plurality of the light sources.
Q. And what are some examples of the noncamera sensors?
A. I believe a steering sensor is one example.
MR. HUGHES: Okay. I think that's all the questions I have.
MS. SHAH: Okay. If you can give me a couple minutes.

MR. HUGHES: Yes.

MS. SHAH: Just to see if there's anything more for today.

VIDEO TECHNICIAN: We are going off the record. The time is 3:48 p.m.

(Recess taken at 3:48 p.m.)

(On the record at 3:56 p.m.)

VIDEO TECHNICIAN: We are back on record. The time is 3:56 p.m.

(The requested portion of the record was read by the reporter at 3:57 p.m.)

EXAMINATION

BY MS. SHAH:

Q. So based on the answer that you gave there, I wanted to ask a question in relationship to what you said.

Why is it that only one LED would be at the focal length?

A. The focal distance -- the focal distance of a lens like this is a number that describes how far away from the lens, in the direction perpendicular to the lens, parallel rays of light would focus, or similarly, a light source would send out parallel rays. That distance lies along a plane that is at a particular distance from the lens.

Because these light sources are not on a

plane, I think they're described as along -- on a curve along the focal length, only one of them would be actually on that plane and the others would be off of that plane at various distances.

So according to the physics of how lenses work, only that one that's on the plane at the focal distance would project light as described by these lines. The other would be somewhat different.

Q. And what would the effect of that be?

A. There would be more overlap of the segments than seems to be indicated here. To an observer out in the world in front of this headlight, the desired maximum illumination may differ, depending on where that observer is, sort of to the left and right and there might be other effects as well, but at least those.

I should also add that the shape of the light being emitted from any one of those sources will be somewhat different if the sources are not all at the focal distance from the lens.

Q. Would there be variation in the shape of the light if that's the optics that would need to be -- that accompany the design?

A. To arrive at the effect that I believe Alden is describing for the driver of the vehicle with this device, and for the other drivers, you would need a

different kind of lens to make that work with this -- this particular setup or architecture.

MS. SHAH: Okay. I have no other questions.

MR. HUGHES: I have nothing further.

VIDEO TECHNICIAN: Okay. This concludes the deposition. The time is 4:03 p.m. We are off the record.

(The deposition was concluded at 4:03 p.m. Signature of the witness was not requested by counsel for the respective parties hereto.)

CERTIFICATE OF NOTARY

STATE OF MICHIGAN)
) SS
COUNTY OF MONROE)

I, LEISA PASTOR, certify that this deposition was taken before me on the date hereinbefore set forth; that the foregoing questions and answers were recorded by me stenographically and reduced to computer transcription; that this is a true, full and correct transcript of my stenographic notes so taken; and that I am not related to, nor of counsel to, either party nor interested in the event of this cause.

LEISA PASTOR, CSR-3500, CRR,
Notary Public,
Monroe County, Michigan
My Commission expires: 9/7/27

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Federal Rules of Civil Procedure

Rule 30

(e) Review By the Witness; Changes.

(1) Review; Statement of Changes. On request by the deponent or a party before the deposition is completed, the deponent must be allowed 30 days after being notified by the officer that the transcript or recording is available in which:

(A) to review the transcript or recording; and

(B) if there are changes in form or substance, to sign a statement listing the changes and the reasons for making them.

(2) Changes Indicated in the Officer's Certificate. The officer must note in the certificate prescribed by Rule 30(f)(1) whether a review was requested and, if so, must attach any changes the deponent makes during the 30-day period.

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