

1 UNITED STATES PATENT AND TRADEMARK OFFICE

2
3 BEFORE THE PATENT TRIAL AND APPEAL BOARD

4
5 FOX Factory, Inc.

6 Petitioner

7 v.

8 SRAM, LLC

9 Owner

10
11 US Patent No. 7,147,207 B2

12 Filing Date: November 4, 2004

13 Issue Date: December 12, 2006

14
15 Case No. IPR2024-00492

16
17
18 ALL PARTICIPANTS APPEARING VIA ZOOM

19
20 VIDEO DEPOSITION of ALEXANDER SLOCUM, PhD

21 Thursday, October 24, 2024 - 11:14 a.m.

22
23
24 Reporter: Jill K. Ruggieri, RPR, RMR, FCRR, CRR

Page 2 1 APPEARANCES: 2 3 Finnegan, Henderson, Farabow, Garrett & Dunner, LLP 4 Arpita Bhattacharyya, Esq. 5 Stanford Research Park 6 3300 Hillview Avenue 7 Palo Alto, California 94304-1203 8 arpita.bhattacharyya@finnegan.com 9 650.849.6600 10 Counsel for petitioner 11 12 Lewis Rice LLC 13 Michael H. Durbin, Esq. 14 600 Washington Avenue, Suite 2500 15 St. Louis, Missouri 63101 16 314.444.7600 17 mdurbin@lewisrice.com 18 Counsel for owner 19 20 21 22 Videographer: Brad Thompson 23 24 25	Page 4 1 P R O C E E D I N G S 2 3 THE VIDEOGRAPHER: Good morning. 4 We are going on the record at 11:14 a.m. 5 Eastern Time on October 24, 2024. 6 Please note this deposition is 7 being conducted virtually. Quality of 8 recording depends on the quality of camera and 9 Internet connection of participants. What is 10 seen from the witness and heard on the screen 11 is what will be recorded. Audio and video 12 recording will continue to take place unless 13 all parties agree to go off the record. 14 This is Media Unit 1 in the 15 video-recorded deposition of Alexander Slocum, 16 PhD, taken by counsel for respondent in the 17 matter of FOX Factory, Inc. v. SRAM LLC, filed 18 in the United States Patent and Trademark 19 Office. Case number is IPR2024-00491. 20 My name is Brad Thompson, 21 representing Veritext. I'm the videographer 22 today. Our court reporter is Jill Ruggieri, 23 from the firm Veritext as well. I'm not 24 authorized to administer an oath. I'm not 25 related to any party in this action, nor am I
Page 3 1 I N D E X 2 3 WITNESS: 4 5 ALEXANDER SLOCUM, PhD 6 Examination by Mr. Durbin 6 7 Examination by Ms. Bhattacharyya 24 8 9 E X H I B I T S 10 EXHIBIT DESCRIPTION PAGE 11 Exhibit 1001 US Patent No. 7,147,207 8 12 Exhibit 1003 Declaration of Alexander 9 13 Slocum, PhD, in support of 14 inter partes review of US 15 Patent No, 7,147,207 16 Exhibit 1005 US Patent No, 6,360,857 84 17 Exhibit 1007 Certified Translation 102 18 of JP2516279Y2 19 Exhibit 1006 US Patent No. 6,491,146 171 20 21 22 23 24 25	Page 5 1 financially interested in the outcome. 2 If there are any objections to 3 proceeding, please state them at the time of 4 your appearance. 5 Counsel and all present, 6 including remotely, will now state their 7 appearances and affiliations for the record, 8 beginning with the noticing attorney. 9 MR. DURBIN: My name is Michael 10 Durbin. I am counsel for SRAM in this matter, 11 the patent owner, and I am from the law firm 12 Lewis Rice. 13 MS. BHATTACHARYYA: Arpita 14 Bhattacharyya from the law firm Finnegan on 15 behalf of FOX Factory and the witness. 16 17 ALEXANDER SLOCUM, PhD, a witness 18 having been duly sworn, on oath deposes and 19 says as follows: 20 21 THE VIDEOGRAPHER: Thank you, 22 counsel. You may begin. 23 24 25

Page 6 1 EXAMINATION 2 BY MR. DURBIN: 3 Q Good morning, Dr. Slocum. 4 A Good morning. 5 Q Dr. Slocum, since you have recently 6 been deposed by me in another matter between 7 these same parties, I will again spare you the 8 long instructions before starting this 9 deposition. But do you have any questions 10 before we get started about how things will 11 proceed today? 12 A I do not. 13 Q And as we -- 14 MS. BHATTACHARYYA: Mr. Durbin, 15 I just want to put it on the record that 16 this -- I think the case number that was read 17 out is incorrect, so I just want to put it on 18 the record that this IPR today is for case 19 number IPR2024-00492, and it's for the -- FOX's 20 IPR petition on Patent No. 7,147,207. 21 We can proceed now. 22 MR. DURBIN: Thank you, Arpita. 23 And I concur. 24 BY MR. DURBIN: 25 Q Dr. Slocum, is there anything that	Page 8 1 this deposition, Dr. Slocum? 2 A I am in a conference room by myself 3 at the law firm of Finnegan in Palo Alto, 4 California. 5 Q Is there anyone else present in the 6 room with you? 7 A No. 8 Q Please let me know if at any time 9 someone is present with you in the room so that 10 we may note it for the record, okay? 11 A Okay. 12 Q I'd now like to introduce a few 13 exhibits, Dr. Slocum. 14 A Okay. 15 MR. DURBIN: The first exhibit 16 I'd like to introduce is an exhibit that has 17 been previously marked as Exhibit 1001. I just 18 uploaded it to Exhibit Share. 19 (Exhibit 1001 marked for 20 identification.) 21 THE DEPONENT: Okay. It is 22 here, and I have opened it, and I also have a 23 clean paper copy. 24 BY MR. DURBIN: 25 Q What is this document, Dr. Slocum?
Page 7 1 would prevent you from giving your testimony 2 today? 3 A No. 4 Q Are you under the influence of any 5 medications, alcohol or any other substance, or 6 do you have any condition that would prevent 7 you from answering my questions truthfully and 8 completely? 9 A I'm under the influence of nothing, 10 and I will answer truthfully and completely. 11 Q And, Dr. Slocum, before we get 12 started, I would like to ask, do you understand 13 that you're under oath today to answer my 14 questions truthfully and completely? 15 A Yes. 16 Q And I will -- would like to conduct 17 things as we did yesterday. We'll go for about 18 an hour before taking a break. 19 If at any time you need a break, 20 though, please let me know. And in all cases, 21 I'll just ask that you finish whatever 22 questions are pending. 23 Is that acceptable to you? 24 A Yes. 25 Q Where are you appearing today for	Page 9 1 A This is the '207 patent. 2 Q Thank you. 3 (Exhibit 1003 marked for 4 identification.) 5 BY MR. DURBIN: 6 Q Now, Dr. Slocum, I'd like to 7 introduce another exhibit that has been 8 previously marked as Exhibit 1003. 9 A It's not up yet, but I have a paper 10 copy. That is my declaration. 11 I don't see it in the Veritext, 12 but I have paper, so I'm happy. 13 (Discussion off the record.) 14 A Okay. Now it did it. It seems to 15 be -- sometimes there's a lag, sometimes 16 there's not, but I clicked it a few times, and 17 it came up. 18 Q Dr. Slocum, what is this document 19 that has been previously marked as 20 Exhibit 1003? 21 A This is my declaration in support of 22 the inter partes review of US Patent -- and 23 I'll just use the last three numbers -- '207. 24 Q Thank you. 25 Did you draft your declaration

3 (Pages 6 - 9)

Page 10 1 in this matter, which is Exhibit 1003? 2 A I did. I started with -- Arpita said 3 she would like me to form opinions on -- she 4 gave me the claims of the patent, and she said 5 here are some -- here's some prior art. If you 6 want anything else, feel free to search. And 7 so I have the patent-in-suit, the prior art. I 8 did not see a need for anything further, and so 9 I based my opinions on reading the patent -- 10 the '207 patent, the other prior art patents, 11 and then I drafted my opinions regarding the 12 claims that I was asked to opine on. 13 And then we went back and 14 forth -- there's the, you know, the legal 15 boilerplate, there's the formatting of the 16 report, and she took care of that part, so she 17 was the scribe for me on that. 18 And then if I didn't answer 19 anything completely the way -- you know, we 20 would go back and forth. That was the process. 21 Q Did you physically type any portions 22 of your report? 23 A Yes. In my initial drafting of it, 24 and then I created some solid models of cam 25 designs, which I'm sure we'll be going over,	Page 12 1 my standard rate. 2 Q The couple of person-weeks figure 3 that you estimated in your previous answer, 4 does that include time spent on the underlying 5 District Court matter? 6 A No, because this -- this declaration 7 is just about the IPR. The District Court 8 matter happened -- gee, I think that was what, 9 last December or something. That was a while 10 ago. I forgot when the District Court was. 11 But my recollection of the time 12 it took was just in regard specifically to this 13 IPR document. And there's some relation 14 between the two, like with claim construction 15 and stuff we will get to, but my focus here was 16 on the IPR. 17 Q Do you understand that the parties 18 involved in this matter are SRAM, LLC, and FOX 19 Factory, Inc.? 20 A I do. 21 Q And do you understand which party in 22 this matter submitted your declaration? 23 A Well, I assume that FOX submitted my 24 declaration, because I wrote it for Arpita, and 25 she represents FOX.
Page 11 1 and of course the detailed discussions around 2 those. 3 Q How much time did you spend drafting 4 your declaration in this matter, Exhibit 1003? 5 A You know, it was a while ago I did 6 it. It was probably a person-week or two of 7 time. I don't have any finer resolution than 8 that. 9 It was not a couple of days, and 10 it wasn't months. It was probably, like I 11 said, a person-week or two. It didn't all 12 happen at once, you know. It gets drawn over a 13 period -- I'll do things, throw it over the 14 wall, take a look, and then I won't hear back 15 for a while. 16 Q How much time have you billed to this 17 matter? 18 A Again, I -- it's probably a couple of 19 person-weeks. I don't have the exact time. 20 Q Do you know the amount of 21 compensation you have received related to this 22 matter? 23 A I did not tally that up for this. I 24 don't know. It's -- you know, again, similar, 25 a couple of person-weeks to create this times	Page 13 1 Q I'll represent that I believe that 2 that is true also. 3 Have you worked with FOX 4 Factory, Inc., in other matters? 5 A There has been a few other patent 6 suits, for example, relating to axles and some 7 of the other patents that FOX and SRAM have 8 been in dispute before. 9 I can't recall exactly which 10 ones where I could give you numbers. 11 Q How much has FOX Factory paid you 12 over the many engagements you've had with them? 13 A Over the what engagements? 14 Q Over the sum total of engagement. 15 A I just don't -- I don't know. I do a 16 lot of things, and so I don't keep track of 17 things. I mean, I have two companies I run. 18 You know, I teach. I'm very active in 19 designing stuff myself, so my life is a rather 20 fast whirlwind of activities. 21 Q Do you have any estimate of the 22 amount of total compensation you've received 23 from working for matters with FOX Factory, 24 Inc.? 25 A I just can't give you any kind of an

4 (Pages 10 - 13)

Page 14 1 accurate estimate. It's not \$10,000. It's not 2 a million dollars. It's maybe 100 or so, 3 around there, 200. 4 I -- over the many years, I 5 don't know. It's not a little; it's not a lot, 6 and it's spread out over some years, so I just 7 can't have any -- I don't have any finer 8 granularity than that. 9 Q You would estimate, though, less than 10 \$500,000? 11 A Gee, I would think so. 12 Q Did you do any preparation before 13 this deposition? 14 A I did. I probably spent about two 15 days or so in total reviewing my declaration 16 and the patents, you know, the prior art. And 17 I flew in Monday, mid to late morning, and I've 18 been meeting -- I met with Arpita as of, you 19 know, the -- Monday late morning on and then 20 Tuesday. And we talked about all three of the 21 patents, the '993, this -- this one, and then 22 there's one more that we're being -- deposing 23 on tomorrow. And, I don't know, I guess it's 24 probably even amount of time on each of them. 25 Q In your preparations for this	Page 16 1 Ms. Bhattacharyya. 2 Q Have you spoken with anyone from 3 petitioner FOX Factory regarding your work with 4 this matter? 5 A I have not. 6 Q What about for the underlying 7 District Court case also involving the '207 8 patent? 9 A Not that I recall. I mean, someone 10 might have been -- gee, I don't -- not that I 11 recall. I mean if in one of these meetings 12 with Arpita someone was on the phone, I just 13 don't know. 14 But my interaction as far as my 15 recollection in both the district case and here 16 is primarily with Arpita, and Robert McCauley 17 is sometimes in some of the discussions. 18 Q Have you ever spoken with anyone from 19 petitioner FOX Factory, Inc.? 20 A When -- there was the -- remember 21 there was the trial -- or the hearing before 22 the -- a judge in Denver, and I think there was 23 some FOX Factory people there. But that was -- 24 speaking with him, but not about the technical 25 content about any of my reports.
Page 15 1 deposition regarding the '207 patent -- scratch 2 that. 3 Dr. Slocum, would you agree with 4 me -- scratch that. 5 Dr. Slocum, if I said the '207 6 patent, would you understand that that means 7 the patent in Exhibit 1001? 8 A Yes. 9 Q Is it okay with you if we refer to 10 this document as the '207 patent? 11 A Yes. That is preferred, please. 12 Q For your preparations for this 13 deposition regarding the '207 patent, with whom 14 did you speak? 15 A That was Arpita. Robert McCauley 16 stopped by for a brief moment in the room, but 17 my focus was -- focus was with Arpita. 18 And then we had a Zoom call, 19 Xirui, I believe I pronounced her name right, 20 she's with Finnegan in I think DC. I'm not 21 real sure where she's -- and I don't remember 22 her last name. She was on the call for, I 23 don't know, some half an hour or something. I 24 don't recall the exact time. 25 But my primary focus was with	Page 17 1 Q Did you review any documents during 2 your preparations for this deposition? 3 A I did. I read my declaration and the 4 prior art patents as referenced. 5 And then there's the file 6 history of the patent. When I say the 7 "patent," it's the patent, the file history 8 and -- but there was no other external 9 documents that I needed. 10 Q Did you review any documents you have 11 not yet mentioned to me? 12 A No, not that I recall. My 13 preparation was my report and then the 14 documents that are included in my report as 15 exhibits. 16 Q Have you reviewed in your 17 preparations for this deposition any documents 18 that aren't marked as an exhibit in this 19 matter? 20 A No. I was just focused for my 21 deposition here on my declaration and the 22 exhibits that are referenced in it. 23 Q Did you communicate with any third 24 parties during your preparations for this 25 deposition?

5 (Pages 14 - 17)

Page 18 1 A No, other than I told my wife where 2 I'm going to be this week. And she said, "yes, 3 dear. Goodbye, dear." 4 Q Did you do anything else to prepare 5 for this deposition? 6 A Had a good night's sleep, and, you 7 know, read -- read the documents so I can 8 hopefully efficiently answer your questions. 9 Q Did you speak with anyone else that 10 you haven't discussed yet? 11 A I have not. 12 Q Did you review anything else that we 13 have not yet discussed today? 14 A No. 15 Q Did you perform any prior art 16 searches for this matter? 17 A I did not. I found that the prior 18 art that was provided was all I needed. 19 Q Did you request that anyone else 20 perform a prior art search on your behalf? 21 A I did not. 22 Q Were you provided by -- scratch that. 23 Were you provided with all of 24 the prior art references you refer to in your 25 report?	Page 20 1 chunks of tissue that have been lost, he is the 2 chunks of tissue person. And then -- so 3 sometimes he needs my expertise for detailed 4 mechanism or impact studies and stuff to relate 5 to what he does. So that's where our overlap 6 is. 7 John is in his materials. Alex 8 Jr. is the surgeon. I'm the mechanism guy, and 9 we're all mechanical engineer PhDs. So that's 10 how we cover the gamut of what is needed, in 11 addition to then you can see from the patent 12 record, we design quite a lot of hardware 13 ourselves for the company we have. 14 Q Was Dr. Jonathan Slocum involved in 15 this matter in any way? 16 A He was not. 17 Q Dr. Slocum, could you please turn 18 your attention to Exhibit 1001, which we 19 referred to -- we've agreed to refer to as the 20 '207 patent? 21 A Okay. 22 Q Broadly speaking, what is disclosed 23 in the '207 patent? 24 A This is a shock absorber/also spring, 25 so it's part -- it's a suspension system for
Page 19 1 A Correct, in that, again, it was the 2 starting point and I was told if I think I need 3 anything else, feel free to search yourself or 4 tell us to search. So I -- I read things, and 5 I found that was all I needed. 6 The cam design that I did, I 7 think I referenced my own textbook, but that's 8 all in my head, about how I teach cam design, 9 so I didn't need to go and use any external cam 10 design reference software or anything. 11 Q Has your son, Alexander Slocum Jr. 12 been involved in this matter? 13 A No. 14 Q Do you work with any other 15 individuals in your expert services? 16 A Well, my son, Dr. Jonathan Slocum, 17 and I, we do a fair amount of forensic work, 18 mostly in the oilfield industry but also in 19 heavy equipment. 20 So we figure out when there's an 21 accident why things broke and report on that. 22 Dr. Alexander Slocum Jr. is a PhD mechanical 23 engineer, and he's also a surgeon. 24 So the three of us will also -- 25 if there's a case involving, for example,	Page 21 1 ostensibly a mountain bike. I think you could 2 probably use it in some of the new electric 3 hybrid bikes, and whether that's a motorcycle 4 or a bicycle, to be determined. 5 But ostensibly, it's for 6 mountain bikes. And it provides the spring 7 suspension for the rear of the bike. In those 8 bikes, the -- the seat stays are hinged, and 9 then the chain stays are hinged. They come 10 back to the point where the axle goes through, 11 and so that whole triangle formed by the stays 12 moves, and it is -- there's a spring mechanism 13 and a damping mechanism all contained within 14 the same assemblage of tubes, which is what the 15 '207 is claiming. 16 And that allows the seat stays 17 and the chain stays to move up and down with 18 the wheel. And it's a suspension, so it has a 19 certain springiness, and you have to dissipate 20 the energy. 21 And what this patent is about is 22 how you can adjust the amount of damping that 23 you get in that, so that -- this is something 24 that's a desirable thing, because different 25 riders have different riding skills, body

6 (Pages 18 - 21)

Page 22 1 weights and types of terrain you traverse. 2 Q And how does the '207 patent disclose 3 that one could adjust the amount of damping? 4 A Okay. So there's two -- two forms of 5 damping, or two modes. One is during the 6 compression cycle. That's like when you land a 7 jump or go over a bump and you -- you compress 8 it and you dissipate energy by slowing how fast 9 your body is headed to the ground once the 10 tires re-hit, or over a bump. 11 And then after you compress, 12 you're compressing a spring. The spring will 13 return the energy, and that's called rebound. 14 And that also needs damping; otherwise, it 15 could throw you out of your seat. 16 So those are the two modes that 17 you want to adjust. And we're primarily 18 concerned here with the compression mode. And 19 it does it in one of two ways. There's a 20 handle that you can move, for example, from one 21 position to another position. You often want 22 to have what's called "lockout" because if 23 you're riding your mountain bike now not on a 24 trail but on a flat stretch of, you know, road, 25 and you have to pedal hard, you could end up	Page 24 1 Q Dr. Slocum, do you see the annotated 2 image on this page 12? 3 A I do. 4 Q What is shown in the annotated image? 5 A So what I'm showing here is an 6 embodiment of the invention where, as I 7 described earlier, the lever, which is called 8 the selector, it is -- it ostensibly has two 9 positions, where it's either on lockout or it 10 activates to be on. And as the lever moves, it 11 turns a camshaft, which is all in purple -- the 12 lever and the camshaft, they're connected. 13 That camshaft contacts the end 14 of what's called the driver. The driver is a 15 rod that extends down through the center of the 16 shock absorber, and that controls the opening 17 of a valve down at the bottom, at the end of 18 the driver. And that -- by controlling that 19 valve opening, that controls the resistance to 20 oil flow as the shock absorbers compress. 21 So the smaller the opening, the 22 more energy will be dissipated and the stiffer 23 the damping will be. 24 And then to get the fine 25 adjustment of that opening, and hence the
Page 23 1 bouncing up and down on your bike. So that's 2 why you want to do lockout and just turn the 3 suspension off. 4 And then in the other position, 5 you want the suspension to be active, so that 6 would be a second position. 7 Now, how active? And then now 8 there's an adjustment ability either by the 9 position of the lever itself -- that's one 10 embodiment that's shown -- or you just move the 11 lever all the way over to the "on" position, if 12 you will, and then there's a knob that you can 13 turn to give you the fine adjust. 14 So the patent discloses two 15 modes of fine adjust or the amount of damping 16 you get, either just with a lever or with a 17 lever plus a screw knob. 18 And then there's -- you can also 19 then adjust the rebound. But, like I said, I 20 think we're -- I was focused on the compression 21 side of the adjustment. 22 Q Dr. Slocum, would you please turn 23 your attention to page 12 of your declaration, 24 Exhibit 1003. 25 A Okay.	Page 25 1 damping factor, there's an adjuster assembly. 2 It's labeled -- it's shown in kind of an orange 3 color there, and it has a knob 70. 4 So as you turn that knob, it 5 activates a screw thread to slide the camshaft 6 back and forth. And the way that gives you 7 adjustment of the position of the driver is if 8 you look in the image there, you can see the 9 camshaft has an angled surface on it. 10 And so that angled surface or 11 wedge shape is moved to the left and right by 12 rotating that knob 70, because it's activating 13 a screw thread that causes motion. 14 So that's one embodiment of the 15 invention. 16 Q Dr. Slocum, is this figure taken from 17 the '207 patent? 18 A Yes. This is from Exhibit 1001. And 19 I did the annotations with the coloring. 20 Q I'd like to break down your 21 explanation of how it operates for my own 22 edification. 23 A I'm sorry. 24 Q What is driver 22? 25 A Okay. Driver 22 is a rod that

7 (Pages 22 - 25)

Page 26 1 extends from this actuating assembly to 2 transmit motion down to a valve system that -- 3 if you see, it's labeled -- 14 is the number, 4 and then there's a line with an arrow that's 5 pointing. It doesn't touch anything. So 6 that's indicating -- and you can -- the valve 7 assembly at the bottom. 8 And you can see where the end of 9 the -- where I've colored orange, the driver 22 10 now touches what looks like a little 11 trapezoidal element 52. So that's where you're 12 starting the contact of the valve assembly and 13 change the opening of the valve assembly, which 14 will now affect the amount of damping you get. 15 So the axial position of the rod 16 is what controls how much damping you get. 17 Q Is the axial position of driver 22 a 18 position along the line labeled 60 in this 19 figure? 20 A Yes. 21 Q Does driver 22 move up and down, as 22 shown in this figure, along line 60? 23 A Yes. It -- and that motion is 24 controlled by the interaction of the end of 25 driver 22 with the camshaft.	Page 28 1 around axis 68 will cause a movement of the 2 camshaft 56 left or right, as shown in this 3 image, along axis 68, correct? 4 A Correct. 5 Q When lever 54 is in this position, 6 movement of the camshaft 56 along the axis 68 7 will cause driver 22 to move up or down along 8 axis 60, correct? 9 A Correct. 10 Depending on your rotation of 11 that adjuster knob, which you can see is 12 connected to a thread -- and that's what causes 13 the driving left or right of camshaft 56 -- 14 it's that angled portion labeled 66 that is 15 engaging with the end of driver 22. That wedge 16 angle is what pushes the driver up and down. 17 Q Dr. Slocum, rotation -- scratch that. 18 Dr. Slocum, knob 70 isn't 19 rigidly fixed to camshaft 56, correct? 20 A No, it has to -- it has to only apply 21 axial forces. The center of camshaft 56 goes 22 through a round center, a hole of knob 70. 23 When you rotate knob 70, knob 70 24 has a shaft that is threaded, that is engaged 25 with threads in the body. And now, if you
Page 27 1 Q What is selector 20? 2 A So selector 20, you see there's a 3 handle 54, or a lever. You could call it a 4 lever or a handle. And that is connected -- 5 the setscrew that does the connection isn't 6 labeled, but it's -- it's connected to the 7 camshaft 56. 8 So the two are rigidly connected 9 to it. So when you move the selector 20, that 10 lever 54, it will cause the camshaft to rotate, 11 and that will influence the motion of the 12 driver. 13 Q Lever 54 will rotate about axis 68, 14 correct? 15 A Correct. 16 Q Camshaft 56 will also rotate around 17 axis 68 as lever 54 rotates around axis 68, 18 correct? 19 A That is correct. 20 Q Rotation of lever 54 will cause 21 driver 22 to move axially up or down along axis 22 60, correct? 23 A Correct. 24 Q When lever 54 is in the position 25 shown in this Figure 1, rotation of knob 70	Page 29 1 rotate it one direction, it's going to push 2 camshaft 56, for example, to the left. You 3 rotate it in the other direction, and it's 4 going to push the camshaft to the right. 5 Q Dr. Slocum, the "push" in your 6 previous answer is caused by a shoulder or a 7 flange of knob 70 pushing on some coordinate 8 flange or shoulder of camshaft 56, correct? 9 A Correct. And in the other direction, 10 it's shown that it's just pushing on what would 11 be -- look like a shoulder of the lever 54 to 12 go the other way. 13 So it's a push me/pull you sort 14 of thing. 15 Q Okay, Dr. Slocum, would you please 16 turn your attention to Figures 1 through 6c of 17 the '207 patent. 18 Please just review these 19 figures. 20 (The deponent read the 21 document.) 22 A Okay. 23 Q Do these figures show one of the two 24 embodiments you previously testified are 25 included in the '207 patent?

8 (Pages 26 - 29)

Page 30 1 A Correct. Figures 1 through 6 of the 2 first embodiment, and then Figure 7 is a second 3 embodiment where you no longer have that knob 4 70. That's -- basically, the thread is 5 incorporated into the camshaft itself, 56. 6 Q You anticipated my next question. 7 A Oh, I'm sorry, I was just explaining 8 what I saw in the figures. 9 Q Dr. Slocum, what does -- scratch 10 that. 11 Dr. Slocum, what is the valve 12 actuating assembly 16 disclosed in the '207 13 patent? 14 A There's a selector, a camshaft, and 15 in embodiment 1 you have a fine adjustment due 16 to that knob. In the second embodiment, the 17 fine adjustment is just with the selector 18 acting on the camshaft. 19 Q And what is adjuster assembly 17 in 20 the '207 patent? 21 A Hold on. Let review 17. 22 (The deponent read the 23 document.) 24 A Let's see, I have 16 and 18. Let me 25 see if that's the second one. You said 17,	Page 32 1 Adjuster assembly 18 here, that 2 gives me fine adjustment position of how the 3 cam 56 affects the position of driver 22. 4 Because to dissipate the energy, you have to 5 control the size of the opening that the oil is 6 forced through as the -- as the shock absorber 7 compresses. 8 The smaller the opening, the 9 greater amount of damping. The bigger the 10 opening, the easier it is for the oil to flow, 11 and there's less resistance to flow and hence 12 less damping. 13 The flow through those passages 14 goes typically with the third power of the 15 characteristic dimensioning of the opening. So 16 a very small little bit of motion can create a 17 big change in how much damping you feel, and 18 that is where SRAM has showing in this 19 embodiment that the user will just pick with 20 the lever lockout or open for damping. And 21 then you have an adjuster assembly 18 that 22 gives you fine motion of the camshaft to give 23 you fine control of that opening through which 24 the hydraulic oil is forced through. 25 So in other words, valve
Page 31 1 correct? 2 Q I did, but I'd like to withdraw my 3 question and ask you what is the valve 4 actuating assembly 16? 5 A Okay. Well, that's what we just 6 covered. It's the camshaft, and the camshaft 7 is always -- is present all the time, and 8 that's what -- the various surfaces which we 9 can go through in the figures are showing 10 different types of cam logic that interfaces 11 with driver 22 to cause it -- it motions up and 12 down, whether it's locked out or incrementally 13 along the lines to give you fine positioning of 14 driver 22, which would give you fine 15 positioning of the valve and the actual damper 16 dissipation of the oil down at -- remember I 17 mentioned there's a number 14 pointing to that 18 whole lower assembly of the valve. 19 Q And, Dr. Slocum, I misspoke once 20 again, okay? And I'm going to get it right 21 this time. 22 Dr. Slocum, what is adjuster 23 assembly 18? 24 A Okay, yeah, that's why I was thrown 25 for a loop. I don't -- didn't recall a 17.	Page 33 1 actuating assembly 16 is a course between 2 closed and open in that embodiment of the 3 two-position system of the lever. 4 And now how much damping you get 5 when you've selected "open" is governed by the 6 adjuster assembly 18. That's what the first 7 embodiment is about. 8 Q For the first embodiment shown in 9 Figures 1 through 6 of the '207 patent, is the 10 adjuster assembly 18 knob 70 and its associated 11 threads and shoulders that we discussed 12 earlier? 13 A Correct. 14 Q Turning back our attention to the 15 second embodiment disclosed in Figures 7a 16 through c, what is the adjuster assembly 18? 17 A Okay. There, the adjuster assembly 18 is -- you see there I'm on page -- I'm sorry, 19 on Figure 7a. 20 Now the adjuster assembly, that 21 lever 54 provides multiple functions. In other 22 words, I can move the lever 54 and achieve 23 lockout, or I can move it intermediate 24 positions along the way where that -- see the 25 thread 84 and 86?

Page 34 1 I am now going to move that 2 lever 54 not just, for example, from position 1 3 to position 2, but I'll stop at positions along 4 the way. And as I'm moving it along the way, 5 the thread -- the thread engagement causes the 6 camshaft and the attached lever to move left or 7 right to vary the contact between the camshaft 8 and the rod 22, again, through that angled 9 surface 66. 10 So it's a combination of 11 rotation and axial motion of 56, in this case, 12 all driven by the lever 54, whereas in the 13 previous embodiment, lever 54 only affected the 14 rotation motion of the cam, and the axial 15 position was governed by a separate knob, but 16 still with a thread. 17 Q Dr. Slocum, for each of Figures 7a 18 through 7c, lever 54 is pointing downwards, 19 correct? 20 A Correct. 21 Q It has the same angular position? 22 A Well, see the threads? It's a -- the 23 way that you can look at the pitch of the 24 thread, that's the spacing between the 25 subsequent teeth. So lever 54 is not just	Page 36 1 the end of driver 22, they're actually showing 2 a gap between it and that angled cam surface 3 66. 4 Q Dr. Slocum, in the embodiment shown 5 in Figures 7a through 7c of the '207 patent, 6 does one full rotation 360 degrees, either 7 clockwise or counterclockwise, cause the axial 8 movement of the lever -- of -- scratch that. 9 Dr. Slocum, in the embodiment 10 shown in Figure A through Figure -- scratch 11 that. 12 Dr. Slocum, in the embodiment 13 shown in Figures 7a through 7c of the '207 14 patent, does one full rotation 360 degrees, 15 either clockwise or counterclockwise, cause the 16 axial movement of the camshaft 56 in a 17 direction that's either left or right as shown 18 in these images? 19 A Correct. And if you go to column 5, 20 line, call it 63, it says, "at which the driver 21 22 engages the angled cam surface 66, the lever 22 54 is rotated through one or more complete 23 revolutions. For example, the lever 54 shown 24 in Figure 7b has been rotated through one 25 complete revolution compared to the lever 54 in
Page 35 1 swinging, for example, through 180 degrees. To 2 get more motion, it would actually spin more 3 than 180 degrees. 4 So I can go in here and count 5 the actual threads. But what you see if you 6 look at Figures 7a, b and c, it's hanging down 7 in all instances, but the axial position of 8 lever 54 with respect to the body, which is 9 24 -- you can tell by the crosshatching, that's 10 the entire body -- that axial distance between 11 that little dog leg -- it's not a dog leg, 12 because this is actually a cylinder, so that 13 would be the outside of the cylinder -- is 14 moved. 15 So that's -- let me show, for 16 example, between 7b and 7c, let me count the 17 threads. 18 I'm counting from 7b to 7c three 19 threads have been -- I'm sorry. Two threads 20 have been covered up in those two positions, 21 which would indicate I've got two rotations 22 there of 54, and that's why the lever, you can 23 see, is much closer to the structure 24 in 24 Figure 7c than 7b. 25 And you can now see in Figure 7c	Page 37 1 Figure 7a, causing the camshaft 56 to axially 2 displace by an amount equal to one thread 3 pitch." 4 So that's what I was referring 5 to earlier. 6 Q Dr. Slocum, may I please direct your 7 attention to the second sentence in the same 8 paragraph? I'll read it to you. 9 "In this embodiment, the 10 function of the knob 70 of the previous 11 embodiments is replaced with threads 84 on the 12 camshaft 56 that engage threads 86 on the first 13 cylinder 24. The adjuster assembly 18 is 14 formed integrally with the selector 20." 15 Do you see that? 16 A Yes, I do. I believe that's what I 17 was just trying to describe. Maybe I should 18 have just read from the patent rather than 19 looking at the figures, but it's the same. 20 Q Does this indicate that the adjuster 21 assembly is in this embodiment threads 84 and 22 threads 86? 23 MS. BHATTACHARYYA: Objection. 24 Mischaracterizes the record. 25 A It also includes the lever, because

10 (Pages 34 - 37)

Page 38 1 the threads by themselves do nothing unless you 2 cause relative motion. 3 So just like earlier, the 4 adjuster assembly 18 includes the knob 70, 5 because that's what actually engages and causes 6 thread motion. You have to have something as 7 part of the adjuster assembly that causes 8 the -- the threads to move. Otherwise it's the 9 sound of one hand clapping. Doesn't do 10 anything. 11 Q So without those threads, this 12 embodiment -- scratch that. 13 What would we have if we didn't 14 have those threads? 15 A Well, it's an adjuster assembly. So 16 the goal is to change, do something to a cam to 17 cause driver 22 to move in reaction to position 18 of your human input, which is a lever in this 19 case. 20 So if you're not going to use 21 threads, then you'd use a different type of 22 cam. 23 This particular cam they're 24 doing here is a combination of surfaces 25 arranged circumferentially and a wedge.	Page 40 1 depend upon how much space I have to put things 2 and also a big thing then becomes potentially 3 the controllability, and particularly the 4 ergonomics if people are activating the cams. 5 Q Would you please turn your attention 6 to column 1 of the '207 patent, which is 7 Exhibit 1001. 8 A Okay. Hold on. 9 Okay. I'm in column 1. 10 Q Would you please -- scratch that. 11 What is the title of this 12 patent? 13 A "Actuator apparatus for controlling a 14 valve mechanism of a suspension system." 15 Q What is stated immediately below the 16 title of this patent? 17 A "Background of the invention." 18 Q What does "background of the 19 invention" mean to you? 20 A So this is telling me what was known 21 at the time of the invention, what has been 22 done. And sometimes in the background, it will 23 also describe what the problem is with what has 24 been done before. In other words, the problem 25 to be solved by the invention.
Page 39 1 And when you have a cam with a 2 wedge surface on a cylinder, you have to have 3 axial motion. You cannot have a wedge if you 4 now use -- and I show images of this later. 5 You can have a cam shape -- if you think about 6 a lobed cam, like a camshaft on your car. Now 7 I can achieve up-and-down motion of the driver 8 just by the shape of that -- those lobes, and 9 they're circularly just round about a central 10 axis on the cam, just like a camshaft in your 11 car. 12 There's many different types of 13 cams. In other words, you can get motion of a 14 cam follower, which is the generic term for the 15 end of driver. You can get that motion of the 16 follower either by eccentric features, like a 17 lobed cam, so just pure rotation of the cam 18 causes the follower to move up and down, or you 19 can have a camshaft that has an angular surface 20 or a tapered surface such that axial motion 21 causes motion of the driver. And you can have 22 a hybrid, which is a combination of the two. 23 They're all camshafts. 24 So when I teach students how to 25 design cams, and my own design of cams, it will	Page 41 1 Q Do you have any experience -- scratch 2 that. 3 How many background of the 4 invention sections have you reviewed in your 5 lifetime? 6 A Wow. Lots of them. I have -- I 7 think the running, if I were to do the most 8 current, is like 190 to almost probably perhaps 9 200 patents of my own. 10 The examiners usually come back 11 with some prior art, and then I read them, so 12 they all have backgrounds of the invention. 13 I write my own when I give my 14 patents to lawyers. And then -- so there is 15 thousands of them there. And then the several 16 dozen cases I've done expert witnessing on, 17 there may be another half dozen or more 18 backgrounds per there. 19 So, in other words, gee, I've 20 read a lot of them. 21 Q Do patent owners describe their 22 invention in the background of the invention? 23 A You typically do not. You're 24 describing what is known and what has been done 25 and what is -- you often frame and here's the

Page 42 1 problem that still exists after all this time. 2 And you don't say then what the 3 solution is, typically. But you often will say 4 here is a problem and sometimes you'll say an 5 approach to a problem, but you're not supposed 6 to put your invention discussion in the 7 background. That follows right afterwards. 8 So you set the stage for what 9 the problem is, and then you write right after 10 that the summary of the invention. 11 And the summary of the invention 12 usually maps pretty -- pretty well onto your 13 first claim. And then detail happens after 14 that. 15 Q Does the '207 patent include a 16 summary of the invention section? 17 A It does. It follows right after the 18 background, kind of standard format. 19 Q Would you please review the last 20 paragraph in the background of the invention 21 section of the '207 patent, Exhibit 1001. 22 A Okay. Let me have a second here. 23 (The deponent read the 24 document.) 25 A Okay.	Page 44 1 those openings, okay? 2 Now, so then it goes on to say, 3 "For example, a cam attached to a lever may be 4 engageable with the adjuster rod to vary the 5 axial position of the rod." 6 So now it's going on to talk 7 about just one version of that adjuster rod 8 motion. Not rotational motion but axial motion 9 of the rod. 10 And then it says, "One problem 11 associated with this configuration is that any 12 given angular position of the lever/arm" -- 13 excuse me, "lever/cam" -- because, again, the 14 lever is attached to the cam -- "corresponds to 15 exactly one position of the adjuster rod. This 16 limits the ability of the rider to customize 17 the damping characteristics of the suspension 18 system to suit the terrain or the rider's 19 particular riding style." 20 Would you like me to comment on 21 that or just having read what it says? Because 22 what it's saying there is exactly what the 23 second embodiment is. 24 So the background is saying here 25 that the second embodiment exists and it's not
Page 43 1 Q What is discussed in this paragraph, 2 Dr. Slocum? 3 A What they're saying here is exactly 4 what we have been talking about, that -- let me 5 just read and comment along the way. 6 "A typical design for a damping 7 adjuster uses an adjuster rod that extends down 8 the center of the piston shaft and engages the 9 valve mechanism." 10 So that's that rod 22 or the 11 driver, okay? 12 "Adjustment is commonly made in 13 either of two ways, the adjuster rod is moved 14 axially (up or down) to alter damping or the 15 adjuster rod is rotated to alter damping." 16 So in other words, the end of 17 that rod can either move up and down to affect 18 the motion of the valve -- opening of the valve 19 plate. You can also have valve plates -- they 20 would look like a flour sifter, where when you 21 rotate a plate, it opens or closes holes 22 between that plate and another plate. That 23 would be if you rotated a driver, you could 24 affect the opening or closing of those 25 orifice -- they're not exactly orifices, but	Page 45 1 very good because the rider is -- but I 2 disagree with that. So that's probably another 3 discussion. 4 Q Are you aware of any reason why a 5 patent applicant might describe their invention 6 in the background? 7 A My experience is that most inventors 8 rarely actually read all of their patents. And 9 lawyers put these things together after 10 interviewing and discussing with the inventors 11 what they think the invention is, and so I do 12 not have an opinion of why this might be so in 13 there. 14 I happen to try to really 15 carefully read all of my inventions to make 16 sure I actually have an invention. And if it's 17 a background, then it's not an invention, is 18 it? 19 So I don't know what -- why they 20 said that, and then they claim in Figure 7 21 where the lever is actually -- the position of 22 the lever through its angular position is 23 actually controlling the adjuster rod. Because 24 right here in the background, they're saying 25 that that's known and it doesn't work well, yet

12 (Pages 42 - 45)

Page 46 1 they're claiming it. 2 Q Dr. Slocum, would you please turn 3 your attention to Figures 7a through 7c of the 4 '207 patent, which is Exhibit 1001. 5 A Okay. 6 Q In Figures 7a through 7c, is the 7 lever at the same angular position? 8 A No. Because you start with the lever 9 from example position 1. And as you rotate it, 10 you have to count rotations from one position. 11 So even though you may look at 12 it and say, oh, it's in the same angular 13 position, it's hanging down, angular position 14 of a camshaft system, you have to start with 0. 15 So -- and the text itself says, 16 for example, if you go between 7a and 7c, the 17 angular position goes from 0 to 720. So you 18 have a different angular position that's 720 19 degrees from where you started. 20 The cross-sectional pictures 21 indicate it's hanging down, but that is not the 22 angular position of the lever camshaft system. 23 Q The lever points directly downward in 24 each of Figures 7a through 7c, correct? 25 MS. BHATTACHARYYA: Objection.	Page 48 1 hands be pointing on a typical clock? 2 A On a clock, they'll both be pointing 3 up. But I don't know the day now. 4 Q Between 12:00 noon and the 5 12:00 midnight examples we just discussed, will 6 the hands have the same angular position? 7 A On a clock, yes, that is a planar 8 mechanism. It's not a cam. 9 Q Does your statement that the 10 Figures 7a through 7c do not have the same 11 angular position rely upon your understanding 12 of angular positions for cams versus the 13 system -- versus the system you just described 14 for the clocks? 15 A Yes. 16 MS. BHATTACHARYYA: Objection. 17 Form. 18 A This is a -- this patent is about a 19 cam mechanism, not a clock. I am -- my 20 opinions are based on a cam mechanism where the 21 cam controls axial position of a driver. 22 The rider does not use this 23 machine to tell the time. The rider uses this 24 machine to not hurt themselves as they ride a 25 bicycle. And that's a cam damper, not a clock.
Page 47 1 Asked and answered. 2 Q You can answer. 3 A The direction of pointing is straight 4 down, but the position is not the same. They 5 differ by 720 degrees. 6 There's a very important 7 difference, because we're talking about 8 camshafts. You can't -- you can't just use a, 9 if you will, a colloquial discussion of what 10 you think you see on a cross-section. You 11 can't do that with a camshaft. It's improper. 12 It doesn't work. 13 You have to specify the angular 14 position, and that starts at one position, and 15 then as you rotate through many rotations, you 16 have to count the angular degrees when 17 describing the position. 18 Q Dr. Slocum, at 12:00 noon on a 19 typical clock, where will the hands be pointing 20 to? 21 MS. BHATTACHARYYA: Objection. 22 Form. 23 A If I pick a day, they're both going 24 straight up. 25 Q At 12:00 midnight, where will the	Page 49 1 Q Were the board to decide that your 2 angular position of a cam understanding was 3 incorrect, would the Figures 7a through 7c show 4 a lever being in the same angular position? 5 MS. BHATTACHARYYA: Objection. 6 Form. 7 A I can't opine on something if someone 8 tells me physics one plus one is three. I have 9 no opinion. I will only opine on physical 10 mechanisms that have reality basis, not on what 11 someone tells me is non-real. Then I will 12 state I have no opinion. 13 Q In your opinion for Figures 7a 14 through 7c, rotating the lever through one 15 complete rotation does not result in the lever 16 being at the same angular position, correct? 17 A Correct. It's 360 degrees from 0. 18 You have a visual in a cross-section that its 19 orientation is down, but orientation is 20 different than position for a three-dimensional 21 mechanism. 22 For a planar mechanism, like a 23 clockface, as I discussed earlier, the two are 24 commensurate. 25 But this is not a planar

Page 50 1 mechanism. This is a three-dimensional 2 mechanism. There is a huge difference, and 3 this is, again, sophomore mechanical 4 engineering. 5 And sometime -- it's been about 6 an hour -- the morning bio break would be 7 appreciated. 8 Q We can take a break now. That's 9 fine. 10 A Okay. 11 MR. DURBIN: How long do you 12 need? Arpita? Dr. Slocum? 13 THE DEPONENT: Five, ten 14 minutes. I'm going to run down the hall and 15 refill my drink machines here. 16 THE VIDEOGRAPHER: The time is 17 12:23 p.m. We're off the record. 18 (Recess.) 19 THE VIDEOGRAPHER: The time is 20 12:31 p.m. We're on the record. 21 BY MR. DURBIN: 22 Q Dr. Slocum, this is a yes-or-no 23 question. I'd like to ask if you discussed the 24 substance of your testimony already given or to 25 be given with counsel during your break?	Page 52 1 So I guess I don't understand 2 your question. We would have to go to the 3 claims themselves if you ask me what's claimed. 4 Q Dr. Slocum, in the first embodiment 5 that we've been discussing today -- 6 A Mm-hmm. 7 Q -- is the valve actuating assembly 8 comprised of the selector 20 and the driver 22? 9 (Reporter clarification.) 10 A I'm sorry, could you ask the question 11 again? 12 Q Dr. Slocum, as described in the first 13 embodiment that we've been discussing today, 14 does the valve actuating assembly include a 15 selector 20 and a driver 22? 16 A It does. And the camshaft 56. So, 17 yeah, the selector 20 includes camshaft 56 and 18 lever 54. 19 Remember, the valve is deep down 20 inside the shock absorber, and that's what the 21 driver does. It communicates the intent of the 22 rider to control the position of the valve, 23 which then controls how much damping, and 24 that's why that rod or driver 22 has to connect 25 the actual valve to the mechanism that the
Page 51 1 A No. 2 Q Thank you. 3 Dr. Slocum, do you offer any 4 claim constructions in your declaration? 5 A With this IPR, I don't need to. If 6 it's relating back to the District Court, we 7 have to because of this "how many positions of 8 the lever are there" question. 9 That's indefinite, in my mind, 10 because -- and I don't know what the claim 11 means in terms of what's lockout and what are 12 the other positions it talks about in claim 1. 13 It implies there are more than 14 two, but if there are just two, then I'm fine. 15 But if it's more than two, then I would have to 16 for the district. 17 But for the IPR, if I find 18 something that has two, I'm fine. I don't need 19 it for the IPR. 20 Q Dr. Slocum, what is the claimed valve 21 actuating assembly? 22 A Well, the -- you mean in terms of the 23 broad claim? Because there's a lot of finer 24 and finer claims that keep adding elements to 25 it.	Page 53 1 rider operates. 2 Q Dr. Slocum, what are the positions of 3 the valve actuating assembly? 4 A In the first embodiment? 5 Q Yes. 6 A So in the first embodiment, you are 7 going to either lock out -- that's position 8 1 -- or you will rotate it to position 2 where 9 now you have damping. And then how much 10 damping comes about by using the adjuster 11 assembly 18, and it's that knob with the 12 threads that push on the shoulder surfaces, for 13 example. 14 Q Dr. Slocum, do any of the positions 15 of the '207 patent cover a range of angular 16 positions of the lever? 17 A Well, the first -- 18 MS. BHATTACHARYYA: Objection. 19 Form. 20 A Sorry. I don't understand your term 21 "range." I can -- in the first embodiment, the 22 range is it's in one position or the other, and 23 then you control the driver using the knob 70. 24 In the second embodiment, 25 there's an infinite number of positions between

Page 54 1 lockout and maximum damping, for example. Or, 2 sorry, between lockout and minimum damping. 3 Lockout is maximum damping. 4 It's infinite. It doesn't -- doesn't move. 5 Q Dr. Slocum, would you please turn 6 your attention to Figures 5a through 5c of the 7 '207 patent. 8 A Okay. Hold on. 9 Okay. I have them here. 10 Q Do Figures 5a through 5c show 11 different angular positions of the lever? 12 A Oh, I'm sorry, yes. There's an 13 intermediate one. That's in 5b. But, again, 14 your fine motion is controlled by the cam. Not 15 by the cam. Excuse me. By the adjustment 16 knob. 17 So there's a -- I misspoke 18 earlier. There's going to be middle -- let me 19 go to the text. It gives me the exact naming 20 of them. 21 But the fine adjustment is 22 always through the knob. 23 Q Dr. Slocum, do Figures 5a and 6a show 24 the same angular position of the lever? 25 A Okay. Hold on. I need to --	Page 56 1 A Well, the lever is not shown in those 2 figures; the camshaft is, okay? And since the 3 lever is attached to the camshaft, yes, then I 4 would have to infer that it is. 5 Q The lever is rigidly fixed to the 6 camshaft, correct? 7 A Correct. You asked me does it show 8 the lever position, but the lever's not there. 9 So that's why I say I infer that it is based on 10 the position of the camshaft. 11 Q Dr. Slocum, can we infer that the 12 lever has the same angular position between 13 Figures 5b and 5c? 14 A Correct. 15 Q Dr. Slocum, can we infer that the 16 angular position of the lever is the same 17 between Figures 5c and 6c? 18 A Yes, that, I think, is fair. 19 So for 5a to 6a and 5c to 6c, 20 those cases, the lever would be in a similar 21 position. 22 Let me just check the text here 23 I'm reading. 24 Okay. I'm ready. 25 Q And I may -- I may have misspoken
Page 55 1 MS. BHATTACHARYYA: Objection. 2 Mischaracterizes the record. 3 (The deponent read the 4 document.) 5 A If you go to column 5, line 30, 6 "Comparing Figs. 5a and 6a, there is no 7 difference in the axial positions of the driver 8 22." That's that dimension X, okay, that's 9 shown. 10 And then it's -- the 11 intermediary position, 5a and 6b, there's a 12 difference in that position between W and Y. 13 But in 6a and 6 -- 5a and 6a, 14 it's the same axial position of the driver. 15 Q Dr. Slocum, I don't believe I was 16 asking you about the axial position of the 17 driver. 18 A Oh. 19 Q I'll reask the question. 20 A I'm sorry, I -- I thought you wanted 21 to know what was happening with the assembly. 22 Q Do Figures 5a and 6a show the same 23 angular position of the lever? 24 MS. BHATTACHARYYA: Objection. 25 Mischaracterizes the record.	Page 57 1 earlier, so I'll ask the question again. 2 Dr. Slocum, can we infer that 3 the lever has the same angular position between 4 Figures 5b and 6b, B as in boy, in each case? 5 A Yes, we can. The difference there is 6 not the -- the lever's in the position, but the 7 knob will have turned to change that angled 8 surface of the cam, and that's why you see the 9 difference in dimensions Y and W. 10 Even though the lever is in the 11 same position, the cam has moved axially in and 12 out of the page. 13 Q Dr. Slocum, in your most recent 14 response, when you stated that the lever is in 15 the same position, you mean more specifically 16 angular position? 17 A Correct, or orientation. But the 18 camshaft itself, the position has changed. So 19 thank you for that. It's the angular position 20 or orientation. 21 The actual position of the lever 22 will have shifted because it's attached to the 23 camshaft, and it's dragged left to right in 24 that intermediary position, which is 5b and 6b. 25 Q Dr. Slocum, if we were looking at the

15 (Pages 54 - 57)

Page 58 1 device shown in Figure 7a such that this figure 2 was rotated 90 degrees and we were looking 3 straight on at the lever -- 4 A Is there -- A, is there a question? 5 And B, what do you mean, "straight on"? You 6 have to give me some -- because this is 7 straight on looking at 7A. Is there a 8 different "straight on"? 9 Q I asked an unartfully worded 10 non-question. May I -- I would like another 11 shot at it, and I will do so now. 12 If we were considering Figures 13 7a through 7c in only two dimensions from a 14 perspective looking directly down on the lever, 15 would the levers in each of Figures 7a through 16 7c have the same angular position? 17 MS. BHATTACHARYYA: Objection. 18 Form. 19 A Again, angular position, no, because 20 that includes the 0 to 720. And you also have 21 to give me an orientation of "looking," because 22 looking down could be looking down left to 23 right on the page or top to bottom on the page. 24 There are different "looking 25 downs," so I -- I wish we were live so you	Page 60 1 of a non sequitur to me. I -- I'm sorry I 2 can't be more helpful. 3 Q Can we not isolate the changes in 4 only two dimensions from the change in the 5 third? 6 A I'm closing my eyes to envision this 7 thing. 8 You see, if you -- let me think 9 about this. If I were to look -- I have to -- 10 I haven't considered this before so I have to 11 think about this, so excuse me while I close my 12 eyes. It helps me to envision things in three 13 dimensions for something I haven't considered. 14 (Pause.) 15 You can -- wow. You have to 16 know that -- you have to know the pitch of the 17 thread in order to do such a thing. I just 18 don't see how to do it with only two. 19 Now, maybe if I had, you know, 20 an hour to think about it and go and play and 21 create my own solid model and play with it in 22 accordance to what I'm seeing in my head when I 23 close my eyes and envision. 24 But I was never asked to do 25 that, because I have these cross-sections,
Page 59 1 could take a marker and mark the page for 2 exactly what you want. 3 Q Is there a way to describe the 4 movement of the lever in only two dimensions 5 without considering the third dimension? Is 6 that possible? 7 A I mean, I'm looking at it in two 8 dimensions here, and I can -- I can tell that 9 because the threads. The threads, even though 10 it's a two-dimensional view, will tell me how 11 that lever has rotated, because they indicate 12 the axial motion at the same time. 13 I have enough information at 14 this cross-section. 15 Q I'm just -- I'm looking for the words 16 so that we can talk about the rotation of this 17 lever in just 360 degrees and not considering 18 720. 19 Is there a framework that you 20 and I can use to discuss that or is that just 21 not possible? 22 A It's not a planar mechanism, so I 23 just don't see how it's possible. 24 You're trying to compress the 25 volumetric system into a plane. It's just kind	Page 61 1 which give me all the information I need to 2 know. 3 Q From the perspective of axis 68, 4 which is the axis -- scratch that. 5 Is axis 68 the axis of rotation 6 of the camshaft 56? 7 A Yes, even though it's not drawn in 8 those Figures 7, as you can see from Figures 4, 9 it goes through the center of the camshaft 56. 10 Q If someone were oriented looking at 11 this lever 54 from the perspective of axis 68, 12 would lever 54 be in the same angular position 13 for Figures 7a, 7b and 7c? 14 A I have to ask for clarification of 15 "perspective." 16 Q Dimensional perspective from the 17 direction that extends along the same line as 18 axis 68. 19 MS. BHATTACHARYYA: Objection. 20 Form. 21 A Let me state what I think I 22 understand you're asking me so you can -- 23 because I'm trying to help you here. 24 If I take Figure 7a and now I -- 25 I'm looking straight down on it, and if I

16 (Pages 58 - 61)

Page 62 1 rotate my head 90 degrees and look from the top 2 of the paper to the bottom of the paper, so 3 the -- the rays of light are emanating along or 4 parallel to the axis 68 into my eyes, that's 5 the direction I think you're asking me to look 6 at. 7 Q Where axis 68 would just be a point 8 if you represented it on this diagram, right in 9 the center of the axis of rotation of camshaft 10 68. 11 A Okay. The correct mechanical 12 description for your own reference is consider 13 the orthographic projection of 7a to the right, 14 or a plan view of the end of camshaft 56 would 15 be another way to describe it. 16 Q Plan view of the end of camshaft 56. 17 Understood. 18 A So now the record can be straight for 19 what we're talking about. 20 Q Right. 21 (Laughter.) 22 A Okay. So now, if you don't mind, now 23 that we've established what you want me to look 24 at, could you please ask me the question again. 25 Q Considering a plan view of the end of	Page 64 1 cam -- I'm sorry, the end of driver 22 engages 2 to move it axially. 3 Q As a result, will the damper 4 characteristics of the damper in Figures 7a, 7b 5 and 7c be different? 6 A They will be. I'm sorry, yes. They 7 will be. 8 Q Dr. Slocum, what is fine-tuning? 9 A So in the context of this invention, 10 having something locked out or just switched to 11 one extreme end of what is available for 12 damping, that would be a coarse selection. 13 Fine-tuning would be in between 14 those two, I can select now how fine it is. 15 That's often called the fidelity of the 16 mechanism. 17 And, for example, in embodiment 18 1, you see the adjuster knob 70, and then there 19 is a spring-loaded button 76, and there's an 20 arrow pointing to it of 74. 21 So on the back side of that 22 adjuster knob, you, for example, would have 23 detents, maybe every 30 degrees, for example. 24 So as you adjust the knob, you 25 will feel click, click, click, click. So the
Page 63 1 camshaft 56 for each of Figures 7a, 7b and 7c, 2 does lever 54 have the same angular position? 3 MS. BHATTACHARYYA: Objection. 4 Form. 5 A Okay. It has the same orientation. 6 I'm not going to say position, because I know 7 that there's a screw thread in there, and the 8 position goes from 0 to 720, even though it's a 9 plan view. 10 But it does have the same 11 orientation. There's a difference between 12 position and orientation. 13 Q Angular orientation, Dr. Slocum? 14 A It has the same angular orientation 15 in these images if I'm -- from the plan view, 16 yes. 17 Q Do Figures 7a, 7b and 7c show 18 different axial positioning of driver 22? 19 MS. BHATTACHARYYA: Objection. 20 Form. 21 A Yes, because driver 22 engages the 22 angled cam surface 66. So as the lever 54 is 23 rotated, it rotates the camshaft and the thread 24 engagement between the camshaft -- that's at 25 84 -- moves that angle left or right, which	Page 65 1 number of detents or angular position of the 2 knob indicates to the rider discrete changes in 3 damping, so that's a discrete system for fine 4 adjustment. 5 Continual fine adjustment is 6 what you get when you just rotate the thread 7 without stopping on predetermined stop points. 8 So discrete adjustment would be 9 one form of fine adjustment, but truly 10 infinitely fine adjustment is just your 11 rotations of the screw thread without any 12 detents. So those are the two forms of fine 13 adjustment. 14 Q Does the '207 patent use the words 15 "fine" or "coarse"? 16 A I don't know if it's fine or coarse. 17 Let me refresh myself, please. 18 (The deponent read the 19 document.) 20 A It talks about adjust -- it says to 21 adjust -- to further adjust the damping 22 characteristics. 23 If you go to column 5, line 9, 24 "The knob 70 may be rotated anywhere between 25 these two extreme positions, thereby providing

17 (Pages 62 - 65)

Page 66 1 various positions of the driver 22 along the 2 axis 60, resulting in various damping 3 characteristics." 4 So this is a POSITA or rider 5 says, aha, I can have anything I want. So that 6 is fine adjustment or infinitely fine 7 adjustment, as it would be known to someone who 8 designs mechanisms or rides. 9 And then later on, it also talks 10 about the discrete detent points. 11 That's my answer. 12 Q Is fine adjustment an objective 13 measure? 14 MS. BHATTACHARYYA: Objection. 15 Form. 16 A I don't understand your question. 17 What do you mean, an "objective measure"? 18 Q Can you look at something and know 19 whether it's fine or not fine without 20 comparison to anything else? 21 A Yes. So, again, this is in the 22 context of the patent or any human-operated 23 device. Your ability of a normal person -- and 24 now it depends upon if you're gloved and cold 25 or not -- but you typically will say that a	Page 68 1 When I have a thread involved as 2 opposed to just a lever or moving a cam, that 3 nominal 10 degree rotation I talked about, 4 which is pretty basic for a human to 5 understand, I've just rotated something 6 10 degrees, like -- I'm not supposed to use my 7 visuals on this. 8 But I think all of us can 9 envision turning something about 10 degrees. 10 If that is directly affecting something like 11 the driver, well, I can enhance the fineness or 12 the tuning ability by putting a transmission, 13 that is something that amplifies -- and 14 amplify, remember, it's a gain, or deamplify, 15 depending on how you want to look at it. 16 But a thread is something that 17 takes my 10 degrees of angular motion, and 18 based on the pitch of the thread, can make it 19 look like, for example, one degree of motion, 20 if I had a pitch of 10, for example. 21 So that's why you use a 22 transmission or a thread. And a thread is a 23 form of a transmission or a lever to amplify -- 24 Remember, "amplify" doesn't mean 25 make it worse. It makes better in terms of --
Page 67 1 person can control the rotary orientation of 2 things to easily about five degrees. So your 3 adjustment capability, five degrees. 4 So if I see something that has a 5 lever or a knob that has a total range of 6 motion, let's say, of 360, so the "fineness" of 7 the adjustment would be 360 with, say, 10 8 degrees if you're gloved and cold, divided by 9 10 degrees. And so you have 36 positions you 10 can select from easily. Your fidelity is 36. 11 No gloves, nice and warm, I can 12 easily get 5 degrees, so now it's 360 divided 13 by 5, or 72 positions I can give you. 14 If there's a servomotor 15 involved, now it gets back to the servocontrol 16 system, and you may have several thousand 17 different selection abilities. 18 So you have to -- you have to -- 19 yes, I can see this in the context of the human 20 and the intend -- excuse me, the intended 21 interaction of the human with the system. 22 Q Are some forms of tuning inherently 23 finer than others? 24 A Okay. So now it becomes the 25 transmission.	Page 69 1 amplify the fidelity of a mechanism that I can 2 control it. 3 Q Are threaded adjustments inherently 4 fine-tuned adjustments? 5 A If I'm -- if I'm rotating the thread 6 to cause motion of something else, that 7 inherently is fine. You can have -- it's 8 called a very high lead, or the lead of the 9 thread is greater than the diameter, okay? And 10 that's not fine-enhancing it. 11 An example would be the -- I'm 12 trying to remember the trade name. There's a 13 screwdriver -- the company was called a Yankee 14 screwdriver, and that is where when you push 15 down on it, it had -- I believe the lead was 16 about one and a half times the diameter, and 17 that would cause rotation from your vertical 18 motion input. You would back-drive the thread. 19 But that's not what we're doing here. 20 Usually when you're talking 21 about adjusting something using a thread, the 22 thread is increasing the fidelity of your human 23 ability. 24 Q Is fine adjustment always relative to 25 coarse adjustment?

18 (Pages 66 - 69)

Page 70 1 A Well, I'm not sure I understand 2 your -- your question, because coarse 3 adjustment implies coarse, and fine implies 4 fine. And fine is finer than coarse, so I'm... 5 I just really don't know how to 6 understand. 7 Q Can you have fine adjustment without 8 coarse adjustment? 9 A I just don't know how to answer that. 10 You can have -- coarse adjustment, I go between 11 here and there. And then between the two, I 12 will allow you to select much finer than 13 position 1 or 2, intermediate positions. 14 So if I think about your earlier 15 question, fine adjustment gives me intermediate 16 positions between coarse positions. That's how 17 I interpret your question. 18 Q What does "fine adjustment" mean if 19 you're not comparing it to anything else? 20 A Ergonomically, does the human feel 21 they have control over the system to give them 22 the performance they want. 23 If your human working with your 24 device is left thinking, wow, I wish I could 25 adjust this better, then that means you need a	Page 72 1 MS. BHATTACHARYYA: Objection. 2 Form. 3 A I have a problem with the word 4 "systems." 5 It is between two states. But 6 when you say "systems," that means I'm 7 comparing the Mississippi River to my car, so I 8 don't know how to do that. 9 But between two states on the 10 same mechanism, yes. 11 Q For cleanliness, I'll ask this. 12 Is relative fineness always a 13 comparison between two states of a given 14 system? 15 A In the context of this human 16 operated, yes. If it's purely a 17 servomechanism, no, now I have specific numbers 18 and equations for it. 19 But for ergonomic systems, in 20 other words, human-controlled things, then the 21 answer is affirmative. 22 Q For servo systems, is there a 23 comparison made when we're discussing fineness? 24 A Well, then you give me a 25 specification of a specific number to achieve,
Page 71 1 finer level of adjustment ability. So it 2 will -- you have to ask that in context of what 3 is the system that we are talking about. 4 Q In your response then, are you 5 comparing the system to what a human is able to 6 produce without assistance? 7 A I'm sorry, I don't understand your 8 question. 9 Q You stated in your response, "if your 10 human working with your device is left 11 thinking, wow, I wish I could adjust this 12 better, then that means you need a finer level 13 of adjustment." 14 Correct? 15 A Correct. 16 Q When you state "finer level of 17 adjustment," you're making a comparison, 18 correct? 19 MS. BHATTACHARYYA: Objection. 20 Form. 21 A Correct. That means the human has 22 moved something from A to B and wishes there 23 was an intermediary between the two. 24 Q So I ask again, is relative fineness 25 always a comparison between two systems?	Page 73 1 and I make sure that my servo system has all 2 the elements -- and we can go into servo system 3 design if you want. It's a -- I don't think 4 you want me to, but, you know, I pick all the 5 elements in the system, including the 6 controller, the update rate, and I design those 7 systems, but I don't think we need to do that 8 here. 9 And you tell me how many 10 degrees, fractions of a degree, nanoradians. I 11 mean, I work with everything from offshore 12 structures to wafer steppers where now we're in 13 the picometer range. 14 So no problem. You tell me what 15 you want, and I'll design the mechanism to get 16 you there. 17 Q You discuss fine-tuning in your 18 declaration, correct? 19 A Correct. 20 Q Is this fine-tuning in a sense of how 21 a microscope has a fine adjustment knob and a 22 coarse adjustment knob? 23 A I'm struggling to understand your 24 question. And I don't mean to be pedantic in 25 terms of this is not a microscope, but

Page 74 1 they're -- 2 In embodiment 1, if we can keep 3 things in the context of the patent, please, 4 embodiment 1, you have the lever in the lockout 5 position or the fully damped position. And 6 then if you go to position B, like 5b, now 7 you're in a state where you're engaging the 8 angled cam, and the knob 70 as it moves will 9 now change the amount of damping between the 10 extremes of, for example, the A and C 11 positions. 12 So the lever in that 13 embodiment 1 is the coarse knob of the 14 microscope, if I'm trying to map onto your 15 question, and then the adjustment knob 70 is 16 now the fine adjustment knob of the microscope. 17 Q Can different systems be compared to 18 determine which system offers finer levels of 19 tuning? 20 MS. BHATTACHARYYA: Objection. 21 Form. 22 A I'm sorry, it's too broad. 23 You mean can I look at two shock 24 absorbers and comment on it? If we could 25 please keep things in the context of the patent	Page 76 1 my objection? 2 If you don't -- if you want the 3 witness to answer questions, then ask cleaner 4 questions. You are asking vague questions that 5 call for the objection, "form." 6 So I will put my objections in. 7 You have to phrase better questions. 8 MR. DURBIN: We can agree to 9 disagree. 10 BY MR. DURBIN: 11 Q Dr. Slocum, do you compare different 12 systems and their relative level of fineness in 13 your declaration? 14 MS. BHATTACHARYYA: Objection. 15 Form. 16 A Shock absorber systems, yes, but not 17 systems broadly in general. I'm looking at 18 shock absorbers. 19 Q How is the comparison made between 20 different levels of fineness for shock 21 absorbers? 22 A That would be on what would the 23 ability -- what is the ability to control the 24 position of the driver 22, that vertical rod, 25 the axial position. That is -- that is common
Page 75 1 of shock absorbers. I work on -- 2 Q I understand, Dr. Slocum. This is my 3 deposition, though, and I -- 4 A Okay. 5 Q You can refuse to answer my 6 questions, but I'm going to ask the questions. 7 A Okay. 8 MR. DURBIN: And, Arpita, if you 9 wouldn't signal to the witness, I'd appreciate 10 it. 11 MS. BHATTACHARYYA: If I 12 wouldn't say what? 13 MR. DURBIN: If you would stop 14 signaling to your witness, I would appreciate 15 it. 16 MS. BHATTACHARYYA: Excuse me, 17 but what do you think I'm signaling to the 18 witness? 19 MR. DURBIN: Okay. I asked a 20 question, and your witness refused to answer 21 after you objected. 22 MS. BHATTACHARYYA: Because you 23 asked a very vague question, I said "objection. 24 Form." 25 Are you saying I shouldn't give	Page 77 1 between all of the systems I'm comparing. 2 Q In your response, what do you mean by 3 the ability to control the position of the 4 driver 22? 5 A The driver 22 is what actuates or 6 acts on the valve that either is going to be 7 closed for lockout or open for one extreme of 8 damping. 9 Now, if you want to have 10 something in between, you have to be able to 11 control the axial position of the driver, so 12 that is what I mean. You -- that's what I 13 mean. 14 Q If two shock absorber systems are 15 able to control the axial position of their 16 relative drivers, do they both have the same 17 level of fineness of tunability? 18 MS. BHATTACHARYYA: Objection. 19 Form. 20 A If they have the ability to control 21 the position of the driver with equal 22 resolution, in other words, they -- each one of 23 them can give me the same axial positions of 24 the driver and assuming valves are the same, 25 then they have the same fineness. That --

Page 78 1 again, it's how many discrete positions or 2 infinite number of positions of the driver 3 axially is a measure of fineness. 4 So if I'm looking at two shock 5 absorbers, that's what I would have to assess. 6 All things else being equal, you know, the 7 bicycles, the valve, everything else. We're 8 just talking about, you know, the mechanism 9 that will affect the axial position of the 10 drivers. 11 Q Dr. Slocum, in your response, what do 12 you mean by "resolution"? 13 A Resolution is another term for 14 fineness. Those are synonymous terms. This 15 gets back to the -- sorry -- can I control the 16 position to 10 degrees or 5 degrees. What's my 17 ergonomic ability. 18 Q Dr. Slocum, does resolution have a 19 unit of measure? 20 A It can. It can be linear. It can be 21 rotary. For human ergonomics, it can be the 22 feel of the shock as I was riding. 23 You can ask a rider, "Were you 24 able to control the shock absorber to give you 25 the fineness you want? Do you have enough	Page 80 1 resolution. 1 degree resolution. And it can 2 spin around and around and around multiple 3 times, but you don't need to go per. 4 Now, there's a -- when you look 5 at, like, for example, millimeters per meter, 6 now you get into accuracy of, for example, 7 thread pitch, because some things in terms of 8 accuracy are cumulative. But that's not 9 resolution. That's a very different number. 10 Q If we were to compare the fineness of 11 two threaded systems, what would the unit of 12 measure for that comparison be? 13 A Now you're bringing in threads, so 14 you would either -- given a fixed angular 15 position, now you -- it's the pitch of the 16 threads, because the angle of the nut, if you 17 will, or the male to the female, the angular 18 position or resolution is the same, but how 19 that affects axial position is amplified by the 20 thread. 21 This is the earlier discussion I 22 was talking about, the transmission effect, 23 that is a function of the pitch also. 24 Q Would threads per inch be an 25 acceptable unit of measure?
Page 79 1 resolution?" 2 There's a bunch of synonymous 3 terms. And if a rider looks at you -- or not 4 even just a rider, anybody I'm designing 5 mechanisms for, if they don't understand one, 6 I'll use the other. 7 So I apologize if I switched 8 from "fineness" to "resolution." They're 9 synonymous. 10 Q Dr. Slocum, what is the unit of 11 measure for a linear resolution? 12 A That would be a linear dimension, for 13 example, millimeters. 14 Q What would the unit of measure be for 15 a rotary system? 16 A That would be an angular measure, 17 degrees or radians. 18 Q Degrees alone would give you the 19 resolution or it would be degrees over 20 something else? 21 A No, just resolution is -- for 22 example, for angular, is just degrees. 23 Now, some people will say I have 24 so many degrees, you know, per 360, but I don't 25 need that. I just need to know your angular	Page 81 1 A Yes, that's the -- that's synonymous 2 with pitch. So threads per millimeter, threads 3 per inch. 4 But that tells me for one 5 complete revolution of 2 pi radians, what is 6 the axial motion. That's the pitch. 7 Q Dr. Slocum, a higher number of 8 threads per inch would provide a higher 9 resolution? 10 A Correct. 11 Q Dr. Slocum, for a higher number of 12 threads per inch, would that provide a greater 13 level of fineness of tuning? 14 A Given the same angular input, yes. 15 And I just need to -- tuning for 16 axial motion, because I'm including that 17 transmission in what your angular input is 18 doing, so it's a mechanism. 19 Q Dr. Slocum, what is the claimed 20 adjuster assembly? 21 A In embodiment 1, you see it's the 22 knob 70, and then that knob 70, as we discussed 23 before, engages the threads, and then you have 24 the shoulders. So that is the adjuster 25 assembly that will then move your camshaft back

Page 82 1 and forth. 2 But if you have just the knob 3 itself, the knob does -- has to work with 4 something. It's the -- working with the 5 threads and then the shoulders, so that the 6 motion does something. 7 Q Dr. Slocum, what does claim 1 say 8 about the adjuster assembly? 9 A Pull it up here. 10 (Pause.) 11 A You want me just to read from the 12 claim or -- I'm not sure your question. 13 Q Dr. Slocum, what does "an adjuster 14 assembly operatively connected to the valve 15 actuating assembly for adjusting the damping 16 characteristics corresponding to at least one 17 of the positions of the valve actuating 18 assembly independently of the damping 19 characteristics corresponding to another 20 position of the valve actuating assembly" mean 21 to you? 22 A It means that there is a position of 23 the actuating assembly where if it's in that 24 position, now I can do a fine adjustment of 25 what is happening to my damping. So that, for	Page 84 1 connected" mean in the context of claim 1 of 2 the '207 patent? 3 A Again, there's a rigid connection. 4 And "rigid" means, again, not rigid in terms of 5 welded, but there's no backlash. 6 In other words, when I move -- 7 for example, we're looking at the embodiment 8 from Figure 5b to 6b. Any motion of the 9 knob -- angular motion of the knob will cause 10 some motion of the rod. 11 Q Dr. Slocum, I am now going to 12 introduce an exhibit that has previously been 13 marked as Exhibit 1005. 14 A Hold on. Let me do a little cleanup 15 of my papers strewn about here. 16 (Exhibit 1005 marked for 17 identification.) 18 A Okay. I have that. 19 BY MR. DURBIN: 20 Q Are you familiar with this Exhibit 21 1005, Dr. Slocum? 22 A Yes, I am. 23 Q What is this Exhibit 1005? 24 A This is a US patent, 6,360,857. 25 Maybe we'll just refer to it as the '857
Page 83 1 example, would be the B position. I think it's 2 5b and 6b, for example. Let me just 3 double-check my numbering. 4 Right. So that's telling me you 5 have -- in Figures 5b and 6b, right, that 6 middle position of the actuating assembly, now 7 the adjuster assembly can change the damping 8 characteristics of the valve mechanism with the 9 adjusting -- adjuster assembly in that 10 position. 11 So I move, if you will, my 12 actuating assembly to one position, it's there, 13 and now the adjusting assembly further controls 14 how much damping I'm getting for that one 15 position. 16 Q Dr. Slocum, what does "operatively 17 connected" mean to you? 18 A That it's a rigid connection, that if 19 you move one, you will see motion out of the 20 other. There's -- you're not going to have, 21 for example, backlash. That's a nonlinear -- 22 In other words, if it wasn't 23 effectively rigidly connected, if I moved one 24 end, I wouldn't see the other end moving. 25 Q What does the term "operatively	Page 85 1 patent, please. 2 It is entitled "Damping adjuster 3 for shock absorber," and this patent is 4 assigned to FOX Factory. 5 Q Would it be okay with you if I 6 referred to this patent as "FOX"? 7 A That's fine. It's the only FOX 8 patent we're talking about in the context of 9 today's deposition. 10 Q Okay. 11 Moving forward, if either of us 12 refer to the "FOX patent" or the "FOX 13 reference," we can agree that that's referring 14 to Exhibit 1005, correct? 15 A Correct. I prefer names for these 16 things, please. 17 Q What is shown in Figure 5 of FOX? 18 A Figure 5 is a cross-section through 19 the damper, and it's showing a lever 60, and 20 there you can see the axis of rotation of the 21 camshaft to which the lever is attached, and 22 it's showing -- even though it's a 2-D picture, 23 with that indication D, the arrows on an 24 ellipse, the ends of an elliptical arc, that's 25 telling me that 60 rotates and there's --

22 (Pages 82 - 85)

Page 86 1 So lever 60 is attached to the 2 camshaft 58, although 50 -- I'm sorry, yeah, 58 3 is not labeled in Figure 5. It is in Figure 6. 4 And that camshaft has a surface 56, there is 5 this driver rod 34, where at 34.4, it's showing 6 that driver is touching that camshaft, and it's 7 a cross-section, so -- yeah, that's what it's 8 showing. 9 So it's indicating as I move 10 that lever 60 around D, I'm going to affect 11 axial position of that rod 34. 12 Q Is lever 60 rigidly fixed to camshaft 13 58? 14 A That is what I see by the means of 15 there's a setscrew there on what would then be 16 indicating a flat or some sort of detent, 17 although they don't label it. 18 But, again, that's just one of 19 those things that ones skilled in the art will 20 look at and understand that that's why, for all 21 intents and purposes, they're rigidly 22 connected. 23 Q If lever 60 rotates, camshaft 58 will 24 also rotate, correct? 25 A Correct.	Page 88 1 sophomore level, and then the mathematics is 2 basic trigonometry. 3 Q Dr. Slocum, which components do you 4 allege are a valve actuating assembly? 5 A So the lever in the camshaft, as they 6 move, they move the rod 34. So together, that 7 whole mechanism is what is controlling what the 8 valve is doing. 9 I think in my report I labeled 10 that also, like we were talking about earlier, 11 so let me go there. 12 If you go to my report, page 34. 13 Are you there? 14 Q Mm-hmm. 15 A So the adjuster assembly is the lever 16 and the camshaft. That's 60 and 58. And then 17 when you include that axial -- it was called a 18 rod before, but here, shaft 34, those three 19 elements together are the valve actuating 20 assembly, the valve itself being at the end of 21 the shaft 34, deep inside the shock absorber. 22 Q Dr. Slocum, do you allege that the 23 valve actuating assembly is comprised of lever 24 60, camshaft 58 and shaft 34? 25 A Correct. Just as it's labeled there.
Page 87 1 Q If camshaft 58 rotates, shaft 34 will 2 move axially up or down, correct? 3 A Correct. By some amount. You don't 4 know what that motion is yet because there's 5 not enough information in this particular 2-D 6 drawing to tell me what the cam shape is. 7 All I know is it is some sort of 8 cam, and looking at the mechanism, as a POSITA, 9 I would understand that yes, it will. But how 10 it moves exactly, I would have to have more 11 information about the cam shape itself. 12 Q Would a person of ordinary skill in 13 the art know how to shape the cam? 14 A Yes. And I provided examples in my 15 declaration. Again, it's something in the 16 introductory -- introduction to mechanical 17 design, typically a sophomore class. We -- we 18 teach about cams. 19 Later on if someone wants to 20 take a more advanced machine elements class, 21 like in their junior or senior year, we will 22 get into more detail of how you can get just 23 about any motion you want. 24 But the basic understanding of, 25 for example, eccentric circles, that is	Page 89 1 Q Does anything else comprise the valve 2 actuating assembly in FOX? 3 A Well, there are the fine features of 4 those elements, but they're inherently 5 included. Like, for example, the shape of the 6 cam, and then there's the stop, which is a 7 little detent on there, so that will limit the 8 range of motion. 9 But for all intents and 10 purposes, these are the primary elements, the 11 lever 60, the camshaft 58 and the shaft 34. 12 Q Dr. Slocum, is the adjuster 13 assembly -- scratch that. 14 Dr. Slocum, do you allege that 15 the adjuster assembly in FOX is the combination 16 of the lever 60 and the camshaft 58? 17 A Correct. As labeled in the -- 18 labeled in the figure there. 19 Q Does the adjuster assembly as alleged 20 by you in your declaration include anything 21 beyond lever 60 and camshaft 58? 22 A It doesn't have to. It's -- just 23 that is sufficient just the way the second 24 embodiment of the '207 patent doesn't need a 25 separate knob. You can just get the

23 (Pages 86 - 89)

Page 90 1 resolution -- intermediary positions of shaft 2 34, given that camshaft shape 56, for example. 3 Q Does the adjuster assembly include 4 anything as stated in your declaration besides 5 lever 60 and camshaft 58? 6 A It doesn't have to. I can add to it 7 to add increased fineness or resolution. But 8 as it stands, that's all I need as the basic 9 system. So I'm saying that what exists there 10 is all you need. 11 You can add to it if you want, 12 but that's good enough. 13 Q What have you added to it? 14 MS. BHATTACHARYYA: Objection. 15 Form. Mischaracterizes the record. 16 A So I haven't added. 17 My first contention is is that 18 the FOX patent anticipates '207, which means I 19 have everything in the FOX patent explicitly to 20 address, for example, each of the claim 21 elements of claim 1 of the '207. 22 If I want to -- and when we go 23 through other claims of the '207, you know, I 24 can now say, all right, I'm going to take FOX 25 and I'm going to add some other types of fine	Page 92 1 34? 2 A It is. 3 Q Can something be operatively 4 connected to itself? 5 MS. BHATTACHARYYA: Objection. 6 Form. 7 A You can, just as the way in the 8 second embodiment shown in claim 7, you can 9 have a mechanism that operates so that when I 10 move one thing, I get another. And in this 11 case, that's the shape of that cam surface 56. 12 So as I said earlier, I have a 13 lever and a camshaft and a shaft, there are 14 features on the camshaft that enable that 15 operative coupling between the lever and the 16 shaft and then the valve, and that's the shape 17 of the cam. 18 It's still one piece, the 19 camshaft, but there is a feature on there that 20 gives me that operative connection. 21 So in that respect, yes, it -- 22 it is coupled to itself by means of that 23 feature. 24 And may I just request whatever 25 is reasonable then, we're about an hour since
Page 91 1 adjustments, like the screw threads, you know, 2 from Nagai, and other references, to give me a 3 screw thread adjustment or a finer resolution. 4 But the basic adjuster assembly 5 for the basic, you know, claim 1 is all right 6 there in the FOX patent. 7 Q For your first ground, where you -- 8 scratch that. 9 Does your first ground allege 10 anticipation by the FOX reference of claim 1 of 11 the '207 patent? 12 A Yes. 13 Q For your first ground, do you allege 14 that the adjuster assembly includes anything 15 further than the lever 60 and a camshaft 58? 16 MS. BHATTACHARYYA: Objection. 17 Asked and answered. 18 A No. That's all you need, as I showed 19 in that -- that -- the colorization of that 20 figure on page 34, that is the valve actuating 21 assembly, and then there's the adjuster 22 assembly. 23 Q Is the combination of lever 60 and 24 camshaft 58 operatively connected to the 25 combination of lever 60, camshaft 58 and shaft	Page 93 1 before, so it's nice to have a quick bio break. 2 I don't need long, but... 3 Q Yes. Right now is a fine time to 4 take a break. Five minutes or so, come back at 5 1:43, let's say. 6 A Okay. Yeah. I'll just run down to 7 the restroom down the hall and run back. 8 THE VIDEOGRAPHER: The time is 9 1:37 p.m. We're off the record. 10 (Recess.) 11 THE VIDEOGRAPHER: The time is 12 1:49 p.m. We're on the record. 13 BY MR. DURBIN: 14 Q Dr. Slocum, does FOX include an 15 adjuster rod? 16 A An adjuster rod. I've got to think 17 if I... 18 You know, you could call the 19 shaft 34 a rod and that adjusts the valve, so 20 that would be a synonymous term. But, you 21 know -- and for the FOX patent in particular, 22 it's called a shaft 34. And the function is to 23 move the valve in response to motion of the 24 lever. 25 So if I go, like, for example,

24 (Pages 90 - 93)

Page 94 1 back to the '207 patent, it's called a driver 2 22, but that's synonymous with shaft 34. 3 Q Shaft 34 is moved axially up or down 4 to alter damping? 5 A Well, left to right along axis line 6 B. Depends on the orientation, so the -- yeah, 7 it moves along its axis labeled B in the 8 figure. 9 Q Does FOX include a cam? 10 A It does. That's that surface -- you 11 see a surface of it, 56, labeled in the figure. 12 Q Is that cam attached to a lever? 13 A Yes, because -- well, the cam is a 14 surface on the camshaft, and the camshaft and 15 lever are rigidly attached. That's through the 16 setscrew we talked about earlier. 17 But the setscrew is not 18 numbered. You can just see it. 19 Q Dr. Slocum, is the cam engageable 20 with the shaft 34? 21 A Yes, that's what -- when you move the 22 lever, you rotate the camshaft and the contact 23 of shaft 34 with the cam. That's what hence 24 causes motion axially of shaft 34 for certain 25 positions of the lever.	Page 96 1 Okay. Now, if you look at the 2 bottom of that image, you'll see that the 3 orange circle is tangent to the green circle, 4 so that's often referred to as bottom dead 5 center, or BDC. 6 Now, imagine -- so you have the 7 shaft 34 touching it at the bottom dead center, 8 and there will be a unique position for the 9 lever. And we'll just assume here that the 10 lever is in an orientation hanging straight 11 down. So the lever is oriented in what would 12 be called the bottom dead center position. 13 Okay? 14 That would correspond to -- 15 because I said the shaft is projecting downward 16 to the furthest, rightmost position in Figure 5 17 of the shaft 34 along the axis B. 18 Now, if I wiggle the lever, 19 let's say, 5 degrees, the axial motion of the 20 shaft will be looking like the sine of 5 21 degrees. 22 So from 0 to 5, the sine -- 23 excuse me. The sine of 0 degrees minus the 24 sine of 5 degrees, you'll see very little 25 motion of the shaft. It's not sensitive
Page 95 1 Q Does the engagement between the cam 2 and shaft vary the axial position of the shaft? 3 A Yes, that's what I think I just said. 4 Q Dr. Slocum, does FOX show that any 5 given angular position of the lever corresponds 6 to one position of the shaft 34? 7 MS. BHATTACHARYYA: Objection. 8 Form. 9 A Yes. You have to look at the fact 10 that it's a camshaft. And a camshaft, as FOX 11 is describing, is an eccentric circle within -- 12 on the other circle, and I've got a picture 13 that shows that. It's around page 68, I think 14 it is. Hold on. 15 So if you'll let me refer, 16 please, to the drawings I did, that will be 17 helpful for you to understand. 18 Okay. If you look on page -- 19 I'm sorry -- 66, right above paragraph 95, you 20 see the camshaft 58, the green cylindrical part 21 corresponds to the body of the camshaft that 22 rotates in a round bore. 23 And then that eccentric circle 24 with the orange coloring, that is the actual 25 cam.	Page 97 1 because of that -- the way the eccentricity and 2 the two diameters. 3 Now let me go 180 degrees to 4 what's called top dead center. In that second 5 position, the shaft will be furthest to the 6 left that it can be, and the valve will be, for 7 example, in its other extreme, for example, all 8 the way open. One is all the way open and one 9 is lockout. 10 Now, as you -- again, if you 11 wiggle the lever a little bit, being at top 12 dead center, you get very little motion of 13 the -- excuse me -- of the shaft, and that is 14 because, remember, the cam is rotating not 15 about the center of the orange circle. The cam 16 is rotating about the center of the green 17 cylinder. 18 So in those two extremes, you'll 19 get very little motion of -- the motion of the 20 lever by what the human would be -- the human's 21 resolution will cause very, very little motion 22 of the shaft. 23 Between those positions, there's 24 a much finer sensitivity and it's nonlinear 25 because it's the -- there's a trigonometric

25 (Pages 94 - 97)

Page 98 1 function of eccentric circles but that's the 2 nature of what cams are. 3 You will get that resolution of 4 motion of the driver, and the greatest 5 resolution will occur at that midpoint, which 6 will be roughly the 90-degree orientation 7 between top dead center and bottom dead center. 8 Or in clock-speak, as you said 9 earlier, bottom dead center is 6:00. Top dead 10 center is noon, and at the 3:00 and 11 9:00 positions are where you get the finest 12 resolution. 13 Now, if you want to make it more 14 linear between the two, that is what I've done 15 in the figure to the right. Because I know the 16 axial position, I can write the equation for 17 how a rotary position of the green cylinder 18 affects position of the shaft in accordance 19 with the shape function of the eccentric body. 20 It's not necessarily a cylinder 21 now. It would be an ellipse, elliptical shape. 22 I can now linearize or I can give it any shape 23 I want -- I can get any kind of angular 24 performance I want. 25 And what I do is when I work	Page 100 1 thing. How do I make linear motion of a piston 2 or a steam piston being driven by steam, turn 3 it into even rotary motion, for example, the 4 railroad wheels, the locomotive wheels, right? 5 And it was actually Newcomen -- 6 I think it was Newcomen, who did the best 7 linearization. 8 And in my textbook "Fundamentals 9 of Design," in Topic 5 at the end I show some 10 fun mechanisms for the -- from history. 11 You have to go three-dimensional 12 if you want to drive it to be truly linear, 13 okay? And that's where we come to the cam 14 shape in 96. Sorry, right above 96. Right 15 now, I'm showing a three-dimensional surface. 16 I add a degree of freedom to get greater 17 linearization if you want. 18 But all you really need to just 19 function with reasonable fidelity -- and, 20 again, it depends upon what the rider wants -- 21 is this most simple starting thing, which are 22 eccentric circles and shown in the left-hand 23 figure above paragraph 95. 24 So I kind of went from the most 25 basic, which is what the patent teaches me, to
Page 99 1 with doctors a lot, I find out what they want 2 to feel, and I correspond what you want to feel 3 with your hand to what you want to see in terms 4 of performance of the device, and then I can 5 create a mathematical function correlating the 6 two and shape my cam. 7 That's the basics of cam design. 8 And there are many good programs -- one is 9 Camnetics, for example -- that are linked to 10 CAD programs that allow you -- allow you to 11 design that without having to write the 12 equations yourself. 13 Q Can you provide a linear output using 14 a cam? 15 A You can come close to linear. And, 16 again -- 17 Q I tried to research this, I'll admit, 18 and this was somewhat hard for me to 19 understand. 20 It appears that you can come 21 close. Can you explain yourself? I'm sorry 22 for interrupting. 23 A Okay. To go even closer, you go in 24 three dimensions. And when you go back to the 25 days of steam engines, right, that was the big	Page 101 1 finer fidelity or finer resolution that is 2 possible, and then that's actually shown in 3 some of the other prior art, I do a combination 4 with. 5 Q If you didn't need full 360 rotation, 6 could you have kind of a snail-type-looking 7 thing to provide a linear output? 8 A So that is called a helical or a 9 nautilus cam, and for our latest device that is 10 coming out soon for a -- it's a device for 11 needle insertion for eye surgeons to treat eye 12 diseases, that's exactly what I'm using, is a 13 nautilus cam. 14 Q But at some point in the angular 15 positioning of that cam, it will have an abrupt 16 change, correct? 17 A If you go beyond the 360, you'll fall 18 off the cliff and you'll reset, yeah. 19 But, again, it's driven by what 20 the user says they want to feel, for the 21 ergonomics adjustment, and what they want to 22 see with respect to the output, and then the 23 design person, we teach them how to do the 24 corresponding mathematical function to 25 accomplish that.

26 (Pages 98 - 101)

Page 102 1 But you always start with the 2 simplest thing because, quite often, just the 3 eccentric circles is quite often good enough, 4 and that's really easy to manufacture. 5 Q Dr. Slocum, I'd now like to introduce 6 another exhibit that has previously been marked 7 Exhibit 1007. 8 A Okay. Let me do just a little 9 cleanup here. 10 (Exhibit 1007 marked for 11 identification.) 12 A Okay. 13 BY MR. DURBIN: 14 Q What is this document that's labeled 15 Exhibit 1007? 16 A So this is a Japanese patent by Ohta. 17 That's the name of the inventor. And the title 18 of the device is "Hydraulic Shock Absorber 19 Damping Force Adjusting Mechanism." And this 20 is a translation of the Japanese patent. 21 Q Do you have a preferred name for this 22 Exhibit 1007? 23 A Just Ohta, or the Japanese patent. 24 Either one. 25 Q Ohta -- we can agree that Ohta, or	Page 104 1 separate adjustments must be made to adjust the 2 compression-side and extension-side damping 3 forces." 4 And that's what we were talking 5 about earlier, the user -- you want different 6 things, whether you're hitting the ground or 7 bouncing off it. 8 So what it says -- I'm sorry. 9 Means for solving the problem then is "a single 10 slider, movable in the radial direction and 11 driven by a single motor at the back end of 12 each adjustment rod." 13 So they are moving this angled 14 surface, which we also saw in the '207 patent, 15 for example. 16 Q Dr. Slocum, in your previous answer, 17 did you start by reading on page 2 of Ohta 18 under the section titled "Problem the Device 19 Seeks to Solve"? 20 A I did. 21 Q Dr. Slocum, under -- on page 2 of 22 Ohta under the section titled "Means for 23 Solving the Problem," does Ohta also state that 24 two sloped surfaces with differing angles are 25 formed on the slider?
Page 103 1 the Japanese patent, refers to Exhibit 1007, 2 correct? 3 A That would be nice. Yes, please. 4 Q What is disclosed in Ohta? 5 A Okay. 6 So the figures in the Japanese 7 patents appear at the end. And, broadly, what 8 Ohta is discussing or disclosing is a wedge 9 shape moved axially with a knob connected to a 10 thread to cause the wedge to move, and engaging 11 with the wedge is a -- axially moving because 12 it's touching the wedge, element 34, like the 13 rod. 14 So the -- Japanese patents also 15 start out with what they call claim 1, because 16 they start with the scope of the claims. And 17 then they go into what you would call the 18 background, which is prior art and the problem 19 the device seeks to solve. 20 So it says, "In the damping 21 force adjustment mechanism described above, the 22 damping force can be adjusted so the 23 compression-side and extension-side" -- that's 24 for the shock absorber, compression or 25 rebound -- "have differing damping forces, but	Page 105 1 A Oh, it does, yes. I was reading -- 2 broadly you're using a sloped surface to 3 control axial motion. But here, he's 4 describing also you can have this -- two 5 surfaces, because you have two adjustment rods, 6 he's saying. 7 Q One adjustment rod adjusts 8 compression-side damping and the other adjusts 9 extension-side damping? 10 A That is what he's stating, that he -- 11 we need a different adjustment for different 12 directions. 13 Q Dr. Slocum, what do push rod ends 33 14 do? 15 A We're talking about Ohta, correct? 16 Q In Ohta, yes. 17 A I'm sorry, so now ask me the question 18 again? 19 Q Dr. Slocum, in Ohta, what do push rod 20 ends 33 do? 21 A Push rod ends. 22 (The deponent read the 23 document.) 24 A I mean, that's the -- these are the 25 rods that move axially, so that's where the --

27 (Pages 102 - 105)

Page 106 1 that's -- and that's what a push rod that 2 engages a cam surface does, it moves axially. 3 So I'm not sure what I 4 understand -- in other words, the end contacts 5 the cam, and as the cam moves, it moves the 6 push rod. 7 Q Dr. Slocum, when you just said "cam," 8 did you mean slider or tapered surface? 9 A Yes. So that is a type of cam. So 10 let me generically describe, please, something. 11 A screw thread is a type of cam. 12 It's a wedge. An angled surface is a screw 13 thread of infinite pitch. And eccentric 14 circles are another type of cam. 15 So mathematically, they're all 16 the same, by the way, because it's described as 17 a radius and a pitch and an eccentricity. And 18 the mathematical theory, it's called screw 19 theory, developed by a person named Robert Ball 20 in the early 20th century. 21 In my book, "Precision Machine 22 Design," which I think I referenced, I have a 23 whole section on screw threads, and I show how 24 it's a wedge, an equivalent to a cam, and 25 here's the math that ties it all together.	Page 108 1 document.) 2 A It just says a motor 47. It doesn't 3 tell me what type. But one would assume it's 4 an electric motor, because I can see the cables 5 coming off the back. 6 So, anyway, when motor 47 7 receives a signal, it turns pinion 48, which, 8 in turn turns 49. 9 There will be a transmission 10 ratio. This will increase the resolution or 11 fidelity of the motor, because you have a small 12 gear driving a big gear. That then drives the 13 screw thread 50, which moves the wedge 43. 14 Now, given -- if I can opine how 15 much I love my electronic shifters, and I swore 16 I would never use them, I'll bet you soon I'll 17 be loving my electronic damper control on my 18 mountain bike. 19 Q Does Ohta include a valve actuating 20 assembly? 21 A It does. This whole mechanism is 22 what is actuating the valve. You can see -- 23 let's see, it's 35, because push rod 34 is what 24 is affecting the valve. And in this particular 25 valve, they're using what is -- you could --
Page 107 1 So a wedge is a type of a cam. 2 A screw thread is a type of a cam, an eccentric 3 circle is a type of a cam. All of these 4 things, according to screw theory, which they 5 are, a rotation causes a motion. It can be 6 pure rotary, pure linear, or a combination of 7 the two, depending upon the pitch and the 8 radius and any eccentricity. Sorry. 9 Q Dr. -- thank you, Dr. Slocum. 10 Dr. Slocum, what does Ohta's 11 gear 49 do? 12 A Let me go to the figures again. I 13 want to make sure I get it in the context of 14 the other elements around it. 15 Okay. So when you -- see how 49 16 is connected to the screw thread 50? That's 17 in -- you can see that in -- clearly in 18 Figure 3. And then there's another gear 48, 19 which is actually a pinion. So the smaller of 20 a gear set is the pinion and the larger of a 21 gear set is the gear. 22 And now you've got 47 -- and let 23 me see if it tells me what type of motor we 24 have. 25 (The deponent read the	Page 109 1 you could term a needle valve, but let me 2 double-check here. They don't use that term. 3 This is a translation. 4 Oh, yeah, they do. See it 5 says -- the very end of the discussion, "35 is 6 a needle," so -- and you can see in Figure 2, 7 the end of the push rod 34 is a taper, so 8 that's what's called a needle. And that will 9 fit into -- you can see item 24 -- I'm sorry, 10 25, which is the valve seat. 11 So the tapered needle engaging 12 with the -- the male taper of 25 engaging with 13 the female taper 25 -- one is a convex cone, 14 one is concave cone -- the amount of engagement 15 of the two cones axially will determine the 16 fluid resistance between the surfaces of those 17 cones. 18 So if it's all the way in, 19 it's -- there's no gap at all and it's locked 20 out. 21 Q Gear 49, feed axle 50 and slider 43 22 are functionally equivalent to a lever and a 23 cam, correct? 24 A I think that's a fair statement. 25 Q Ohta's gear 49, feed axle 50 and

Page 110 1 slider 43 function to move push rod ends 33 and 2 the rod labeled 34 up and down to adjust 3 damping characteristics, correct? 4 A Correct. That's -- you'll get -- 5 you'll be able to affect both compression and 6 rebound. 7 Q Any given position of Ohta's slider 8 43 corresponds to one position of the shaft 9 labeled 34, correct? 10 A Correct. 11 Q Any given position of Ohta's slider 12 43 corresponds to exactly one position of push 13 rod ends 33, correct? 14 A Correct. The two are coupled 15 together. 16 Q Where does JP -- excuse me. Strike 17 that. 18 Where does Ohta suggest that its 19 slider 43 offers fine-tuning? 20 A Okay. On the surface of it, you -- 21 you look and you see I've got a screw thread 22 driving a wedge, which to one skilled in the 23 art, that inherently is, wow, I can really, 24 really get very fine position control. 25 Now that I have a motor with a	Page 112 1 able to -- to do. 2 Now, a human could just -- you 3 could eliminate the motor in 48 and the human 4 just grabs ahold of 49 and you'd still get very 5 fine resolution because you have a screw thread 6 driving a wedge, but that requires manual 7 intervention. 8 And here at the very end of the 9 paragraph in "Effect of the Device," right 10 above "Brief Explanation of the Drawings," Ohta 11 specifically says, "Fine adjustment amounts can 12 be achieved at the needle portion." And the 13 needle is what -- is the valve opening. 14 Q Where does it state "fine adjustment 15 amounts"? 16 A On page 6, the last sentence in the 17 paragraph above "Brief Explanation of 18 Drawings." 19 So it's the last paragraph of 20 the section "Effect of the Device." 21 Q Dr. Slocum, would you please review 22 the entire paragraph on page 6 of Ohta that 23 begins "The hydraulic shock absorber damping 24 force adjustment mechanism of claim 2." 25 A Okay.
Page 111 1 reduction gear set, it's telling me I can -- I 2 get even a finer level of control. 3 Now, if you look at the last 4 paragraph, which is above -- this is on page 6, 5 that it says you can "control the rotary speed 6 of motor 47 and adjust the damping force by 7 moving slider 43 to a desired position; by thus 8 detecting the position of slider 43, the 9 positions of push rod end 33 and push rod 34 10 can be estimated, and the damping force can be 11 continuously adjusted by controlling the 12 rotation of motor 47 so that slider 43 comes to 13 a desired position." 14 So if you recall earlier our 15 discussion of fine adjustment, I said you can 16 have discrete or continuous, where continuous 17 would be the ultimate, where you are -- a 18 servo -- have a servomotor, which is what this 19 is describing, essentially, you can have an 20 infinitely adjustable range. It will be 21 limited only by what the feedback element, like 22 the rotary encoder and the transmission ratio 23 on the screw thread all amount to. 24 So this is a very, very fine 25 tunable, far better than a human would ever be	Page 113 1 (The deponent read the 2 document.) 3 A Okay. 4 Q Ohta explains here that fine 5 adjustment amounts can be achieved by using a 6 more gently sloped surface, correct? 7 A Correct. 8 Q Is the more gently sloped surface in 9 comparison to another sloped surface? 10 MS. BHATTACHARYYA: Objection. 11 Form. 12 A So if you read here, it says, "made 13 to contact the more gently sloped surface of 14 the two sloped surfaces." 15 So in this context here, he is 16 calling into account that you'll have a -- he's 17 making the comparison between those particular 18 sloped surfaces, that they're different, and 19 one has a shallower angle than the other. 20 Q Would you please turn your attention, 21 Dr. Slocum, to Figure 4 of Ohta. 22 A Okay. 23 Q Do you see surfaces 44 and 45 in this 24 figure, Dr. Slocum? 25 A I do. Those are the two surfaces

29 (Pages 110 - 113)

Page 114 1 that we just read about. 2 Q Is surface -- scratch that. 3 Does surface 45 of Ohta have a 4 lesser slope than surface 44? 5 A Correct. 6 Q Dr. Slocum, is this an example of the 7 fine adjustment provided by Ohta? 8 MS. BHATTACHARYYA: Objection. 9 Form. Mischaracterizes the record. 10 A The fine adjustment you achieve by 11 the rotation of 49, the screw thread and the 12 wedge or the sloped surface to a rod. 13 Remember, Ohta is looking to 14 adjust two of the rods at the same time and 15 saying I want to have a different amount of 16 adjustment for the different rods given one 17 rotation of the gear 49. 18 So Ohta has two fine adjustment 19 mechanisms, one for compression rod and one for 20 rebound rod. 21 You don't need to have one to 22 have the other. They're independent. He's 23 making a comparison that I can actually effect 24 two adjustments at once if I want to. Don't 25 need to, but you can. That's part of what he's	Page 116 1 drags 25, the seat, with it. 2 35, which is the needle, which 3 will engage that, is attached to the end of 34. 4 And, see, this is where the two elements are 5 working together. 6 So if we keep going down to the 7 bottom of page 5, it says, "slider 43 moves in 8 the radial direction, and push rod end 33, 9 which contacts slider 43 tapered surface 44, 10 and push rod 34, which contacts tapered surface 11 45 at its back end, advance or retract; the 12 advancement or retraction of push rod end 33 13 causes adjusting lever 22 to rise or fall via 14 collar 32 and push pipe 31." 15 This is the mechanism that in 16 the end ultimately differentially control -- 17 and I say differentially, because you have 18 multiple motions going on -- the gap between 19 35, which is the convex or the cone, and the 20 valve plate concave or the female conical 21 surface in 25. 22 It's that relative spacing 23 between the two that is ultimately controlled 24 by the cam surface 44 that is going to control 25 your damping.
Page 115 1 doing here. 2 Q Dr. Slocum, can we take a look again 3 at the last full paragraph on page 6 of Ohta? 4 A Okay. 5 Q What does "fine adjustment amounts" 6 mean in this paragraph? 7 A Fine adjustment amounts can be 8 achieved at the needle. If you go back to the 9 structure here, and you'll see -- you see the 10 valve seat 25, right, that is contained in 11 element 7, so hold on a second. 12 You see hollow rod -- if I go to 13 page 5, the paragraph midway in the middle, it 14 says, "First, when hollow rod 7 is lowered in 15 the compression step, hydraulic oil in the 16 lower chamber passes through the 17 compression-side oil passage," okay? 18 And then you read on. "When 19 hollow rod 7 rises in the extension step, 20 hydraulic oil in the upper oil chamber passes 21 through the extension-side oil passage." 22 So hollow rod 7 is moving 23 depending in which direction you're moving. 24 And then if you -- let's keep on going down to 25 now where the -- so when hollow rod moves, it	Page 117 1 Now, this is a different type of 2 valve in terms of to affect the resistance, 3 flow of hydraulic oil -- 4 (Reporter clarification.) 5 This type of needle valve is a 6 different type of restrictor or resistor -- 7 fluid resistor than is used in some of the 8 other shock absorbers we talked about. 9 But all of them are based on 10 motion of a push rod changing the gap through 11 which the oil must flow, and that's how you 12 change the amount of damping you get. 13 Q Dr. Slocum, does Ohta state that 14 surface 45 provides finer adjustability than 15 surface 44 due to its lesser slope? 16 A Yes, that's -- that's -- that's 17 correct. 18 Q Does Ohta tell us the sizing of 19 slider 43? 20 A I do not have -- no, he does not 21 provide dimensions. 22 Again, you will -- you can -- 23 you don't supposed to scale these drawings. 24 You can look at it and say this is the starting 25 point. But ultimately, a POSITA will write a

Page 118 1 spreadsheet or map, some sort of code to give 2 me what is the response of the system given the 3 geometry I've selected, and I just pick a 4 starting point. 5 And then I have my code loop 6 through a range of values and produce, given 7 these different variations on dimensions from 8 the starting point, here is the performance I 9 get, and then I'll pick what I believe the user 10 wants to feel. 11 Q Dr. Slocum, can you quantify the 12 level of fine-tuning provided by either surface 13 44 or 45 in Ohta? 14 A I could. I didn't write a 15 spreadsheet for it, but I easily could. We 16 could even do it now if you want. 17 Q Would it require you to know the 18 dimensions of slider 43? 19 A As one skilled in the art, I will 20 pick a very common typical starting point, 21 about a ten-to-one slope, and then a typical 22 lead screw pitch for this size mechanism of 23 about 1 millimeter, for example, 1 1/2 24 millimeters, okay? 25 So the ten-to-one pitch -- I'm	Page 120 1 that's your starting point for all these types 2 of mechanisms. 3 Q Does Ohta state the thread pitch for 4 feed axle 50? 5 A He does not give me in words in the 6 text. Just looking at the pictures and 7 understanding as a POSITA a 1- to 2-millimeter 8 pitch is a typical starting point. 9 You pick a fine pitch because 10 it's easy to achieve, the forces are low, and 11 you get a very good transmission ratio. 12 That's -- a POSITA will pick that starting 13 point in their optimization routine that they 14 write. 15 Q Dr. Slocum, do you include in your 16 declaration any of these calculations that 17 you're discussing in your response? 18 A I did not include a spreadsheet for 19 this. I guess I should -- should have. 20 But I think it's clear to me as 21 a POSITA or just anyone looking at this, oh, I 22 have a wedge and I have a screw thread so I get 23 greater fidelity. 24 Q Dr. Slocum, is there any statement of 25 the slopes -- scratch that.
Page 119 1 sorry, ten-to-one slope of the slider, which is 2 very typical, means if I move to the right 3 10 millimeters, the axial position will change 4 by 1 millimeter, and a -- we'll just pick a 5 1-millimeter pitch thread, which would not be 6 unusual for an adjustment thread. So one 7 rotation moves 1 millimeter. 8 So that tells me that one full 9 rotation of 49 causes 1-millimeter rotation -- 10 or, sorry, sliding of, for example, 45. And if 11 I have a ten-to-one slope, which is very 12 common, that means one rotation of the knob 49 13 will cause one-tenth of a millimeter motion of 14 34 up and down. 15 Q Does Ohta indicate the slope of 16 surface 44 or 45? 17 A Indicates it. I look at the 18 drawing -- and as a POSITA, when you design 19 wedges for moving things like this in cams, a 20 ten-to-one is a very good starting point. 21 Q Does Ohta explicitly state the slope 22 of surface 44 or 45? 23 A It doesn't in words. The picture 24 shows me -- and, again, as a POSITA, a 25 ten-to-one slope is very typical. I mean,	Page 121 1 Dr. Slocum -- scratch that. 2 Dr. Slocum, do you state any 3 value for the slopes of Ohta's surfaces 44 and 4 45 in your declaration? 5 A I don't give numbers. I just say 6 it's obvious to a POSITA what you would pick, 7 as I just explained. 8 Q Dr. Slocum, in your declaration, do 9 you state the thread pitch at any point for 10 feed axle 50? 11 A Again, I did not give a specific 12 number. I just say it's obvious to a POSITA 13 what your starting point would be. 14 Q Dr. Slocum, does Ohta state the 15 number of gear teeth on gear 49? 16 A Ohta does not. It just shows the 17 relative diameter, which is how you get your 18 gear ratio. Number of gear teeth or the 19 relative diameters get the same number. 20 Q Does Ohta state the relative diameter 21 of gear 49? 22 A He does not give me a specific 23 diametrical pitch. I just see that gear 49 is 24 driven by the pinion 48, and it's about a 25 two-to-one.

31 (Pages 118 - 121)

Page 122 1 Q Dr. Slocum, I might get this wrong, 2 so please listen carefully. 3 Is Ohta's 48 a pinion? 4 A It is. 5 Q Dr. Slocum, does Ohta state either 6 the gear teeth or the relative diameter of 7 pinion 48? 8 A Relative to what? 9 Q Scratch that question. 10 Dr. Slocum, what does "relative 11 diameter" mean? 12 A When you have a pinion engaging a 13 gear, the relative diameter will tell me the 14 gear ratio. 15 So a 1-centimeter diameter 16 pinion engaging a 2-centimeter diameter gear -- 17 and these are always pitch diameters we're 18 talking about -- gives me a gear ratio of two 19 to one. 20 Q And so the pinion would rotate twice 21 for one rotation of the larger gear? 22 A Correct. 23 Q Okay. 24 Dr. Slocum, does Ohta offer a 25 finer level of tuning than FOX?	Page 124 1 motion of the range I'm trying to control, if I 2 put that through a screw thread -- and, 3 remember, a round cam is equivalent to a 4 tapered surface -- linear tapered service by 5 the -- as we spoke of earlier. 6 But if I'm now controlling those 7 same, effectively, tapered surfaces, one 8 directly but the other one through a screw 9 thread, the one that uses a screw thread 10 inherently will have finer controllability or 11 resolution given that same angular input by the 12 human. 13 I could force it to be awful, 14 but that would -- I think the term is I would 15 be shooting myself in the foot as a mechanism 16 designer to make something worse with -- to add 17 complexity and make it worse would be a very 18 bad thing with respect to product design. 19 So even though mathematically 20 it's possible, it's not practical. 21 Q Dr. Slocum, does FOX state the size 22 of its cam? 23 A None of these references are telling 24 me sizes. They're just showing relative sizes 25 of components. They're leaving it up to the
Page 123 1 A In my opinion, you would get -- if 2 you used Ohta, you could get a much finer level 3 of tuning than in FOX, because you have the 4 transmission ratio of the gear. And 5 furthermore, you have electronic control via 6 the motor. 7 Now, do you need it or not? I 8 don't know if the user will -- it will depend 9 upon the user whether or not they can feel the 10 difference. You know, certainly a professional 11 bike rider would. Would I? Probably not. 12 So it depends upon your market 13 segment that you're addressing in terms of 14 whether you need it. 15 But mechanically, yes, Ohta can 16 give you much higher resolution. 17 Q Dr. Slocum, would that depend on the 18 relative sizes of Ohta's components and FOX's 19 components? 20 A Inherently, the screw thread on a 21 wedge will give you probably an order of 22 magnitude greater resolution than just my 23 ability as a human to rotate a cam through a 24 180-degree arc, because that same 180-degree 25 arc, for example, right, that would cause full	Page 125 1 POSITA to pick actual sizes to optimize, I 2 guess you would call it, for the user market 3 you intend. 4 I just want to note, we promised 5 the court reporter -- I think that's what I 6 refer to her as -- around this time we would 7 break for lunch and she could make her phone 8 call. 9 So whenever it's convenient for 10 you, we should probably do that in deference to 11 her kind service. 12 Q Your timing is amazing, Dr. Slocum. 13 You've mentioned that it's about time to have a 14 break twice today, and at each time, we have -- 15 we have landed at a transition between subjects 16 for me. This is a fine time to take a break. 17 MR. DURBIN: Does that work for 18 you, Arpita? 19 MS. BHATTACHARYYA: What works, 20 half an hour? 21 MR. DURBIN: That works well for 22 me. I see 1:40 my time, so 2:10 my time, 23 around there? 24 MS. BHATTACHARYYA: Sounds good. 25 MR. DURBIN: Jill, Brad, is that

32 (Pages 122 - 125)

Page 126 1 okay with you? 2 THE VIDEOGRAPHER: Yes. The 3 time is 2:40 p.m. We're off the record. 4 (Lunch recess.) 5 THE VIDEOGRAPHER: The time is 6 3:11 p.m. We're on the record. 7 BY MR. DURBIN: 8 Q Dr. Slocum, this is a yes-or-no 9 question. 10 Did you discuss with counsel the 11 subject of your testimony already given or to 12 be given in this deposition during your break? 13 A No. 14 Q Thank you. 15 Dr. Slocum, would you please 16 turn your attention to paragraph 91 of your 17 declaration, Exhibit 1003. 18 A Okay. Let me have a read. 19 Q Please. 20 (The deponent read the 21 document.) 22 A Okay. 23 Q In this paragraph, you state, 24 JP '279's adjuster assembly allows for fine 25 adjustments, correct?	Page 128 1 where I state, starting in paragraph 91, about 2 the fifth line down, "A POSITA would have 3 readily understood that, although FOX's 4 suspension system allows adjustment of 5 compression damping when shaft 34 is in 6 engagement with cam surface 56 as discussed in 7 Section VIII.A.1.c, above, an 'adjuster 8 assembly' as taught by JP '279 would allow 9 fine-tuning of the damping characteristics 10 beyond that possible with FOX's adjuster" -- 11 excuse me, "with FOX's actuator arrangement 54 12 because JP '279's 'adjuster assembly' allows 13 fine adjustments, and thus further improve 14 FOX's suspension system." 15 The key for that, as we keep 16 reading in paragraph 92, I explain, "The 17 'adjuster assembly' of JP '279 includes a 18 slider 43 with tapered surface 44 and a 19 mechanism for axially displacing slider using 20 gear 49, feed axle 50, as shown below." 21 And as we discussed before the 22 break, it will inherently have finer adjustment 23 because you're putting a transmission in there. 24 I mean, a transmission will always increase, 25 for all intents and purposes, the fine
Page 127 1 A Correct. That's on page 64. 2 Q As an initial matter, do you agree 3 with me that JP '279 is what you and I have 4 been referring to as Ohta? 5 A Yes. 6 Q Dr. Slocum, do you state any 7 calculations for the relative amounts of tuning 8 for FOX and what we refer to here as JP '279? 9 A I don't believe I need to. I mean, 10 as a POSITA, I look at the mechanisms, and I 11 can make that judgment just by looking at the 12 images and reading the text. 13 Primarily, it's the images as a 14 POSITA you can look at, as I was explaining 15 earlier, and understand what the relative 16 abilities of the systems are, so I didn't feel 17 I needed to do any sort of additional 18 calculations or anything. 19 Q Dr. Slocum, where do you state in 20 your declaration your basis for state -- 21 scratch that. 22 Dr. Slocum, where do you state 23 in your declaration your basis for your opinion 24 that Ohta provides finer adjustments than FOX? 25 A So that is in paragraphs 91 and 92	Page 129 1 adjustment capability of a mechanism. 2 Q Dr. Slocum, where in your declaration 3 do you state that a transmission will provide 4 an increase in the fine adjustment capability 5 of the mechanism? 6 A I believe that's what I just said. 7 It includes a slider with a tapered surface; 8 that's in common to both of them. 9 A tapered surface is a cam, 10 whether it's a linear surface or a rotary 11 surface. They look like a taper to the end of 12 the push rod. So they both have the slider. 13 And I say "and a mechanism for axially 14 displacing" using a gear and a feed axle. That 15 is the transmission. 16 Q Dr. Slocum, would you please look at 17 paragraph 93 of your declaration. 18 A Okay. 19 Q Do you reference a gear or a 20 transmission in this sentence? 21 A I believe it's inherent in there. 22 I'm adding the tapered surface 44 of JP's '279 23 adjuster assembly to FOX's cam surface. So 24 that's step one, and that is reflected in, if 25 you look at page 66, I have added the tapered

Page 130 1 surface to FOX's eccentric circles, so I get 2 even without the gear an increase in 3 resolution. 4 As a next step, if I add the 5 gear and lead screw, I'll have even finer. It 6 will basically be a -- two steps or a two-stage 7 transmission. 8 The first -- the first level, 9 though, is to add the taper. And then if you 10 want to have even more, you can add axial 11 motion by the screw, depending on what the 12 pitch of the screw is. 13 Q Dr. Slocum, is this transmission -- 14 scratch that. 15 Dr. Slocum, is this 16 transmission-based theory included in your 17 declaration? 18 A I don't know what you mean by 19 "transmission-based theory." 20 The use of a screw thread to 21 move a wedge is POSITA 101. I mean, that's -- 22 that's what I thought I was explaining well. A 23 POSITA, when you see a wedge, you know you have 24 a transmission. You add a screw, and you get 25 even finer resolution. That's in this JP.	Page 132 1 Those are your starting points 2 that every POSITA knows and understands. 3 Q Dr. Slocum -- 4 A Now, how much you need depends on the 5 application, so -- 6 Q Dr. -- Dr. Slocum, do you teach your 7 sophomore students that a cam inherently 8 provides finer resolution than a screw? 9 MS. BHATTACHARYYA: Objection. 10 Mischaracterizes prior testimony. 11 A In my -- if you can -- you can go 12 look at my textbook, "Fundamentals of Design," 13 in Topics 5 and 6, for example, yes, I teach 14 here's the mechanics of them, and depending on 15 what you want to do, here is how you get the 16 resolution of motion. Here's how you calculate 17 the forces. I even teach how to calculate the 18 efficiency of the systems. 19 It really is -- and not just me. 20 This is basic machine elements taught to 21 undergraduates. In the sophomore year is where 22 it's typically first introduced. 23 Q Dr. Slocum, is it your opinion that 24 is it possible to make a cam have a higher 25 resolution than a screw thread?
Page 131 1 It's also in Nagai. It's just common knowledge 2 in POSITAs. 3 Q Dr. Slocum, is it your opinion that a 4 screw thread system is necessarily -- scratch 5 that. 6 Dr. Slocum, in your opinion, 7 does a screw thread system provide finer 8 adjustments in each and every case than a 9 cam-based system? 10 MS. BHATTACHARYYA: Objection. 11 Form. 12 A Okay, so first of all, just to be a 13 little cleanup pedantic, a screw and a cam are 14 both wedges. One is a circular wedge, for 15 example, and one is a linear form or even 16 cylindrical, but not helical, like a screw is, 17 but they're angled surfaces. 18 So, a screw thread, the 19 advantage is it's much easier to get very fine 20 resolution linear. 21 The cam, as we were showing 22 earlier, just like eccentric circles, is -- you 23 can get fine resolution, but it's going to be 24 nonlinear, and you -- inherently, you can't get 25 as fine as you can with a screw thread.	Page 133 1 A Depends what motion you're trying to 2 do. If you're trying to affect the adjustment 3 of a push rod, like we are talking about here, 4 such that the user can control over the range 5 of motion of what you're trying to accomplish 6 with a push rod, no, I think a screw thread 7 driving a wedge will always give you finer 8 resolution than just one of the simple cams I 9 have shown. That would -- that is, in general, 10 what one would understand. 11 Q Dr. Slocum, is your opinion dependent 12 on the sizing of the cam? 13 A I don't think "sizing" is the proper 14 word. I think "shape" of the cam is the proper 15 word. But no, it's not dependent on that. 16 Q Dr. Slocum, if we made a cam that was 17 one foot in diameter, could it provide a 18 greater resolution than a one-inch slider? 19 MS. BHATTACHARYYA: Objection. 20 Incomplete hypothetical. 21 A I can't even imagine what mechanism 22 you're talking about, in all honesty. You have 23 to give me a drawing and dimension it and let 24 me look at it and study it. 25 But as a first order of

Page 134 1 feedback, the terminology used is nonsensical 2 to me. No offense. Sorry. 3 Q Dr. Slocum, if we had a cam that over 4 180 degrees starts at its smallest radius from 5 the axis of rotation at 1 foot, and at its 6 largest radius of rotation at 1 foot and 1 7 inch, would that provide very high resolution 8 over those 180 degrees? 9 MS. BHATTACHARYYA: Objection. 10 Incomplete hypothetical. Form. 11 A You have to tell me where the axis of 12 rotation is. I -- I need to have a drawing of 13 these hypotheticals. I have to look at the 14 whole picture, and -- yeah, because I just have 15 no opinion otherwise. There's too many -- too 16 many loose ends. 17 Q But it is your opinion that you could 18 not design a cam-based system that has a higher 19 resolution than any screw-based system? 20 MS. BHATTACHARYYA: Objection. 21 Form. Mischaracterizes prior testimony. 22 A Again, I don't have an opinion, 23 because when you use absolutes like "any," you 24 know, you have to include what is 25 manufacturable. I can do things with	Page 136 1 me. 2 Q Dr. Slocum, is it your opinion that a 3 POSITA could not design FOX's system to have a 4 higher resolution than JP '279's system? 5 MS. BHATTACHARYYA: Objection. 6 Form. Mischaracterizes the record. 7 Q You can answer. 8 A I'm thinking. 9 I don't think it would be 10 practical, again, because both use a wedge or a 11 cam. Remember, a cam is a circular form of 12 wedge. 13 So whatever I do to one, I can 14 do to the other, and then -- now we're calling 15 it JP, but Ohta adds the addition of a screw 16 thread to further refine or control the motion 17 of the wedge or the cam, whatever you want to 18 call it. So it inherently will have finer 19 adjustment capability, because I've added an 20 additional stage of adjustment refinement, that 21 transmission, the screw. 22 Q Would you agree with me that a 23 screw's resolution can be defined in the units 24 of threads per inch? 25 A No, that is the pitch. The
Page 135 1 mathematics that are just not physically 2 realizable, or I can do things with mathematics 3 that many POSITAs cannot. 4 I have to put everything in 5 context of what a POSITA is doing when a POSITA 6 is practicing one of these inventions. 7 Otherwise, the hypotheticals make no sense to 8 me. 9 Q Dr. Slocum, in your declaration, do 10 you include a basis for your statement that a 11 POSITA would understand that a screw-based 12 system provides finer adjustment inherently 13 than a cam system? 14 MS. BHATTACHARYYA: Objection. 15 Form. Mischaracterizes the record. 16 A Remember, the screw is driving a 17 wedge. A wedge is a form of a cam. So I don't 18 understand your question. 19 Again, in the context of the 20 patent, the patent itself that's in suit, and 21 then the prior art I'm bringing in, it doesn't 22 have just a -- the screw is accompanied by a 23 wedge, and a wedge is a form of a cam. 24 So you're asking me now to 25 delete the cam. That doesn't make any sense to	Page 137 1 resolution is a function of the pitch and the 2 amount or the angle of rotation input to the 3 screw. That defines the resolution. 4 Q What defines the resolution of a cam? 5 A The shape of the cam and the angular 6 input to the cam, or if it's a linear cam, the 7 linear displacement of that shape. 8 Q Does Ohta state the pitch of its 9 screw? 10 A There is no explicit number 11 associated with the pitch Ohta shows. 12 Q Does Ohta state the amount of angle 13 of rotation input to the screw? 14 A Again, there is no specific number in 15 any of these patents that is telling me that 16 level of specificity on dimensions. 17 Q Does your declaration include a 18 statement of the pitch for Ohta's screw? 19 A It does not. As I said, a POSITA 20 looking at the mechanism would understand 21 because of the nature of a screw in addition to 22 a wedge, you'll have finer resolution than just 23 a wedge, wedge being a generic term for the 24 linear wedge as shown or a rotary cam. 25 Q Does your declaration state the

35 (Pages 134 - 137)

Page 138 1 amount of angle of rotation input of the screw 2 in Ohta? 3 A Again, I do not give a number. I 4 didn't feel I need to give a number. I look at 5 it as a POSITA and understand how these 6 mechanisms work, as we discussed earlier. 7 Q Does FOX disclose the shape of its 8 cam? 9 A It does not give me a mathematical 10 function. I understand it to be from the 11 discussion in the drawings a simple eccentric 12 circular-type cam. 13 So that's the starting point. 14 Q Does FOX disclose the angular input 15 of the cam? 16 A Well, FOX tells me I've got, for 17 example, the top dead and bottom dead center 18 positions. 19 And then in between there, I -- 20 based on the motion of the lever, I will 21 control the amount of damping. 22 Q At any point in your declaration do 23 you provide a comparison between the fineness 24 of the tuning of Ohta and the fineness of the 25 tuning of FOX?	Page 140 1 rotary motion of a tapered cam, and then in 2 addition to the rotary motion, if you look at 3 between 67 and 68, for similar angular 4 orientations, I now move that tapered 5 cylindrical cam axially to illustrate how that 6 affects motion of the plunger. 7 So I can get motion from the 8 plunger by rotation or axial motion or a 9 combination thereof to get the type of 10 performance I want from the system. 11 Q Dr. Slocum, how does your proposed 12 combination of FOX and Ohta differ from merely 13 increasing the size of the cam in FOX? 14 MS. BHATTACHARYYA: Objection. 15 Form. Incomplete hypothetical. 16 A The term "increasing the size of the 17 cam" has no physical meaning in the design of 18 cam systems with respect to the motion control. 19 So you have to give me a drawing of what you 20 mean, you know, a comparative drawing, because 21 I just don't understand. 22 Your terminology does not make 23 sense to me as a POSITA. 24 Q Dr. Slocum, if we had a cam that had 25 a -- scratch that.
Page 139 1 A Yes, that is what I am doing with my 2 solid model representations associated with 3 pages 66 through 68. I am graphically 4 comparing what happens when you have just a 5 simple eccentric circles to now what would 6 happen if I added a taper. And that's on 7 the -- and that's, for example, the coloring 8 that you can see there in these images. I'm 9 discussing what happens as you get motions. 10 And that's why I included that 11 red bullet-shaped plunger, so one could 12 graphically see how different positions of the 13 cam -- that would be the rotary or the -- 14 rotation of the green surface, how that, with 15 the different cam surfaces that are brought to 16 bear on the plunger -- that's the red thing -- 17 affects the axial motion of that plunger in the 18 bore. That is what I am illustrating in those 19 images. 20 Q Dr. Slocum, are the solid models -- 21 scratch that. 22 Dr. Slocum, are the solid model 23 representations associated with pages 66 24 through 68 found in Ohta? 25 A No, I created those. And these are	Page 141 1 Dr. Slocum, would you please 2 turn your attention to page 67. 3 A Okay. 4 (The deponent read the 5 document.) 6 Q What would we call it if we took 7 vertical slices of this truncated cone-ish 8 profile that has multi colors on the left side 9 of the green in that image? 10 If you took slices, what would 11 each slice be called? Cross-section? 12 A When you take a slice of something, 13 it's called a cross-section. You have to -- on 14 this -- and this -- we're on page 67, correct? 15 Q Lower left image. 16 A Right. So let's not look at the 17 isometrics. Let's just look at the side views. 18 You can take a -- remember, 19 cross-sections are nominally always 20 perpendicular to a view unless stated 21 otherwise. So now ask me a cross-section 22 question. 23 Q And I think I have a good way to do 24 it. 25 Dr. Slocum, if the image in the

Page 142 1 upper-left corner of 67, if that system didn't 2 move axially along the axis of rotation but it 3 just stayed there -- 4 A Mm-hmm. 5 Q -- could we define the resolution of 6 that system? 7 A Remember, resolution requires there's 8 a shape and then an input angle. 9 I can see the shape here, 10 estimating it from -- you know, scaling it from 11 looking at the drawing. 12 You would have to tell me what 13 is the input angle of rotation to assume. 14 Q Can we control for input angle to 15 compare two similar structures? 16 A You have to -- give me two 17 structures. 18 Q The figure in the upper left-hand 19 corner versus the figure in the upper 20 right-hand corner, assume they don't axially 21 move. But if you put a 180-degree rotation in 22 the top one, compare it to a 180-degree 23 rotation on the bottom one, would those have 24 the same level of fineness of tuning? 25 MS. BHATTACHARYYA: Objection.	Page 144 1 A Am I allowed to describe the 2 mathematics of how these things work? Because 3 your questions are -- no offense -- 4 nonsensical. 5 Q I don't think it's necessary, but is 6 it your opinion that it's nonsensical for me to 7 ask if the system shown in the upper right-hand 8 corner is comparable in its amount of fineness 9 to the image in the lower left-hand corner? 10 MS. BHATTACHARYYA: Same 11 objections. 12 A You just said upper right-hand corner 13 to lower left. These are two different -- can 14 we just please stick with either isometric or 15 plan -- side view? 16 Q Okay. Yes, sir. 17 Can you compare the levels of 18 fineness of adjustability between the side view 19 on the top and the side view on the bottom? 20 A On page -- 21 MS. BHATTACHARYYA: Same 22 objections. 23 Q On page 67. 24 A Yes. I can tell you the way that 25 works is the axis of rotation goes through the
Page 143 1 Form. Incomplete hypothetical. 2 Mischaracterizes the record. 3 A What you're getting in those -- when 4 you rotate 180 degrees, right, what's on the 5 top left of page 67 becomes the top right -- 6 I'm sorry, the top left on page 68 and vice 7 versa. 8 So I just don't understand what 9 you mean. In that respect, they're going to 10 have the same stroke of that red plunger for 11 180 degrees, because it's -- the system is 12 reversible. That's what 180 degrees gets you. 13 So in that respect, you know, 14 the resolution for 180 degrees is the same in 15 those two, because I've gone completely around. 16 Red becomes green; green becomes red. And now 17 you reverse it, and it's -- mechanical systems 18 are reversible. 19 Q What are -- is it your opinion that 20 you cannot tell me whether the image in the 21 upper left-hand corner of page 67 provides a 22 finer tuning than the image in the lower 23 left-hand corner? 24 MS. BHATTACHARYYA: Objection. 25 Form. Mischaracterizes the record.	Page 145 1 center of the green, correct? I'm not asking a 2 question. I'm going to state it. Sorry. 3 The axis of rotation goes 4 through the center of the green cylinder. The 5 distance from the axis of rotation to the 6 contact point between the red plunger and the 7 cam surface is different between the top and 8 the bottom because of the taper of that cam. 9 Given a small rotational angle 10 theta -- and I can pick what it is later, but 11 let's just say, you know, a couple degrees -- 12 the up-and-down motion of that plunger for that 13 near bottom dead center looks like the radius 14 times (1 minus cosine of the angle I'm going to 15 rotate), which is approximately equal to the 16 radius times the angle squared over 2 for that 17 near bottom dead center position. Okay? 18 So in the upper image, you see 19 how the plunger is closer to the axis of 20 rotation, so that radius is smaller. In the 21 bottom image, the radius is larger. 22 So you will have a different 23 motion of the plunger in those two cases for 24 the same angular input. 25 Q And does that lead to a different

37 (Pages 142 - 145)

Page 146 1 level of fineness of tuning? 2 A Correct. For a given angular input. 3 Q So by adjusting the radius, we can 4 increase or decrease the level of fineness of 5 tune? 6 MS. BHATTACHARYYA: Objection. 7 Incomplete hypothetical. Form. 8 A For a given rotation -- and you have 9 to be able to define where the radius is. 10 That's the eccentricity of the cam. I have to 11 know the radius of the cam itself and the 12 eccentricity or the -- where the center of 13 rotation of the cam is with respect to the 14 center -- I'm sorry, the center of the shape of 15 the cam with respect to the center of rotation. 16 So the earlier formula I gave 17 you, I didn't add in those ra- -- length of 18 radii. That was to give you an example of how 19 it would go. 20 If you want, I can recite the 21 full mathematics, but I didn't think you want 22 that. 23 Q I don't, Dr. Slocum, although I will 24 say it is helpful that you gave the rather 25 complicated equation involving radiuses and	Page 148 1 Q As a cam designer, is there a maximum 2 or minimum amount of fineness one can get out 3 of a -- the use of a cam? 4 A You ultimately are limited to two -- 5 several locations. The first one is just the 6 pure mathematics of perfect exact surfaces, and 7 then I can drive things to a near singularity 8 for near infinite fine resolution. 9 Practically, a mechanical 10 engineer understands when two surfaces touch, 11 there's deformation at the surface, and that 12 deformation depends upon the shape and the 13 force and the materials. And the amount of 14 deformation is inherent in terms of a limiting 15 factor on what sort of resolution you can get 16 from that mechanism. 17 And that's the, you know, junior 18 and senior level or in some respects first-year 19 master's student. So you either get it with 20 the mathematics in the more advanced courses 21 or -- this is in the definition of a POSITA -- 22 a couple years in industry will teach you this 23 pretty quickly. 24 Q But a POSITA would understand how to 25 alter the level of fineness were they to want
Page 147 1 minus cosines and things like that, because we 2 can see that the level of fineness depends on 3 radius; is that correct? 4 MS. BHATTACHARYYA: Objection. 5 Mischaracterizes prior testimony. 6 A I picked the radius of contact for 7 that instant at bottom dead center. You can't 8 now extend that and say it's the radius of the 9 cam. That's nonsensical. 10 I took this one geometric 11 instance of the position of that tip with 12 respect to the center line of rotation of the 13 entire system. 14 You can't generalize and call it 15 the radius of the cam. If you want to 16 introduce the actual cam wordage, we have to 17 have the full shape of the cam and that shape's 18 location with respect to the axis of rotation. 19 That's the green piece. 20 So, again, a POSITA, you can 21 look at this and understand how the cam works 22 and that the wedge shape I show inherently will 23 increase -- give you an ability to fine-tune 24 your resolution, but that's as broad of a 25 generalization as you can make.	Page 149 1 to for any given project? 2 A Those terms are so broad. But in the 3 context of the patents here, yes. 4 Q Yet a slider and a screw provides 5 inherently greater levels of fineness? 6 MS. BHATTACHARYYA: Objection. 7 Form. Mischaracterizes prior testimony. 8 Mischaracterizes the record. 9 Q You can answer. 10 A I don't understand what you mean, 11 inherently a slider and a screw. 12 Q What is disclosed in Ohta? 13 A You have an angled surface. Motion 14 of the angled surface pushes one of the two 15 plunger assemblies, depending on which one you 16 want to talk about for controlling the 17 compression or the rebound stroke, you know, 18 the -- and we can get into which of the 19 plungers affects which. 20 I gave the example of flow 21 control through the convex/concave orifices. 22 That's -- 23 Anyway, a user will understand 24 that if you have a wedge, a slope, or a cam -- 25 they're all synonymous. It's an angled surface

Page 150 1 that motion of that surface causes axial 2 displacement. That directly moving that -- a 3 human directly moving that will inherently not 4 give you as fine a motion as if a human turns a 5 screw to move that surface. 6 That's what's inherent, is if I 7 add a mechanism between my hand and the cam, 8 that -- it inherently makes my 10 degree motion 9 of my hand look like 1 degree motion because 10 I've got this thread pitch, you know. 11 That's what I've been -- that's 12 what a POSITA understands, and that's -- I 13 thought that's kind of what we've been 14 discussing in your lines of questions. 15 Q Where do you state in your 16 declaration that the screw is responsible for 17 Ohta's fineness of adjustment? 18 MS. BHATTACHARYYA: Objection. 19 Mischaracterizes the record. 20 A Okay. Hold on. Let me go back to my 21 table of contents so I can get you the exact 22 paragraph. 23 (Pause.) 24 A Okay. If you look on the -- I 25 discuss broadly to start Ohta on paragraphs 42	Page 152 1 Q Dr. Slocum, where are you right now? 2 What are you comparing? 3 A Paragraph 76, which is page 52. 4 Now, in paragraph 77, Ohta is -- 5 specifically uses the term "fine adjustment." 6 Ohta is talking about the need to have fine 7 adjustment. And as we had discussed earlier 8 today, Ohta in particular was using a motor, a 9 pinion, a gear and the screw to give very fine 10 adjustment or motion of that wedge or cam 11 surface. Okay? 12 Now, if you go to page 79 -- 13 sorry, paragraph 79 on page 53 at the bottom, I 14 state, "A POSITA would also have readily known 15 how to axially move FOX's camshaft 58 (modified 16 to have JP '279's tapered surface) along the 17 camshaft's longitudinal axis using a manual 18 push-pull mechanism actuatable by a rider, or 19 with a motorized mechanism as taught by 20 JP '279." 21 I then go on to then say, well, 22 you can also use -- because JP -- sorry. 23 JP '279, or Ohta, has using a 24 motor, and then I go on to further state that 25 the other teaching of Nagai uses a manually
Page 151 1 through 44. 2 And then I show in the colored 3 images on page 25, the gear 49, the feed axle 4 50 and then the slider 43. So that is -- you 5 turn the gear, you move a screw and you move a 6 wedge. So that's the first place. 7 And again, the POSITA looks at 8 that and says, aha, I'm using a screw to get 9 fine motion capability of the wedge as opposed 10 to just trying to move it directly by my hand. 11 The next place is going to be 12 around page 88. Hold on a second. Let me go 13 first, actually, to 51. The next place, the 14 first phase is on page -- sorry, paragraph 67. 15 We're now on just taking the taper of Ohta, and 16 that's where I'm now tapering the surface of 17 the cam. And those were the images that we 18 were just talking about earlier, my colorized 19 cam surface images where I took a cylindrical 20 cam and tapered it. 21 So now in the first phase, I'm 22 taking the teaching of Ohta to use a tapered 23 surface to act on a push rod, and I'm adding 24 that tapered surface to my cam to increase the 25 resolution ability of the cam.	Page 153 1 operable bolt. So, in other words, the screw 2 threads are manually turned. So I'm saying if 3 you don't want to use a motor, go ahead and use 4 manual turning of a screw thread. That's what 5 Nagai is teaching. 6 So there it is in a whole bunch 7 of places, I believe I was clear, in answering 8 your question. 9 Q Where is your discussion of Nagai, so 10 that we can go through that in more detail? 11 A Okay, so now let me go -- so I can 12 more rapidly go to the pages, I'm going to go 13 back to my table of contents, okay? 14 So again, on page 51, it 15 starts -- the -- well, let's go back to the 16 early broad discussion of Nagai as the -- as a 17 patent itself, because that gives you 18 indication of what's going to be coming. 19 So now let's go to page 26, 20 please. Actually, I -- I don't have -- I want 21 to use the actual patent. 22 Q Dr. Slocum, I asked you where in your 23 declaration. 24 A Okay. So -- all right. So Nagai 25 talks specifically -- here I'm describing

Page 154 1 broadly what Nagai is doing, and on paragraph 2 46, I say, "in Nagai's Figures 6 and 7, damper 3 assembly 101 includes a damping force 4 adjustment mechanism, which comprises an 5 eccentric cam," and it's arranged to cooperate 6 with adjusting rod 126 to cause the rod to 7 displace axially. 8 And then I say, axial 9 displacement of adjusting rod 126 in turn 10 varies the cross-sectional area of the oil 11 passage. 12 And then I say in paragraph 47 13 further, "As shown in Figures 8 and 9 of 14 Nagai," I talk about the eccentric cam, and if 15 you read down -- I can read the whole thing if 16 you want, but down at the fifth line from the 17 bottom -- I'm sorry, fifth line from 47, "Nagai 18 additionally includes a stopper bolt 141 that 19 is threaded into the camshaft housing 115 20 adjacent to shaft 133." 21 So the stopper bolt, when I move 22 that, that gives me -- because it's threaded, I 23 get finer adjustment. 24 Now let's go to page 51 -- 25 Q Dr. Slocum, if you would just let me	Page 156 1 proposed combination? 2 MS. BHATTACHARYYA: Objection. 3 Mischaracterizes the record. 4 Q Scratch that. 5 Dr. Slocum, is a screw required 6 for your combination to have finer adjustment? 7 MS. BHATTACHARYYA: Objection. 8 Mischaracterizes the record and prior 9 testimony. 10 A The first step of using Ohta does 11 not. I just used Ohta's taper added to the 12 cylindrical cam shape of what is already there 13 in the FOX patent. That is what those colored 14 images around page 68 that we were speaking of 15 earlier that I created to show the motion of 16 the pink plunger. 17 I continue with, if you want 18 even more than that, then you would add in 19 Ohta's screw to move the camshaft with that -- 20 its now-tapered surface imparted to it to get 21 even finer resolution. 22 So it's a two-step process, 23 depending upon what the POSITA determines the 24 user wants. 25 Q Do you state your second step
Page 155 1 know where these are, we're going to go through 2 everything in detail. 3 A I thought I just did. 4 Q Yes, but you're also reading from 5 them. And I just need to know paragraph 6 numbers or pages. 7 A Oh, okay. I thought you wanted me to 8 point with fine resolution to the discussion. 9 So I'll just give you the paragraphs, then. 10 Q Please, and then we can go through 11 them. 12 A Okay. 13 So let me give you the -- after 14 page 51, we would then need to go to page 88 15 for further Nagai discussion. So that's the 16 coarse resolution of where it's at. 17 Q The first groupings you stated in 18 your most recent response was paragraphs 42 19 through 44. 20 Would you please direct your 21 attention to paragraphs 42 and 44. 22 A Okay. Hold on. 23 Okay. Paragraph 42, Ohta. 24 Q Do you explain in paragraphs 42 25 through 44 that a screw is required for your	Page 157 1 regarding a screw in paragraphs 42 through 44? 2 A I do. In the beginning of 3 paragraph 44, I talk about "when motor 47 is 4 driven, it rotates a feed axle." 5 So there is the feed axle part, 6 that I can take that and put that in the FOX 7 cylindrical cam that has been modified with the 8 taper. That's, like, part two. 9 Q In paragraph 44, do you mention FOX? 10 A I'm describing how Ohta works, and 11 later on when I say now I'm combining them, I 12 actually -- well, we can go there, but that's 13 what I'm doing. I'm describing Ohta. These 14 are the elements. And I believe you asked me 15 the question earlier using that in the FOX, so 16 that's why I responded when discussing 17 paragraph 44 how it would be used in FOX's 18 device. 19 But this paragraph here, right 20 now, I'm just generally talking about Ohta, but 21 I understood your question was how does 22 paragraph 44 relate to using it in FOX. We 23 have to go to page 51 for that. 24 Q Let's turn your attention to page 25 25 first.

40 (Pages 154 - 157)

Page 158 1 A Okay. 2 Q Do you suggest using a screw with FOX 3 on this page? 4 A This is just talking about Ohta, so I 5 haven't talked about how the combination will 6 occur. I do do that starting around page 51. 7 Q I'm just walking through your prior 8 response and the different portions you pointed 9 to, and I'm asking my question again, 10 essentially, so that I can understand your 11 response. 12 A I apologize if I added in "FOX," 13 because I thought one of the questions 14 specifically asked about FOX with regards to 15 this paragraph. 16 Q Would you please now turn your 17 attention to pages 51 through 83. 18 A Okay. Hold on. 19 Q Excuse me. Paragraphs 75 through 83 20 on pages 51 through 56 of your declaration, 21 which is Exhibit 1003. 22 A Okay, 75 through 88 paragraphs you 23 just said, right? 24 Q Yes, Dr. Slocum. 25 A Okay. So let me -- would you like me	Page 160 1 because they're all in the same field and the 2 same basic type of mechanism, i.e., a damper. 3 Q Would you now please turn your 4 attention to paragraph 76. 5 A Okay. Let me read. 6 (The deponent read the 7 document.) 8 A Okay. 9 Q What does paragraph 76 state would be 10 added from Ohta to FOX in your proposed 11 combination? 12 A I'm stating in paragraph 76 that I 13 will take Ohta's tapered surface 44 -- I'm 14 sorry -- on cam surface 56 of FOX's camshaft 15 58, and I state specifically, "for example, a 16 rotary cam may have an axial taper on part of 17 its surface." 18 Q In this paragraph, do you mention a 19 screw or a wedge controlled by a screw? 20 A The axial taper I'm talking about, 21 that's the wedge. But I do not in this 22 paragraph talk about a screw. 23 Q Would you please turn your attention 24 to paragraph 77. 25 A Okay.
Page 159 1 to read and review them or just turn there and 2 then you start -- we start from there? 3 Q We can go one at a time. Let's first 4 look at paragraph 75. Would you please review 5 it. 6 A Okay. 7 (The deponent read the 8 document.) 9 Okay. 10 Q Does this paragraph state the 11 importance of a screw to fine adjustment? 12 A No. This paragraph is just stating 13 they're both in the same area, and, as I say, 14 they're hydraulic shock absorbers. Nagai 15 further discloses a suspension system, a 16 specifically hydraulic damper, and thus FOX, 17 JP '279, and Nagai are in the same technical 18 field. 19 And then I state, "Each of these 20 references also teaches adjustment mechanisms 21 for controlling compression," and I'm saying 22 therefore, this is why you would look at them 23 all together to see what you want to take from 24 each to get -- you would investigate what kind 25 of mechanism would you put together from these,	Page 161 1 (The deponent read the 2 document.) 3 A Okay. I read 77. 4 Q Do you mention a screw in 5 paragraph 77? 6 A No. I am just referring that JP 7 talks about you need fine adjustment, so -- 8 and -- but it doesn't -- I'm not exploring yet 9 just in 77 how I might even add more fine 10 adjustment than just the tapered surface. 11 Q Was it your testimony, Dr. Slocum, 12 earlier today that Ohta provides one surface 13 having fine adjustment by having a lesser 14 slope? 15 MS. BHATTACHARYYA: Objection. 16 Mischaracterizes prior testimony. 17 A That is not what I said. I said the 18 relative adjustment is different because of the 19 two surfaces having a different slope. 20 The fact that you have a -- even 21 just one of those surfaces provides fine 22 adjustment capability over having no wedge. 23 Ohta is teaching two of them with different 24 slopes, because Ohta wants to get -- depending 25 on whether you are controlling the compression

41 (Pages 158 - 161)

Page 162 1 or rebound valving actions, they may be 2 requiring different levels of adjustment, and 3 you can get that by having the two slopes 4 driven by one screw. 5 Q Ohta uses the term "fine adjust" -- 6 MS. BHATTACHARYYA: Mr. Durbin, 7 can you stop for a second? Realtime is not 8 working, so I want to make sure Madam Court 9 Reporter can look into that. 10 (Discussion off the record.) 11 THE VIDEOGRAPHER: The time is 12 4:11 p.m. We're off the record. 13 (Recess.) 14 THE VIDEOGRAPHER: The time is 15 4:15 p.m. We're on the record. 16 BY MR. DURBIN: 17 Q Dr. Slocum, would you please direct 18 your attention to page 6 of Ohta, which we have 19 referred -- or which is also marked 20 Exhibit 1007. 21 A Okay. Here I am, it's page 6. 22 Where? 23 Q Dr. Slocum, do the words "fine 24 adjustment" -- scratch that. 25 Dr. Slocum are the words "fine	Page 164 1 of the two sloped surfaces of the slider? 2 MS. BHATTACHARYYA: Objection. 3 Form. Mischaracterizes the record. 4 Mischaracterizes prior testimony. 5 A I don't understand your question, 6 because you took a piece of the sentence. The 7 fine adjustment -- there are two mechanisms 8 that are being adjusted, and they are -- one is 9 for compression and one is for rebound. 10 They're being adjusted at the same time. They 11 are both being fine-adjusted. 12 One is not done relative to the 13 other, for example, for a differential motion 14 of slides. It's just you're adjusting one 15 finely to do one thing and at the same time 16 you're adjusting another one to do something 17 finely. 18 The different slopes are because 19 I need different -- and the term is your 20 transmission ratios for the different 21 mechanisms because they're doing different 22 things. 23 One is controlling the needle 24 orifice. That's only for the rebound. That 25 varies the gap.
Page 163 1 adjustment" featured on this page? 2 A They are. 3 Q Dr. Slocum, are the words "fine 4 adjustment" used in a sentence on this page? 5 A They are. 6 Q Dr. Slocum, does that sentence that 7 uses the words "fine adjustment" provide 8 context for the meaning of "fine adjustment"? 9 MS. BHATTACHARYYA: Objection. 10 Form. 11 A I'm not sure I understand your 12 question. The sentence portion is "and fine 13 adjustment amounts can be achieved at the 14 needle portion." 15 This is all in the context of 16 talking about the slope surfaces and how the 17 adjustment is made with the rotation of the 18 motor. That's what drives the screw thread 19 that moves the sloped surfaces. 20 So that is what I believe is the 21 context. 22 Q Dr. Slocum, in this sentence, are the 23 fine adjustment amounts due to the fact that 24 the back end of one of the adjustment rods is 25 made to contact the more gently sloped surface	Page 165 1 And the other is controlling the 2 way they get done the compression damping. 3 There's a stack of spring plates and how hard 4 you push on them affects how the oil flows 5 through. Okay? 6 So they're very -- one does 7 compression and one does rebound. And both of 8 them, you want to have very fine motions of the 9 rods that push on them, but they don't interact 10 in any way other than that. 11 That's why you're -- the way you 12 asked the question makes no sense to me. 13 Q Dr. Slocum, the full -- Dr. Slocum -- 14 okay. 15 Would you please turn your 16 attention to page 2 of Ohta. 17 A Okay. I'm on page 2. 18 Q Dr. Slocum, would you please read the 19 sentence under the heading "Problem the Device 20 Seeks to Solve." 21 (The deponent read the 22 document.) 23 A You want me to read it aloud or just 24 read it and now you want me to answer 25 questions?

42 (Pages 162 - 165)

Page 166 1 Q Read it to yourself. 2 A Okay. 3 (The deponent read the 4 document.) 5 A Okay. 6 Q Can you describe in your own words 7 the problem to be solved in Ohta? 8 A In a shock absorber, the compression 9 side and the rebound side, there are different 10 forces involved. You know, specifically, one 11 is that the compression side bears the full 12 weight of the rider slamming down on it. And 13 on the rebound side, the rider's weight is 14 relieved. Very different levels of force 15 involved. 16 Therefore, the damping 17 mechanisms for the two are going to have to be 18 at different levels of damping, so they're 19 going to need separate adjustments to get them. 20 That's broadly what they're saying. 21 Q Dr. Slocum, would you please read the 22 "Means for Solving the Problem," and only the 23 first paragraph under there that begins with, 24 "To solve the problem, claim 1 of the device." 25 (The deponent read the	Page 168 1 controlling the compression valve. Yet I only 2 want to move one motion that will do both of 3 them. That's why it uses two different sloped 4 surfaces. 5 So essentially, you're driving 6 two cams to do two different functions but with 7 one input. 8 Q Dr. Slocum, I'll admit to you that 9 I've read Ohta many times, but I still don't 10 understand why you need to adjust both at once. 11 A Ah. Because the -- when you are 12 riding -- you know, mountain biking, the amount 13 of damping on the down is fairly correlated to 14 the type of response you're going to want on 15 the rebound. So this way, you just have one 16 adjustment does two things as opposed to the 17 rider having to make two adjustments that, in 18 the end, will be very similar, so you achieve a 19 more ergonomic shock absorber. 20 You have less knobs to turn, 21 because the fewer knobs to turn to give 22 pleasure to the rider, the happier the rider 23 will be and less likely to get confused. 24 Q And the mechanism -- sorry, I'm 25 jumping on to what you're saying.
Page 167 1 document.) 2 A Okay. I've read it. 3 Q Does Ohta provide a means for solving 4 the problem by providing a single slider having 5 two sloped surfaces but differing angles? 6 A It does. 7 Q Does that -- pardon me. 8 Does that slider and the two 9 differing angled sloped surfaces result in 10 different amounts of displacement for two 11 separate adjustment rods? 12 A It does. That's what the last 13 sentence in that paragraph tells us. 14 Q Does one of those surfaces provide 15 finer adjustments? 16 A The axial motion of the shallower 17 surface -- excuse me, of the rod contacting the 18 shallower surface will move less for a given 19 axial motion of the surface that drives both of 20 those angled surfaces. 21 But that's not what the 22 mechanism is trying to do. The mechanism is 23 saying that the rebound -- the axial motion for 24 the rebound valve needs to be moved a different 25 amount than for the axial motion of the rod	Page 169 1 Is it true that the mechanisms 2 for the rebound and the compression side 3 damping are different in nature? 4 A Well, the fluid flow, this particular 5 thing, through the orifice or a stack of plates 6 are different. 7 In the end, fluid just sees a 8 variance in opening. 9 Q But how that variance in opening is 10 different and therefore you might want to 11 adjust one different than the other because the 12 differences in those mechanisms? 13 A Well, you see, that's what Ohta is 14 doing here. Ohta is saying I have these 15 different valvings. One is a needle valve and 16 one is a stack of plates. And they're going to 17 have different -- the term would be "fluidic 18 gain" or "fluid resistances." 19 And they're going to range -- 20 and the amount of resistances are going to be 21 related based on, you know, the aggressiveness 22 of my ride, so why don't I go ahead and change 23 both of them at the same time, and I'll account 24 for the fact that the different mechanisms need 25 different levels of motion by having two

43 (Pages 166 - 169)

Page 170 1 different cam surfaces, but they're both being 2 driven by one adjustment. 3 Q I think I finally understand. 4 Is the needle or the plates 5 more -- is "sensitive" a good word? 6 A The plates will handle higher flow 7 levels at higher pressures, which is what you 8 need for compression. 9 The industry has found that that 10 is a more effective way of handling those 11 sudden high flow levels than just a needle. 12 Now, please don't ask me can I 13 make one better than the other, because, again, 14 we'll get back to this mathematically, I can 15 make just about anything happen. This gets 16 back to what's the practical implementation. 17 And the industry, through experience, and some 18 pretty good analysis, has arrived at this 19 recipe. 20 Q The light bulb has gone on. Okay. 21 Thank you. 22 Dr. Slocum, I'd like to now 23 introduce an exhibit that has been previously 24 marked as Exhibit 1006. 25 A I'm going to put Ohta aside now for a	Page 172 1 bicycle. 2 Q Dr. Slocum, would you please turn 3 your attention to page 92 of your declaration, 4 which is Exhibit 1003. 5 A Okay. I am now on page 92 of my 6 declaration. 7 Q Does this page show an annotated 8 drawing of Yi's Figure 12? 9 A It does. 10 Q Did you make these annotations, 11 Dr. Slocum? 12 A I did a first-pass colorization and 13 Arpita cleaned them up because mine were not so 14 pretty. 15 Q I have become a professional colorer 16 myself, and/or some of my associates. 17 Dr. Slocum, what does damping 18 adjusting rod 10 do? 19 A So this is similar to the FOX patent, 20 the SRAM patent. That rod transfers motion of 21 a camshaft to cause displacement of a valve 22 structure to vary the fluid resistance through 23 the valve structure for -- in this case, we're 24 looking at the compression cycle. 25 Q Does damping rod 10 move axially up
Page 171 1 moment in my standby pile. 2 (Exhibit 1006 marked for 3 identification.) 4 A Okay, I have Yi, which is 1006, US 5 Patent 6,491,146. 6 BY MR. DURBIN: 7 Q As we have done in the past, can we 8 agree to refer to Exhibit 1006 as "Yi"? 9 A I'm happy. Some people pronounce it 10 "E," but "yee," I think is easier for the court 11 reporter to type Y-I. 12 Q Let's go with the phonetic "Yi." 13 A Thank you. 14 Q What is Yi? 15 A Yi is a damping adjustable shock 16 absorber for a bicycle, is the patent, and that 17 actually is what it is. Sorry, that's the 18 patent title, and that's actually what this is. 19 Q Is that what is shown in Figure 12 of 20 Yi? 21 A Well, Yi has various embodiments, but 22 figure -- and they're all shock absorbers for 23 bicycles. 24 But yes, Figure 12 is an 25 embodiment of Yi for a shock absorber for a	Page 173 1 and down relative to the shock absorber, which 2 would be left or right on the page? 3 A That is correct. 4 Q Dr. Slocum, what does cam -- what 5 does the yellow camshaft 2 do? 6 A As you rotate lever 201, which is 7 blue, and that is connected to the camshaft -- 8 it's not labeled but you can see it looks like 9 a bolt that passes through the end of the 10 camshaft. As you rotate that lever, you rotate 11 the camshaft, and you see there's -- where that 12 camshaft is crosshatched. But then there's a 13 region where it's not crosshatched. That's 14 indicating to me that, okay, that's a cam 15 surface. And the green damping rod adjustment 16 end is in contact with that cam surface. 17 So as you rotate the lever, the 18 camshaft rotates, which means the cam rotates 19 or moves with respect to the center line of 20 rotation of the yellow member, and that effects 21 left-to-right motion of the damping adjustment 22 rod 10. 23 Q And does left-to-right motion of the 24 damping adjustment rod 10 adjust the damping 25 characteristics?

44 (Pages 170 - 173)

Page 174 1 A It does. 2 Q Is a given damping characteristic for 3 Yi's damper dependent on the axial positioning 4 of damping adjusting rod 10 along the -- along 5 its axis that moves left to right in this image 6 on the page? 7 A Correct. 8 Q I know that you -- how do we know 9 that the funnel-looking thing that isn't 10 crosshatched is the cam surface? 11 I'm not denying it, but how do 12 we know that? 13 A When you take a cross-section, you 14 put hatching through material that is 15 physically cut. And if material is not 16 physically cut, you don't put any 17 crosshatching. 18 So that's telling me that in the 19 plain end of the paper below the crosshatching, 20 when I see something that's not crosshatched, 21 it's a solid surface. 22 Now, if you look at the motor, 23 for example, 302, that's not cut, even though 24 the physical structure around the motor has 25 been cut.	Page 176 1 it's coarse. If you go to Figure 7, for 2 example, here is the embodiment of Yi where 3 that camshaft is driven by the motor 32 for 4 changing the damping characteristics for the 5 compression cycle. 6 And because it's a -- and that's 7 a gear motor, I can tell, because the -- when 8 you look at that motor, there's two types of 9 cylinders. It almost looks like a spacecraft, 10 one on top of the other, docking. And coming 11 out of the -- and it's not labeled, but 12 protruding is a shaft 34 that is eccentric to 13 the cylinder, the motor 32, and that would tell 14 a POSITA that that is the output shaft of a 15 gear head. 16 So 32 is the motor, and then 17 that thing with the taper lines between the 18 motor 32 and then the output shaft 34, a POSITA 19 would know that that is a gearbox. 20 So I have a gear reduction 21 there. And then the gears 31 are bevel gears, 22 so they typically do not have a ratio. They're 23 one-to-one, is the typical bevel gear 24 arrangement. 25 And when they're like that, it's
Page 175 1 So the other convention that is 2 understood in mechanical drawing is that that 3 would be a surface of revolution, for example. 4 Now, to know the exact shape, 5 you need another image. But it is telling me 6 that that is some surface of revolution. And 7 in the context of a rotational element, such as 8 201 rotating, now you say, aha, I have a 9 rotational element that hasn't been cut on that 10 cylindrical thing that has been cut; that must 11 be a cam. 12 Now, the exact shape, I need 13 more information, but it's some sort of cam. 14 Q Yi's lever 201, camshaft 2, and 15 damping adjusting rod 10 is a valve actuating 16 assembly, correct? 17 A Correct, the valve being at the right 18 end of that damping adjustment rod 10. 19 Q Does Yi include an adjuster assembly? 20 A I would have to go in terms of -- 21 when you look at Yi, let's go back to the 22 patent, because you -- the adjuster assembly 23 here is there's three positions of the rod 201 24 in this particular embodiment of 12. 25 If you go to -- so it's a --	Page 177 1 actually specifically called a miter gear. 2 So a bevel gear may have a 3 ratio. A miter gear just goes around a right 4 angle, and then the ratio is one. 5 Okay? So that's telling -- oh, 6 sorry. That's telling me that I can use the 7 motor to effect rotation of the camshaft. And 8 as a POSITA, you look at that and you say, ha, 9 wow, I'll have nearly -- for all intensive 10 purposes to the rider -- infinite resolution. 11 Because the resolution of motion 12 of the cam driven by that geared motor will be 13 so fine, the rider won't be able to tell the 14 difference between -- in other words, won't be 15 able to tell the difference between -- if it 16 was a stepper motor, one click of the motor or 17 not, because it would be that fine of an 18 adjustment. 19 The motor would have to turn it 20 a lot for the rider to feel, aha, my damping's 21 changed. 22 Q Does Yi include an adjuster assembly 23 as claimed in the '207 patent's claim 1? 24 MS. BHATTACHARYYA: Objection. 25 Calls for a legal conclusion.

45 (Pages 174 - 177)

Page 178 1 A If I just look at Figure 12 where the 2 lever 201 rotates, the adjuster assembly, 3 similar to FOX, is going to be the cam surface. 4 So I -- Yi is talking about -- 5 for 12, I just have the -- in terms of three 6 positions. But if I move intermediately, 7 depending on the cam shape, I'll be able to get 8 the adjustment. 9 If you want really fine 10 adjustment, you need to use the motor. Or as I 11 talk about in my -- my declaration, I would 12 take a screw to move things axially, like from 13 Nagai, for example. We'll get to, I guess, the 14 combinations in a bit. 15 Q In your -- in your declaration, do 16 you state that Yi includes an adjuster 17 assembly, in and of itself? 18 (The deponent read the 19 document.) 20 A Well, I'm -- in this section, I am -- 21 I am taking Yi, but I say you got to do 22 something more to Yi. I've got to add JP's 23 tapered wedge, tapered, and then I use Nagai 24 for the screw thread to move that taper on Yi's 25 cam.	Page 180 1 think that works better. 2 Let's go to page 92. 3 Q Of your report? 4 A Yes, please. 5 You see how that 6 non-crosshatched portion of the camshaft, where 7 I indicated that would be the cam surface, 8 that's about the same dimension up and down on 9 the page as the diameter -- or the up-and-down 10 dimension of the damping adjustment rod 10. 11 That's telling me that that's 12 just a simple cam. There's not in that 13 particular image an axial taper. It's just a 14 simple rotary cam. 15 And as we discussed earlier -- 16 and I have my solid model images -- if I add a 17 tapered surface to a simple rotary cam, I can 18 greatly increase the fine adjustment ability of 19 that cam. And that's what I'm referring to in 20 my discussion here. 21 I'm going to add Ohta's taper to 22 Yi's camshaft, and then to move it axially to 23 take advantage of the taper, that's why I'm 24 using Nagai's threaded bolt. 25 It's called Nagai's stopper
Page 179 1 So Yi in itself, no, I need to 2 add something to it. 3 You see my paragraph 119? I say 4 it would be obvious to a POSITA to combine Yi's 5 valve actuating assembly -- that's the cam, the 6 rod -- and elements of JP '279's adjuster 7 assembly -- that's the slider with the tapered 8 surface. That's how I'm going to get the 9 adjuster assembly. You know, that fine 10 adjustment. 11 Q Does Ohta or JP '279 offer a finer 12 level of tuning than Yi? 13 A I believe they do. That's why I'm 14 taking Yi and I'm adding in Ohta to it, for 15 example, to get -- add those tapered surfaces 16 to what appears to be just a simple cylindrical 17 type cam of Yi. 18 Q How do you know that Ohta provides a 19 finer level of tuning than Yi? 20 A This gets back to our discussion of 21 when you add a transmission with a wedge. 22 You're much finer than if you don't have that 23 screw thread transmission. 24 And if we look at Yi, for 25 example -- let me use my colorized version. I	Page 181 1 bolt, but it pushes on the cam, the axial on 2 that rotary cam so I can use the threads on 3 that and manually -- to manually -- manually 4 turning those threads. I don't need the motor 5 of Ohta. 6 Q Do you state in your declaration any 7 calculations for the relative amounts of tuning 8 for Yi and for JP '279, which we also call 9 Ohta? 10 A No. Once again, a POSITA looks at 11 these and inherently understands when you add 12 the screw transmission, you increase the 13 ability -- excuse me, increase the ability of 14 the human to achieve finer resolution of that 15 camming surface. 16 Q Where in your declaration do you 17 explain why JP '279, or Ohta, would allow for 18 fine-tuning of the damping characteristics 19 beyond what's possible with Yi's construction? 20 A In paragraph 124 -- okay. I'm sorry. 21 It starts in paragraph 123, where I explain, 22 about six lines down -- or starting three lines 23 down, "A POSITA would have readily known from 24 the disclosures of Yi and Nagai that Nagai's 25 stopper bolt 141 could have been easily

Page 182 1 integrated with Yi's camshaft 2" -- and that is 2 because Nagai's stopper bolt is shown pressing 3 on a camshaft-like device -- "and that stopper 4 bolt 141 would have served the dual purpose of 5 (1) axially displacing Yi's camshaft for 6 fine-tuning the compression damping forces, and 7 (2) setting the maximum or optimum damping 8 forces." 9 So you can slide the cam to get 10 fine motion or slide it all the way to set it 11 at a maximum point. 12 I go on to state in that same 13 paragraph, "Nagai's stopper bolt" -- sorry. 14 "A POSITA would have been 15 motivated to use Nagai's stopper bolt 141 to 16 axially move camshaft 58 to simplify and 17 combine implementations of the elements of JP 18 '279's 'adjuster assembly' and Nagai's limiting 19 mechanism into FOX's suspension system to 20 improve compression damping adjustment 21 mechanism of FOX." 22 The simplification is, I just 23 have a simple screw at the end of a -- 24 essentially at the end of a bolt, that the user 25 can move. I don't need the motor and the	Page 184 1 straightforward. 2 MS. BHATTACHARYYA: Would now be 3 a good time to take a break if you're done with 4 this line of questioning? 5 MR. DURBIN: I am. You also 6 have -- I guess I start looking around or 7 something. Now is a good time. 8 THE DEPONENT: I was thinking 9 the same thing, but we took a half-break, so I 10 was willing to go longer. 11 THE VIDEOGRAPHER: The time is 12 4:49 p.m. Eastern Time. We're off the record. 13 (Recess.) 14 THE VIDEOGRAPHER: The time is 15 4:57 p.m. Eastern Time. We're on the record. 16 BY MR. DURBIN: 17 Q Dr. Slocum, does Yi disclose a cam 18 attached to a lever? 19 A It does. That's my Figure 12 -- or, 20 sorry, Figure 12 that I colorized on page 92 of 21 my declaration. 22 Q Is Yi's camshaft engageable with 23 damping adjusting rod 10? 24 A Yes, that's what's shown colorized 25 there. The green rod is contacting the yellow
Page 183 1 gearing and the electronic control for, I 2 think, you know, your average user. 3 Ultimately, I think, as I 4 predicted, I'm saying earlier, I opined I think 5 ultimately it's all going to be computer 6 controlled automatically, but that's going to 7 cost money. 8 And so for all intents and 9 purposes, this is a nice intermediary step. 10 Q Do you provide any additional 11 explanation as to why JP '279, or Ohta, would 12 allow fine-tuning of the damping 13 characteristics beyond that possible with Yi's 14 construction? 15 A I explain in my paragraph 125 that a 16 POSITA would understand that this would be 17 desirable because you're increasing the ability 18 of the user to finely adjust damping, and that 19 these are all very well-known simple elements. 20 So it would be -- it would be 21 obvious to a POSITA that if I do this, I will 22 get the result that I think I'm going to 23 result. 24 There's no mystery to these 25 mechanical elements. It's very	Page 185 1 camshaft 2. 2 Q Does that engagement between the cam 3 and damping adjusting rod 10 vary the axial 4 position of the damping adjusting rod 10? 5 A It does. 6 Q Does any angular position of Yi's 7 lever correspond to one position of Yi's 8 damping adjusting rod 10? 9 MS. BHATTACHARYYA: Objection. 10 Form. 11 A For what's happening with that, you 12 have to look in Yi, for example, Figure -- 13 let's see, where is it? Let me just 14 double-check the figure in here, okay? 15 (Pause.) 16 A So Yi is giving me discrete positions 17 of the damping rod. If you look on the -- on 18 page -- or column 2, it describes the figures 19 and is showing -- with reference to, for 20 example, Figures -- let me get my figures 21 right. 22 If you look at Figures 8 and 9 23 and then 10, Yi is talking about different 24 positions of a damping rod. Yi is not giving 25 me a shape of the cam surface per se, so I

47 (Pages 182 - 185)

Page 186 1 can't comment on anything about the resolution 2 you're getting from that damping rod being 3 moved by rotation of the lever. 4 All I know is that you have 5 different positions will correspond to 6 different -- of the lever will correspond to 7 different positions of the damping rod. And 8 that is similar to what you can achieve with 9 FOX, which is why I wanted to add the taper 10 from Ohta, and then I have to move it axially, 11 somehow, and I want to do all this manually. I 12 don't want to use any electronics, because 13 that's expensive, and don't want that. 14 So that's why I use Nagai's 15 thread to axially move Yi's camshaft once I've 16 added the taper surfaces to it to get fine 17 resolution. 18 Q I'm not sure you answered my 19 question, Dr. Slocum. I'll ask it a different 20 way, perhaps. 21 A Okay. I apologize. I tried to. 22 Q For a given angular position of Yi's 23 lever, there is one axial position of Yi's 24 damping adjusting rod 10, correct? 25 MS. BHATTACHARYYA: Objection.	Page 188 1 A In column 4, he's going through in 2 detail about which shaft is moving where to 3 open up which chamber, and I don't want to 4 confuse them, because it's a lot packed into a 5 few words. 6 Okay. Hold on. I almost have 7 it. 8 (The deponent read the 9 document.) 10 A Because there's two different 11 embodiments, remember, in Yi. One is manually 12 controllable and one is motor controllable, and 13 we are using -- we're concerned with the 14 manually controllable. We go to -- back to 15 Figure 6. 16 The adjustment rod 34... 17 (The deponent read the 18 document.) 19 A Hold on a minute. I've got the wrong 20 figure number. Hold on. 21 Okay. So let's go to Figure 4, 22 please. 23 Q Of Yi? 24 A Of Yi. 25 So if you look at the position
Page 187 1 Form. 2 A Correct. It's a linear mechanism. 3 There's no two states for one position. 4 Q Dr. Slocum, what is shown in 5 Figures 8 through 10 of Yi? 6 A Okay. So if you look in Figures 8, 9 7 and 10, there's that lever arm 51, and -- hold 8 on. Let me go to one of the other views, 9 because those are just showing just a little 10 bit of mechanism. 11 Then now if you go back to -- 12 that particular lever arm. Now, if you go back 13 to Figure 3, that's kind of showing -- it says 14 a view from the rear side. 15 Now, hold on, let me go to -- I 16 want to get my numbers -- 17 Q Dr. Slocum -- 18 A I want to get my numbers right. Wait 19 a second. 20 (Pause.) 21 A Because one of the rods, you know, is 22 for compression and one is for rebound, and I 23 want to make sure I don't mix them up. 24 (The deponent read the 25 document.)	Page 189 1 of the lever 51, right, that is -- from 2 Figure 3, that particular lever, because 3 there's different levers that are being 4 shown -- you have -- it controls rod 10. And 5 if you go to paragraph 4, line 18, "The damping 6 adjusting rod 10 is disposed fittingly in the 7 hollow shaft 4 and is movable in the axial 8 direction." 9 So when you rotate the lever, 10 you can rotate -- or move axially that rod. 11 But the -- if you look at damp -- or shaft 4, 12 that is where we're doing for the downward 13 stroke. And that one, if you continue 14 forward -- let me get the cross-section 15 right -- 16 See, if you take 10 -- see that 17 shaft? -- and you move it axially, you will get 18 compression control. If you rotate it, then 19 you get rebound control. That's what that -- 20 you see that little slot in the end of 21 Figure 6? Do you see there's a slot in the end 22 of 10, for example? 23 And then -- so now -- so when 24 you rotate this lever 9 -- I'm sorry, in 25 Figure 9, the lever 51, that is enabling me now

48 (Pages 186 - 189)

Page 190 1 to control shaft 10 in terms of rotating it, 2 and that's how I'm going to affect rebound. 3 But axial motion of 10 is how I 4 control compression. That -- in other words, 5 now when we go to lever 201 on Figure 12, 6 that's a different lever than the other rebound 7 lever we were talking about, and that's 8 controlling the cam that will move 10 axially. 9 So that's when we talk about a 10 lever, we have to -- and I wanted to go to get 11 my numbers right. 12 Q That clears -- that clears it up. 13 Dr. Slocum -- 14 A Mm-hmm, I'm listening. 15 Q I'll strike that question. 16 (Pause.) 17 Q Would you please turn your attention 18 to claim term 1.2 for your second grounds 19 beginning on page 63 of your declaration, 20 Exhibit 1003. 21 A Okay. Hold on. 22 I'm at page 63, or did you say 23 paragraph? 24 Q Page 63, please. 25 A Okay. That's why I -- oh, I see,	Page 192 1 here, take my device and apply it to, you know, 2 Fred's damper. They're just talking about 3 their own thing. 4 And they are saying, broadly 5 speaking, this is usable all over the place. 6 Most patents usually will be -- seek to see 7 what's around them and then comment broadly on 8 could it be used in other places that are 9 similar. 10 Q Does FOX or Ohta suggest adding a 11 tapered surface to the surface of a cam? 12 MS. BHATTACHARYYA: Objection. 13 Form. 14 A A cam -- a cam inherently can be 15 tapered. I mean, there's the most simple 16 cam -- rotary cam is just eccentric circle, 17 eccentric cylinder. 18 And then you can have ellipsis, 19 there's nonlinear shapes. And then cams 20 routinely will have a taper, so that's an axial 21 motion is causing motion. That's called, in 22 general, by the way, a barrel cam, or a family 23 of cams called barrel cams. 24 Q Is there -- 25 A Barrel cams have features that are
Page 191 1 claim term 1.2. I am here. 2 Q Does FOX disclose a cam surface 3 having a tapered surface? 4 A FOX by itself does not. That's why I 5 say if you want finer adjustment, I'm going to 6 take the taper from Ohta. That's JP '279. 7 Q Why in your declaration do you add 8 the tapered surface to FOX's cam surface? 9 A I say that a POSITA may understand -- 10 would have readily understood that although 11 FOX's suspension system allows adjustment of 12 compression, the POSITA may want to have even 13 finer adjustment capability. 14 This gets back to when you're 15 doing product design, depends upon what group 16 for which you are designing. So your average 17 person is probably more than happy. You'll 18 offer a version of the product, for example, 19 for a professional rider where they'll want 20 much finer tuning ability. 21 Q Does Ohta, or JP '279, suggest 22 explicitly adding its tapered surface to any 23 other device? 24 A I don't think I understand your 25 question. I mean, those patents don't say,	Page 193 1 cylindrical and axial. 2 Q Is a tapered cam surface disclosed in 3 FOX? 4 A I do not see a tapered cam in terms 5 of as I drew as an exemplar. 6 Q Is a tapered cam surface disclosed in 7 JP '279, or Ohta? 8 A Well, the cam, the taper there, that 9 is a cam. That wedge is also a cam. 10 Now, it's not a rotary cam, so, 11 again, you have to -- there's rotary cams. 12 There's linear cams. There's hybrids between 13 the two. 14 Q Would you please take a look at 15 page 65 of your report. 16 A Okay. 17 Q Is the effect of what you've 18 annotated in Figure 5 of FOX a rotary cam? 19 A It is, with a tapered surface added 20 to it. So that is essentially the -- my sketch 21 PowerPointically to illustrate broadly what I 22 want to do, and then I -- that's why I go in 23 and actually do real solid models on the 24 subsequent following pages, starting on 66, to 25 show what it would actually look like in three

49 (Pages 190 - 193)

Page 194 1 dimensions. 2 Q Does Yi disclose a rotary cam with a 3 tapered surface? 4 A No. Yi had -- going back to Yi, if 5 we start on Figure 5, 6 and 7, in the 6 descriptor of that, it's just three positions, 7 and they're using a motor to activate between 8 the three positions. 9 There is no discussion of a 10 taper there. And, as I mentioned earlier, you 11 can -- you can look at it, and you say, wait a 12 second, there's -- there's not the ability 13 to -- to give finer resolution, per se. I 14 mean, it doesn't give me the information for 15 that. 16 It doesn't show a taper, for 17 example, and it doesn't show what the 18 cross-section might be intermediate. 19 So I just am going by the 20 discussion in Yi that it just has three 21 positions, in this case, driven by a motor. 22 If you go to Yi Figure 12, where 23 it has a handle 201, as far as I know, it's, 24 again, just a simple cam or just three 25 positions. And if I want to have fine	Page 196 1 with a tapered surface, i.e., a barrel cam -- I 2 didn't cite anything in my declaration for 3 that. 4 Q Dr. Slocum, would you please review 5 the solid models provided in your declaration 6 on pages 66 through 68. 7 (The deponent read the 8 document.) 9 A Okay. 10 Q Are any of these solid models or 11 shapes similar thereto disclosed in FOX? 12 A FOX does not show the taper. FOX 13 shows, if you look on -- just above 14 paragraph 95 -- a cylindrical cam, not a 15 conical cam. 16 I'm sorry, a taper on a cylinder 17 is sometimes called a conical. It doesn't have 18 to be conical in terms of a true round cone. 19 It can -- all of these things can be 20 ellipsoidal and tapered. And even a 21 cylindrical cam, it can be an ellipsoid also, 22 or nonlinear shape, but extruded axially. 23 That's why you would refer to it as a 24 cylindrical type. 25 Q Dr. Slocum, does FOX disclose any of
Page 195 1 resolution, I'm going to have to do something 2 to Yi. 3 And again, I only want pure 4 mechanical. There's a motivation to keep 5 things mechanical. I don't want to add 6 money -- the cost of servo drives. Ultimately 7 I think that's where the industry is going, but 8 everything in the teaching so far is keep it 9 simple, but give fine resolution ability for 10 the rider, which is why I'm bringing in the 11 sliding wedge, but then I'm manual screw 12 thread. That was -- Nagai was my source for 13 moving the slider axially. 14 Q Is there any evidence provided in 15 your declaration that a rotary cam having a 16 tapered surface existed in the prior art? 17 A I mean -- you mean in terms of 18 patents for shock absorbers or you mean prior 19 art in terms of -- 20 Again, a rotary cam with a 21 tapered surface, that's a version of -- the 22 broad -- broad characterization is what is 23 called a form of a barrel cam. So barrel cams 24 are well known. 25 I can't point to a rotary cam	Page 197 1 the conical-shaped cams disclosed on pages 66 2 through 68 of your declaration? 3 A No, FOX by itself does not. 4 Q Does JP '279, or Ohta, by itself 5 disclose conical cam shapes? 6 A They do not. 7 Q Dr. Slocum, does Yi by itself 8 disclose conical cam shapes? 9 A No, I did not find a conical cam in 10 Yi. 11 Q Dr. Slocum, does Nagai disclose 12 conical cam shapes? 13 (The deponent read the 14 document.) 15 A No. Nagai has a cylindrical cam, and 16 cylindrical including the nautilus-type shape 17 you'll see in Figure 9 of Nagai. 18 Q Dr. Slocum, none of the prior art 19 references that comprise your grounds in your 20 declaration disclose conical cam shapes, 21 correct? 22 MS. BHATTACHARYYA: Objection. 23 Form. 24 (Reporter clarification.) 25 MS. BHATTACHARYYA:

50 (Pages 194 - 197)

Page 198 1 Mischaracterizes the record. 2 A Can I have the question again, 3 please? 4 Q Dr. Slocum, none of the prior art 5 references that comprise your grounds in your 6 declaration disclose conical cam shapes, 7 correct? 8 MS. BHATTACHARYYA: Objection. 9 Form. Mischaracterizes the record. 10 A I'm trying to understand or parse 11 when you say none of the grounds contain -- 12 none of the individual references have a, by 13 themselves, a conical cam shape like I have 14 shown when I combined Ohta, for example, with 15 FOX, to produce the cam in 68. 16 That was my -- my obviousness 17 grounds, to get -- FOX by itself gives me fine 18 resolution, but it's limited by the dexterity 19 of the rider. 20 If I want to make even -- and 21 for me, that was the grounds for anticipation. 22 Now, if I want even finer 23 control, I'm going to have to do some mechanism 24 to it, add some enhancement to the mechanism. 25 So that is why I took the	Page 200 1 So, in other words, your full 2 range of -- and easy to manufacture, you would 3 cut this on a lathe, for example, that has 4 something called live tooling. 5 So the live tooling would allow 6 you to -- for example, if you look on page 95, 7 I could take the -- cut the simple round 8 cylindrical cam, and then I hold position, and 9 the milling -- end mill comes in, and I can now 10 machine a flat taper on that one surface. 11 So when I rotate to one 12 orientation and now I move axially back and 13 forth, I get fine adjustment. Or I can do a 14 full taper as shown -- and that would be the -- 15 if you will, the implementation of the simple 16 2-D picture I colored in -- uh-oh, now I got to 17 find it. Hold on. We just had it a minute 18 ago. Let me find that. 19 (Pause.) 20 A What did I do with that? Where I 21 drew the little blue triangle. I'm afraid I've 22 mixed up some of my pages here. Remember we 23 had the -- I did the little blue triangle as a 24 2-D image. We were just there but I might -- 25 Q Are you referring to page 65 of your
Page 199 1 tapered surface from Ohta and put it on the 2 cylindrical surface to create a conical cam, 3 which is, like I said, a form of a barrel cam. 4 So that's what I did in my 5 obviousness combination. It's the combination 6 of references. It's not found in any single 7 reference. 8 Q Dr. Slocum, would you please turn to 9 paragraph 76 of your report, which is 10 Exhibit 1003. 11 A Okay. 12 (The deponent read the 13 document.) 14 A I've read it. 15 Q Would adding a tapered surface onto 16 cam surface 56 increase the costs of making the 17 cam itself? 18 A No. All of these surfaces are made 19 on a computer-controlled lathe, for example, or 20 grinding machine, so the shape is virtually 21 irrelevant. 22 As I state in 76, you can put a 23 taper -- an axial taper on part of the surface, 24 or you can taper it all around to create a 25 cone.	Page 201 1 declaration? I see a blue triangle. 2 A Ah, there it is. As I said, I 3 scrambled my pages. 4 The wedge can be 2-D or, more 5 generally, 3-D. And either one of them, as I 6 was explaining, you could cut on a lathe with 7 live tooling, or it's called a punch grinder. 8 Punch grinders can grind any -- virtually any 9 shape you want, round with a conical -- a 10 conical cam. You could grind a cylindrical cam 11 with one surface being flat, and -- it's all 12 computer numerical controlled, so they come off 13 blazingly fast. It makes no difference to the 14 machine what shape it's cutting. 15 Q Dr. Slocum, does the camshaft in FOX 16 move axially along its axis of rotation? 17 A Just FOX, no. That is the -- again, 18 FOX is just a simple cylindrical cam nominally, 19 and only rotation is how you get the axial 20 adjustment. That's like the embodiments in 21 Figure 7 of the SRAM patent, the '207 patent. 22 You -- and there, just rotation 23 of the handle causes the camshaft to change the 24 axial position of the rod. 25 Now, '207 is using a thread on

Page 202 1 that cylinder. FOX is using an eccentric 2 cylinder, so there's a slightly different 3 mechanism, but it's the motion -- simple rotary 4 motion of the handle that is causing that fine 5 resolution ability of damper control. 6 Q Dr. Slocum, does the camshaft in Yi 7 move axially along its axis of rotation? 8 A Yi does not. That's why I have to 9 add Nagai to Yi if I'm going to put a taper on 10 Yi and then have that taper cause the rod to 11 move axially. 12 Q Dr. Slocum, does Ohta, or JP '279, 13 explicitly teach moving a rotary -- scratch 14 that, please. I will restate my question. 15 Dr. Slocum, does Ohta or -- also 16 known as JP '279, explicitly teach moving a 17 camshaft having a rotary cam surface along its 18 axial direction along the axis of rotation of 19 the camshaft? 20 MS. BHATTACHARYYA: Objection. 21 Form. 22 A Ohta does not teach a conical cam. 23 Ohta teaches a screw, which is a rotary -- a 24 helical version of a cam, but I think that's a 25 different mechanism that you are asking me	Page 204 1 special -- they're called torquer cams you 2 select for it. 3 I had one of those interesting 4 pickup trucks with big, dumb, stupid tires and 5 a really hot engine in it. So I've always been 6 a gearhead. 7 Q Why is this document dated 8 December 1, 2022? 9 A I think that's when I first started 10 working on this case. 11 So I at that time pulled up -- 12 Arpita said send me your CV, so I sent it to 13 her. As we went through yesterday, since then, 14 there has been a lot more articles on some 15 medical devices and patents on hydrogen 16 generation and things. 17 I don't think there's anything 18 in particular -- I can send the most updated, 19 but with respect to my discussion here, I don't 20 think I need to -- I think this is fine. 21 Q Have any of your activities or awards 22 or anything else that isn't included in this 23 but has occurred since the end date listed 24 here, does any of that relate to bicycle 25 suspensions?
Page 203 1 about. 2 Q Does Ohta teach moving a camshaft 3 axially? 4 A Yes, a wedge is a form of cam. It's 5 a linear cam. 6 Q Does Ohta teach moving a camshaft 7 having a rotary cam axially? 8 A That, it does not. 9 Q Dr. Slocum, would you please turn 10 your attention to page 34 of your -- excuse me, 11 134 of your declaration. 12 A 134. So that would be my CV, I 13 think, CV. 14 134 is my school of engineering 15 faculty personnel record, or CV, curriculum 16 vitae. 17 Q Over what time period does this 18 personnel record reflect your experience and 19 accolades? 20 A Well, it's -- it's -- my first degree 21 from MIT, my bachelor's degree, was in June of 22 1982. 23 In the mid '70s -- I don't 24 remember exactly when -- I was quite involved 25 with hot rods, including some very particular	Page 205 1 A No, I think the energy absorption 2 stuff, you know, that we were talking about, 3 the damper systems, those -- those publications 4 are all up to date at 2022. That was only, you 5 know, almost two years ago. 6 So in the past two years, I have 7 not any new damper-type publications to add to 8 this. 9 Q What about for vehicle suspensions? 10 A No. Everything was before 2022. 11 We're currently working on, I think as I 12 mentioned yesterday, offshore damper structures 13 that will use the stuff that I've published on, 14 but I don't talk about those until they're 15 actually built and we have data. 16 So that's a work in progress, 17 but it wouldn't appear on my r sum yet. 18 Q Are the offshore damper structures 19 vehicles? 20 A As I was explaining yesterday, you 21 have cylindrical members, one slides inside the 22 other, and you tune the mass, the stiffness and 23 the damping. 24 These are hydraulic systems, to 25 extract energy from the motion. And that oil,

52 (Pages 202 - 205)

Page 206 1 instead of sending it through an orifice to 2 dissipate as heat, you send it through a motor 3 to spin to generate electricity, for example. 4 Or the orifice that you do send 5 it through, you would use it to pump seawater 6 that pushes it through a membrane to 7 desalinate, for example. 8 But, again, it's a mass, a 9 spring and a damper. There are cylindrical 10 systems. You have to -- the math is the same. 11 The math couldn't tell what the difference is. 12 Q Are you selling these things in Saudi 13 Arabia? 14 A I can't -- I am not at liberty to say 15 where I am working on these things. 16 Q It is well known, though, however, 17 that the Saudi -- that Saudi Arabia produces a 18 ton of desalinated water, correct? 19 A Right. But not by these mechanisms. 20 They are using in general what's 21 called flash, so they use vacuum-based systems 22 in general. The membrane -- you really don't 23 want to get me started talking about this, 24 because I really will dive deep into this, and 25 it will be hours from now.	Page 208 1 energy extraction and damping of structures and 2 servomechanisms. 3 My application of this, again, 4 because the math doesn't care what the 5 application is, so it ranges from machine 6 tools -- those are machines that make things -- 7 to products. 8 So products range from portions 9 of automobiles, engines in particular. Medical 10 instruments, quite a lot of medical 11 instruments. And then a fair amount of 12 drilling equipment for the oil and gas 13 industry. 14 And directional drills, as we 15 talked about yesterday in particular, is one of 16 my specialties, and then there's a fair amount 17 of tools associated with what you do after you 18 drill a long hole. Those would be called frack 19 tools. 20 Q What is your level of skill in this 21 field of interest? 22 A You know, I design -- you can tell by 23 my r sum , a lot of my mechanisms are patented, 24 so you can say my level of skill is on the 25 upper end of things.
Page 207 1 Q Dr. Slocum, what is listed at Item 5 2 on page 134 of your declaration? 3 A It's the principal field of interest, 4 which is precision engineering. 5 Q What does that mean, Dr. Slocum? 6 A So "precision" means "repeatable." 7 And so repeatable engineering in that respect 8 is you tell me what you want. I will design a 9 mechanism that will keep doing it, and it won't 10 wear out. It will -- it will not only do it 11 once, it can do it -- and you have to tell me 12 how many times you'll do it and I'll make sure 13 it lasts for that. 14 So I design some systems that 15 work for, you know, hundreds of millions if 16 not -- and some even go beyond that, quote, 17 infinite life. 18 And then my focus within there 19 ranges from -- well, everything is a dynamic 20 system in that regards, but principally, 21 mechanical mechanisms, screws, cams, bearings, 22 structures, flexural mechanisms, those are 23 mechanisms that use the bending of materials as 24 the bearing or the spring. 25 And quite a lot of my work is on	Page 209 1 As a professor, my primary skill 2 is to teach the next generation to hopefully be 3 better than I am. 4 Q Are you a super POSITA in your area 5 of expertise? 6 MS. BHATTACHARYYA: Objection. 7 A No, no, no. 8 MS. BHATTACHARYYA: Calls for a 9 legal conclusion. 10 A No. A POSITA is a person of ordinary 11 skill in the art. So, remember, I teach 12 students from freshmen all the way to doctoral 13 students, and I can't take a class of freshmen 14 or sophomores and launch right into nonlinear 15 mechanisms. I'll lose them all. 16 So my forte of teaching is to 17 put myself at the ability with those with whom 18 I work, okay? 19 So I also work with oilfield 20 workers who some of them don't have even a high 21 school diploma, right? And my job is -- I 22 learn a lot from them, because they have a lot 23 of experience, and they'll describe what the 24 issues are, and then I need to communicate and 25 understand and then be able to also communicate

Page 210 1 to them what I'm thinking about and get 2 their -- get their feedback as a real person 3 who will use my stuff. Am I going to design 4 something they're going to look at, screw up 5 their eyeballs and say this is nuts and not 6 ever use it, because that doesn't do anybody 7 any good. 8 Q Dr. Slocum, what is listed in Item 6 9 on page 134 of your declaration, Exhibit 1003? 10 A Well, these are some of my colleagues 11 who also work in the same field. 12 In other words, these four 13 people in particular also are very good at 14 precision engineering, you know, mechanical 15 systems, mechanisms. 16 Q Also listed here are ranks, correct? 17 A Correct. 18 Q What is the significance of rank? 19 A There are -- you have assistant 20 professor, associate professor, and those are 21 without tenure. And then associate professor 22 with tenure, and then you have a professor or 23 full professor, who are also tenured. 24 And the greater your rank, the 25 more committees you get to be on. We're a very	Page 212 1 engineer, and he was in charge of mechanical 2 design. 3 His family -- he left money. He 4 says I want to provide money for a professor 5 who teaches mechanical design. And when you're 6 a chaired professor, what you basically get is 7 extra play money, you know, discretionary money 8 to buy equipment. It lets me do design work 9 without having to spend a year or more, you 10 know, writing proposals and going through 11 review committees to get the funds to do it. 12 So if I have what I think is an 13 exciting idea, I can rush off, hire a student, 14 buy some equipment, and we can test the idea 15 very quickly. 16 Q Who is above you in the org chart at 17 the university? 18 A I mean, no one is really above 19 each -- anybody else. When you say -- no one 20 has power over me in terms of, "Slocum, you 21 will go do this." 22 When you become tenured, you 23 know, unless you do something extraordinarily 24 stupid, you know, I -- the purpose of tenure is 25 that I write memos to the president, and will
Page 211 1 flat organization, so a brand-new assistant 2 professor is treated the same for all intents 3 and purposes as the older guys. 4 But the new ones are given a lot 5 more latitude in terms of not having to do as 6 much service, because we want them to make sure 7 they establish themselves. 8 Every time you get a promotion, 9 you get a little more pay. But in terms of, 10 you know, space or anything else, it's -- it's 11 a very flat organization. 12 Q Turning to the next page, page 135, 13 does Item No. 9 list your rank? 14 A Correct. I am now -- and you can see 15 the dates associated with it. I am -- I became 16 a full professor in 1998. The question mark is 17 I have no clue when I decide to retire. It 18 could be next week or ten years from now. I -- 19 I teach because I love to teach. 20 Q Are you also a chaired professor? 21 A Correct. So that's -- when you're a 22 professor, then you -- another version is not 23 officially called "rank," but I have an endowed 24 chair. It's the Walter and Hazel May 25 Professorship. Walter May was a Cummins	Page 213 1 tell the president I think what they're doing 2 is extraordinarily stupid, and they can't fire 3 me for that. 4 But I think if one of you -- if 5 you're not a partner in a law firm, for 6 example, and you're an associate and you write 7 a memo to the partners telling them what 8 they're doing is stupid, you may not be there 9 for very long, right? So that's a similarity 10 of tenure. 11 You know, above me, my 12 department head. My department head could 13 assign me to more committees or not give me a 14 raise, but, you know, big deal. 15 Q Dr. Slocum, would you please turn 16 your attention to page 36 -- 136 of your 17 declaration. 18 A Okay. 19 Q What is listed in Section 12 on this 20 page? 21 A So these are particular awards for 22 devices and service over the years. 23 Q Do any of these awards relate to 24 bicycle suspensions? 25 A Well, they do with regards to cams

Page 214 1 and dampers, energy extraction, but there's 2 nothing specifically an award for bicycle 3 design. 4 Q Do any of these awards relate to 5 vehicle suspensions? 6 A Again, I work on dampers and 7 mechanisms and cams that may be used, but none 8 of these specifically are for a vehicle 9 suspension, per se. 10 Q Can you give a few examples of ones 11 which you think are relevant to vehicle 12 suspensions? 13 A Sure. With respect to cams and 14 hydraulic systems, if you look, starting number 15 one, Item 6, this robotic micromanipulator, and 16 then there was a patent. 17 And then later on, if we go 18 through patents, you can see -- I can point out 19 which that is. It's a five-axis miniature 20 robot, all using hydraulic systems, where 21 specifically the end of the piston pushes on a 22 ball which then pushes on a cam surface to give 23 me the motion I want. 24 And that, again, relates to, 25 very importantly, the way that things are	Page 216 1 award. So this is -- that was my student, 2 Jocie Kluger, Professor Sapsis is a -- was a -- 3 was a junior professor then. He's now a senior 4 person. 5 This is where we're doing the 6 offshore wind-wave energy power system. These 7 are these oscillating, as I described 8 earlier -- everything is -- when you say 9 "damper," that means a machine to extract 10 energy. And then what you do with it, you can 11 just dissipate it as heat, or you can turn that 12 energy into a useful form. 13 So, again, the 14 mass-spring-damper equation -- mathematics is 15 the same across. 16 Here, I am actually looking at 17 also, again, fluids, and tubes are nice, 18 because tubes are simple, low-cost, we know how 19 to seal them and work them, okay? So that's in 20 particular what that best paper award was. Our 21 peers thought, wow, that was really nifty the 22 way it was -- 23 (Reporter clarification.) 24 The mathematics may be 25 complicated, but we actually showed how you
Page 215 1 shaped, such that motion of that piston gives 2 me the resolution or fineness of control of 3 what the robot is supposed to do, okay? 4 Then the -- the hydrostatic 5 systems, these spindles, you've got to be very 6 careful on how you control the flow of the 7 fluid, whether it's oil or water, to them to 8 give you the mechanical support and motion. 9 You also have to control how the 10 fluid not only enters but exits, and that's 11 what controls the damping. 12 So this is how do you control 13 passages through which fluid goes to give you 14 the intended dynamic response you want, okay? 15 Then if you go down to number 16 38, this is where the energy -- because I work 17 a lot in renewable energy systems, and 18 specifically, I'm starting to do -- later on in 19 time, I'm realizing, wow, we really need to get 20 some of the renewable energy systems going, so 21 I start focusing on that. 22 My work in energy systems, 23 that's where the Thar Energy Award comes from. 24 Thar is the name of a company. 25 Item 40, you see this best paper	Page 217 1 could use it to create real mechanisms. 2 Item 42, I was in 2007 elected 3 as a member of the National Academy of 4 Engineering. My citation is specifically for 5 my ability to design and -- not only design but 6 to teach people how to do and design 7 mechanisms. 8 So mechanisms may seem old, but 9 they're still quite new in terms of the 10 never-ending stream of things to do with them. 11 And included in those mechanisms 12 are, again, the dampers and the energy 13 extraction systems. 14 And all of -- quite a lot of 15 these -- and we'll go through the patents 16 later, then we'll get into the cams. 17 Q So I want to -- I'm going to ask 18 these -- 19 Well, Dr. Slocum, would you 20 please take a look at Section 14 on page 137 of 21 your declaration. 22 A Okay. 23 Q What is disclosed in this section? 24 A So these are my patents as of -- 25 since December 2022, there are about a dozen

55 (Pages 214 - 217)

Page 218 1 more, but those are related generally to 2 hydrogen production. I think there's a medical 3 device or two, but that really doesn't affect 4 what we're talking about today. 5 Q Do any of these patents directly 6 relate to bicycle suspensions? 7 A They're not bicycles, but we have cam 8 surfaces. And, for example, we look at 9 Item 13, "System to convert rotary motion to 10 linear motion." I've done quite a lot of work 11 with screws, and screw is a tapered wedge. 12 And then, for example -- and 13 there's a bunch of those. 14 Item 4, the micromanipulator 15 system, again, that was the hydraulic pistons 16 where I have to control things. I have to 17 design the system with the rotating -- the cam 18 surface that's at the end of the piston to give 19 me the fidelity of motion of the robot. 20 Then, you know, there's quite a 21 number of them with -- again, I'm using fluids. 22 I have pistons in the fluid -- in the systems 23 for controlling motion. We will come down 24 to -- and we talked about a lot of these 25 yesterday, so I'm going to be brief, because I	Page 220 1 about today, that you -- you'd like to let us 2 know about that are relevant to -- 3 MS. BHATTACHARYYA: Objection. 4 Form. 5 Q -- vehicle systems. 6 A The damping systems for energy 7 generation, there's often talk in vehicle 8 suspensions, why are we dissipating the energy 9 of the vehicle bouncing up and down as heat in 10 a shock absorber? Why are we not harnessing 11 that and generating some electricity? 12 The mechanisms -- some of the 13 very specific mechanisms for -- applying in the 14 large offshore systems, again, the math allows 15 you to shrink it, and we've looked at why don't 16 we use this in a vehicle -- well, particularly 17 not an everyday car but a heavier suspension, 18 like for a truck. 19 Every time we look at that and 20 research that, we come to the conclusion that 21 the cost-benefit analysis is not worth it, 22 because the amount of energy you're going to 23 harvest is insignificant compared to the amount 24 of mechanism weight you would have to add and 25 the cost of that mechanism.
Page 219 1 think I got -- too many good memories were 2 brought back, so maybe we can incorporate 3 yesterday's discussion where I referred to the 4 hydraulic systems. 5 When we come down in particular 6 to -- ah. I lost it. 7 Q Dr. Slocum, may I have the 8 opportunity to maybe withdraw my question and 9 ask a more artfully worded one? 10 A Okay. I was going to refer to the 11 ball piston, because that has a very, very 12 specific cam shape that really makes it not 13 wear out. But okay, go for it. 14 Q Do any of these patents explicitly 15 describe a bicycle suspension? 16 A No, I do not explicitly say here's a 17 bicycle with this new thingy in the bicycle. 18 Q Do any of these patents explicitly 19 describe a vehicle suspension? 20 A Same thing. I do not explicitly say 21 here is a vehicle and here is a suspension. 22 Q Do any of these patents relate to 23 vehicle suspensions but aren't ones that we 24 discussed in the previous sections, something 25 that is new here, that you haven't told us	Page 221 1 Sounds like a great idea, but 2 when you do the detailed engineering, you can't 3 justify the cost. 4 It happens to be very different 5 when you're offshore with really giant, you 6 know, waves and things. 7 Q Dr. Slocum, would you please turn 8 your attention to page 171 -- right? Excuse 9 me, no. 10 Dr. Slocum, would you please 11 turn your attention to page 144 of your 12 declaration. 13 A Okay. 14 Q What is disclosed in Item 16? 15 A So this is in particular what I would 16 call major new products, processes, or systems. 17 So there's a number of machines. For example, 18 the first one, every semiconductor made is made 19 using -- is held in these pods that I was the 20 father of the standard for how the pods are 21 positioned, using what's called a kinematic 22 coupling, some very specially shaped surfaces 23 that are really cheap to make. 24 So that's -- that's very 25 important. That's still used everywhere in the

Page 222 1 world today. 2 Q Dr. Slocum, are any of these major 3 new products, process, designs or systems 4 explicitly describing bicycle suspensions? 5 A They are not. 6 Q Dr. Slocum, are any of these new 7 products, processes, designs or systems 8 explicitly disclosing vehicle suspensions? 9 A Not explicitly vehicle suspensions. 10 Q Dr. Slocum, would you please turn 11 your attention to Section 19 on page 147 of 12 your declaration, Exhibit 1003. 13 A Okay. 14 Q Broadly speaking, what is listed in 15 Section 19? 16 A These are peer-reviewed journal 17 articles that I'm an author on. You know, I -- 18 there's a lot of them because I actually do a 19 lot of work. I don't allow myself to be just 20 an author named on something because someone 21 walked into my office. I actually work on all 22 this stuff. 23 Q Dr. Slocum, in Section 19, are any of 24 these papers explicitly disclosing a bicycle 25 suspension?	Page 224 1 The time is 6:06 p.m. We're off the record. 2 (Recess.) 3 THE VIDEOGRAPHER: The time is 4 6:15 p.m. Eastern Time. We're on the record. 5 BY MR. DURBIN: 6 Q Thank you, Dr. Slocum. I have no 7 further questions at this time. 8 A Okay. 9 MS. BHATTACHARYYA: I have a few 10 redirect questions for Dr. Slocum. 11 12 EXAMINATION 13 BY MS. BHATTACHARYYA: 14 Q Dr. Slocum, does the rotary cam 15 mechanism of the FOX patent provide two 16 positions of compression damping, open and 17 lockout? 18 MR. DURBIN: Objection. 19 Leading. 20 A Okay. So if you recall the questions 21 I was asked earlier about, on page 66, the 22 top-left drawing is the most basic version of 23 my understanding of the cam in FOX. Simple 24 eccentric cylinders. 25 I don't have enough information
Page 223 1 A No. As we discussed earlier, the 2 hydraulic flow, pistons, cams, the mathematics 3 of those are the same for the devices I'm 4 working on as for the bicycles. 5 But I have not specifically 6 published on here is a new bicycle system 7 design. 8 Q Dr. Slocum, are there any of these 9 papers listed in Section 19 that are explicitly 10 directed to a vehicle suspension? 11 A No. It's the same thing as we 12 discussed earlier. We've looked at applying 13 the energy, harvesting systems, and it's -- 14 it's not economically worth it, so it's not 15 worth even doing a paper on it. 16 We'll talk about it in seminars 17 and things, but you can't point to where it 18 could be economically viable. 19 MR. DURBIN: Everyone, I'd like 20 to take a short break. I think I'm at the end 21 of my questions. I just want to go over and 22 make sure that's true. 23 Can we take a ten-minute break 24 and it will probably be me resting? 25 THE VIDEOGRAPHER: All right.	Page 225 1 to know if they've done a more, if you will, 2 tunable version, which would be an ellipsoidal 3 cam, so I'm just assuming it's the most basic 4 cylindrical cam. 5 And then earlier I was asked 6 about this issue of cam radius or diameter, and 7 I gave the basic equation of the sensitivity of 8 this cam. But in the bottom dead center and 9 top dead center positions, those are 10 essentially lockout or full open, because small 11 rotary motions of the lever essentially give 12 you almost no axial motion of the rod. 13 It's the in between where you 14 get the most motion of the rod given a motion 15 of the cam or the lever. 16 And if you think about it in a 17 car, a crankshaft in a car, the top dead center 18 and the bottom dead center position of the 19 crankshaft, at the very top, small rotations of 20 the crankshaft produce very little vertical 21 motions of the piston, and at the bottom dead 22 center, small rotations of the crankshaft give 23 very little vertical motion of the piston. But 24 midway in between, motions of the -- rotary 25 motion of the crankshaft causes quite a lot of

57 (Pages 222 - 225)

Page 226 1 motion of the piston. 2 So that's my -- that's an 3 example I use in class, for example, to 4 teach -- to help people with a physical 5 understanding of. 6 So the top dead center and 7 bottom dead center are essentially lockout or 8 full motion, are the two extreme positions, 9 where I get, for all intents and purposes, to 10 the user no adjustability. 11 And then in between is where you 12 start having the -- the tunable motion 13 associated with lever position to rod position 14 and hence amount of damping. 15 Q So when the -- in the FOX patent, 16 when you -- if you -- if the cam is in an open 17 position, can you then finely adjust that open 18 position a little bit using the lever? 19 MR. DURBIN: Objection. 20 Leading. 21 A Okay. So a way to think about 22 this -- let me go back to the crankshaft 23 example, because I think it's easier to 24 visualize and more people have a physical 25 understanding.	Page 228 1 the 18 positions that the human will be able to 2 effectively control. 3 Eighteen -- so that you have 4 3 millimeters divided by 18 to give you the 5 resolution of motion of that damper. That's 6 the -- that's the fineness of control that 7 FOX's system can do. It's for -- I think most 8 applications, it's more than good enough, you 9 know, for an average rider, such as myself. 10 I think a competitive rider is 11 probably going to want more. They're that 12 sensitive. 13 But for quite a few riders, that 14 will be more than good enough. 15 Q Would it be fair to say that although 16 the FOX system provides fine-tuning of the open 17 position of compression damping, a POSITA would 18 have been motivated to add the tapered wedge of 19 the Ohta, also known as the JP '279 reference, 20 to FOX's rotary cam to further improve the 21 fine-tuning of compression damping? 22 MR. DURBIN: Objection. 23 Leading. Foundation. Form. 24 A Okay. As I state in my report, I 25 believe that FOX -- because just even with a
Page 227 1 Between the top dead center and 2 the bottom dead center positions is the total 3 range of motion the cam controls, okay? So 4 that would be analogous to the total range of 5 motion of the control rod. 6 That motion in a shock absorber 7 corresponds to 180-degree motions of the lever, 8 okay? 9 So if we say that the axial 10 motion of the rod from lockout to full open 11 is -- I'm just going to pick 4 millimeters or 12 3 millimeters. I forgot exactly what in these 13 systems are typical, but it's in that order of. 14 It's not a whole lot of motion you need. Let's 15 call it 3 millimeters, okay? 16 Over a 180-degree motion of the 17 lever, I'm going to move the rod between 0 and 18 3 millimeters. A human, you know, with gloves 19 on, you know, the bicycle, you can rely on them 20 to give you about 10 degrees of motion 21 resolution reliably. 22 So over 180 degrees, that is 18, 23 nominally, positions you will be able to 24 control, or your resolution of motion will be 25 3 millimeters, total axial travel divided by	Page 229 1 simple cylindrical cam, like I show on page 66, 2 meets all of claim 1 limitations. 3 Later on, I say, look, assuming 4 that that's not good enough, well, a POSITA 5 would be looking at other art and bicycle 6 dampers and would see, as I point out, for 7 example, the -- in JP, the use of a wedge -- so 8 JP is Ohta, excuse me -- this ramp, this wedge 9 shape. 10 And a POSITA would understand, 11 aha, I should make a barrel cam or a tapered 12 cam or a conical cam, so -- 13 And there's a whole bunch of 14 different forms of that. Barrel cams or 15 conical cams. You can look up conical cam or 16 barrel cam online, on YouTube, there's huge 17 numbers of them, and this is this cam program I 18 mentioned earlier, Camnetics. You can 19 basically type in what you want to have happen 20 based on what motions you want, and it will 21 synthesize the cam. 22 Cam has been around for hundreds 23 of years, literally. Before we ever had 24 electronic control, all complex motions were 25 done with cams.

58 (Pages 226 - 229)

Page 230 1 And indeed, most bicycle parts, 2 those teeny little parts you look at on your 3 bike, like how do they make these things, 4 they're made on what are called Swiss screw 5 machines, and all Swiss screw machines, which 6 for over a hundred years were all cam-driven, 7 no electronics, and the cams often were 8 combinations of rotary, linear, cylindrical, 9 tapered surfaces. And I've helped design a 10 bunch of these. 11 There's a company, Len 12 Industries, in Michigan that makes vast numbers 13 of small parts. I did a lot of cam design and 14 helped them convert from old-style cams to 15 servomechanisms, so I kind of put myself out of 16 business there, right? 17 Anyway, it's a very old art. I 18 don't publish on it. There's nothing to 19 publish. It's all been done before. I teach 20 it. In my textbook I talk about cams. So it's 21 just well known. 22 A POSITA would look at the taper 23 of Ohta, this basic cylindrical of FOX and say 24 when you add a taper to something, you add 25 ability to fine-control it. It -- taper's a	Page 232 1 It's -- the world of cams is 2 huge and well known. It's not some esoteric 3 thing. 4 Excuse me, it's well known to a 5 POSITA or someone who actually designs 6 mechanisms. It doesn't take PhDs and patents 7 and publications, because it's a 200-year-old 8 art. It's just what people do who design this 9 stuff. 10 Q This priority date of the '207 patent 11 is November 4, 2004. I can represent that to 12 you, Dr. Slocum. 13 Were rotary cams with tapered 14 surfaces, whether you call them barrel cams or 15 conical cams, known before November 2004? 16 MR. DURBIN: Objection. 17 Leading. Beyond the scope of cross. Beyond 18 the scope of his declaration. 19 A Am I supposed to answer? 20 Q Yes. 21 A Okay. 22 For example, what I drew on 23 page 66, that conical cam, I didn't have to 24 invent that. I just said, well, gee, you know, 25 I'm just going to draw something that is well
Page 231 1 wedge. So I'm going to go ahead and take this 2 simple cylinder and I want to increase the 3 resolution over this -- some range of motion, 4 taper it. And that's -- that's the starting 5 point. 6 Q You mentioned that rotary cams with 7 tapered surfaces are commonly known as barrel 8 cams, right? Did I get that right? 9 A Well, it's a subset of barrel cams. 10 What the term "barrel cam" means is I'm 11 combining rotary motion with linear motion to 12 get some interesting output motion, right? 13 And I can -- cams are often 14 reversible, where now I'm going to provide some 15 input motion to get some interesting linear 16 rotary motion. 17 But, yes, in general, when you 18 use the term "barrel cam," the -- it means I'm 19 getting -- I'm having not only rotary, but 20 linear. And linear often in a plane, not just 21 up and down but back and forth. So that's the 22 generic term. 23 You can search "barrel cams," 24 you can search "conical cams," and often you'll 25 come up with a "conical barrel cam."	Page 233 1 known. That's a conical cam, and it combines 2 rotary motion with axial motion to get 3 different types of axial motion of a rod, and 4 that's shown on the images on page 67 and 68. 5 I think it took me all of 6 seconds to recall in my head pictures of things 7 I've seen like this before, and then, I don't 8 know, to make the pretty pictures and other -- 9 maybe an hour at most. 10 These are real surfaces. 11 They're not highfalutin things. It's very easy 12 to generate these things. 13 As I said, there are many 14 programs online to assist those who are not as 15 good at the math to actually graphically get 16 what they want. 17 And this is -- I teach this. 18 This is in my textbook and my design notes. 19 If you search "Fundamentals of 20 Design," I have a whole bunch of YouTube 21 lectures online. I run the gamut of design 22 there. As a professor, that's part of my job, 23 right, is to teach and to pass on. 24 Q Dr. Slocum, I don't think you 25 answered my question.

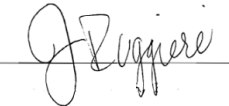
59 (Pages 230 - 233)

Page 234 1 I -- my question was, how long 2 have rotary cams with tapered surfaces, 3 example, barrel cams, conical cams, been known 4 in the mechanical art? 5 MR. DURBIN: Same objections as 6 to the prior question. 7 A I thought I did. At least a hundred 8 years. Probably 200 years or more. Because 9 before we had electronics, we had cams, and we 10 still have cams. 11 So it's an ancient art. I'm 12 sure we could go -- well, Leonardo DaVinci 13 shows cams in his -- way back. 14 Yeah, I think some of the 15 most -- more interesting work in cams goes back 16 to the watchmakers. That really was a -- and 17 there's a book, The Longitude, about a person 18 whose name is Harrison. And if you go to 19 Greenwich at the museum there, you'll see 20 Harrison's clocks. And the cams, many of them 21 three-dimensional, that this person dreamt up, 22 manufactured without any mathematical ability, 23 just looking in his head, is phenomenal. Very 24 brilliant people throughout history who did 25 cams.	Page 236 1 of a different taper drives the rod for the 2 compression control of the damper. 3 Q And both of those tapered surfaces 4 individually provide fine-tuning of either 5 compression damping or rebound damping, 6 correct? 7 MR. DURBIN: Objection. 8 Leading. Mischaracterizes the record. 9 Mischaracterizes his previous testimony. 10 A When you move that wedge, that 11 surface that has the two wedges, the two rods, 12 one for compression damping control and one for 13 rebound damping control, are moved axially, 14 different amounts. 15 But what you're doing is you're 16 taking rotary motion input to drive a screw 17 that gives me very fine motion control back and 18 forth of those wedge surfaces to give me even 19 finer motion control up and down of those two 20 rods. 21 But the rods are not 22 functionally the same in terms of one controls 23 the damping in the compression; one controls 24 the damping in the rebound. 25 What Ohta is inventing is a
Page 235 1 Q And would a person skilled in the art 2 in November 2004 have known how to axially move 3 a rotary cam with a tapered surface? 4 MR. DURBIN: Objection. 5 Leading. 6 A Yes. This is -- this is Mechanical 7 Engineering 101. You know, your sophomore 8 introduction to mechanical design. You would 9 know you could use a screw to cause axial 10 motion. You know that a cam causes motion of 11 some structure that's touching the cam to do 12 some other motion. It's just simple, you know, 13 if you will -- I'm trying to search for the 14 word, but it's almost like kids playing with 15 Legos. It's just one of the most basic 16 mechanical arts. 17 JP '279, which is also known as 18 Ohta, teaches a screw transmission mechanism 19 for axially moving its tapered wedge, right? 20 MR. DURBIN: Objection. 21 Leading. 22 A There is the -- the structure that's 23 moved by the screw thread, and that structure 24 has two tapered surfaces. One of the tapered 25 surfaces drives a rod for the rebound, and one	Page 237 1 mechanism by which one motion input can control 2 two independent damper outputs. But Ohta does 3 it with very fine resolution by the use of a 4 screw thread driving the position of a wedge. 5 Q Would you say that one of the sloped 6 surfaces on Ohta's wedge is for fine-tuning 7 compression damping and another sloped surface 8 on Ohta's wedge is for fine-tuning rebound 9 damping? 10 MR. DURBIN: Same objections as 11 to the last question. 12 A A, that is correct. That's what I -- 13 I said, I believe. 14 Q Does the Yi reference teach 15 fine-tuning of compression damping within any 16 of its three positions: The low-velocity, 17 medium-velocity and high-velocity positions, 18 using the handle 201? 19 MR. DURBIN: Objection. 20 Leading. Foundation. 21 A No. As I explained in my earlier 22 deposition -- or, sorry, testimony, when you 23 just have three positions, as Yi describes, you 24 have only three choices. That may be fine for 25 some riders, but other riders will want more

Page 238 1 than just three options for controlling 2 damping. That is why I added then a taper to 3 it, like, for example, the taper of Ohta, and 4 then I have to control that taper. That's why 5 I needed to bring in Nagai. Nagai has that 6 manually movable screw thread. 7 I could have just used the 8 motor-operated screw thread from Ohta, but I 9 want to have a mechanical system without any 10 electronics. That's really what I'm basing my 11 fine resolution control of damping. Need to do 12 it just with mechanism. 13 Q Earlier when Mr. Durbin was 14 questioning you, you went over your CV, and you 15 talked about a lot of work you have done 16 related to cam and damper mechanisms that do 17 not explicitly relate to bicycles or vehicle 18 suspension systems. 19 Do you recall that? 20 A I do. 21 Q But would those cam and damper 22 mechanisms or similar technologies be 23 applicable to a bicycle or vehicle suspension 24 system? 25 A Yes. The mathematics of describing	Page 240 1 That's why you see all the construction 2 equipment with hydraulic cylinders. 3 In my textbook, Fundamentals of 4 Design, it's a free online textbook that goes 5 with the Fundamentals of Design videos, I -- I 6 even show pictures of, you know -- remember, 7 that book was partially written -- I taught a 8 class where we have this robotics competition 9 every year, and that was the same class that 10 gave rise to the first robotics competition. 11 It was started before me, but 12 I'm the first person in that long line of 13 professors who then actually wrote the text 14 down and then did the videos to pass on the 15 information. 16 Anyway, I teach about turning 17 radius in vehicles. I even show the closeup of 18 suspension of one of the -- that was an 19 RC-controlled car, because when the students 20 would be designing their robots, if they bounce 21 around too much, they'll bounce off the table. 22 You have to consider the 23 dynamics of the machine when it's moving, not 24 just the statics. 25 So the dynamics of machines, you
Page 239 1 mechanical motion, everything can be reduced to 2 it has a mass, it has a certain stiffness or a 3 spring -- springiness. And the second law of 4 thermodynamics also teaches you that energy is 5 always lost. There are no perfect resonators 6 or things that vibrate continually. Everything 7 loses energy. 8 And, in fact, to make a system 9 desirable, you don't want it to rattle around. 10 You want to control the energy loss. That's 11 the damper part. So it's -- mathematically, 12 mass is called m; springiness is called k; and 13 damping is called b. 14 You -- the most basic system 15 gives you what's called a second order 16 differential equation. This is the base -- 17 All engineers get simple second 18 order systems, it's called. All the fields of 19 engineering. 20 The mathematics is the same. 21 Now it becomes how do you actually make the 22 thing. So cylindrical systems are very nice 23 when you're handling things because they're 24 cheap. It's easy to seal in fluids. It's 25 really easy to do things with cylinders.	Page 241 1 get back to this mass-spring-damper. It 2 repeats over and over across all mechanical 3 engineering, right? So it's like the air we 4 breathe. 5 Q Does any of the textbooks you have 6 written discuss bicycles or vehicle suspension 7 systems? 8 A As I just described, in my 9 Fundamentals of Design textbook, I forgot which 10 chapter -- I think it's Topic 5 -- I'm 11 specifically looking at, for example, turning 12 radius, the suspension, because the suspension 13 system in a vehicle is a linkage. You have -- 14 the links allow -- or the motion up and down of 15 the wheel, but you have to be very careful how 16 you move the wheel up and down, that you don't 17 cause a nonlinearity so you lose control. 18 So you have the linkage that 19 gives -- it's called the kinematics of motion 20 of the wheel. Then you will put a spring there 21 and a damper, and sometimes they're contained 22 in one unit, and now make that weight of the 23 wheel -- the mass of the wheel work with the 24 mass of the vehicle, so as you're moving, the 25 wheel is not going to go up and down

61 (Pages 238 - 241)

Page 242 1 uncontrollably. 2 In a bicycle suspension system, 3 as I explained earlier, you'll have the basic 4 frame, and then you'll have -- so that's if you 5 will the front triangle, which is rigid, 6 typically, and then you'll take, I'll call it 7 the rear triangle. It will have a pivot point, 8 typically, so now you have the seat stays that 9 go from the top of the seat tube down to where 10 the wheel is attached. It moves forward to the 11 chain stays, which go toward where the crank 12 is, and then there will be another connecting 13 link to form that rear triangle. 14 And that rear triangle now, as 15 the bicycle is moving, will move the rear wheel 16 up and down with respect to the main triangle 17 frame that holds the seat tube. 18 That's a very simple 19 explanation. But anyway, the relative motion 20 between those two triangles is what the rear 21 suspension does, the shock. The shock 22 absorber -- the rear shock has both a spring 23 and a damper contained in it to control the 24 relative motion of the two triangles. 25 The nonlinearity, the	Page 244 1 you -- your chain comes off the rings. Very 2 bad. 3 Anyway, so that's where you go 4 from a very basic design of the shock absorber 5 with the mechanism to develop a really, really 6 nice bicycle. That's the art on top of the 7 simple design rules. 8 Q Do you teach any classes or have you 9 taught any classes at MIT that deal with 10 designs related to bicycles or vehicle 11 suspension systems? 12 A You know, the classes I teach from 13 sophomore up to senior and graduate students, I 14 specifically go over linkages, damping 15 mechanisms, energy harvesting. I'll use 16 bicycle as an example, because it's a very nice 17 example. I think I even show my mountain bike 18 in my fundamentals book, my blue Trek Liquid, 19 as here's an example of a mechanism with 20 damping. 21 But I don't specifically run a 22 class on bicycle design. It's -- bicycles are 23 very convenient to illustrate the concepts. 24 And then I go through the math, and here's how 25 the math works. It's applicable in anything.
Page 243 1 complexity, the elegance of design -- and this 2 is where one manufacturer differentiates itself 3 from the other. If you think about it, when 4 the rear wheel is bouncing up and down with 5 respect to the crank, if it's changing the 6 relative length of the chain, you will feel 7 that as you pedal. 8 So that's why you see some of 9 these what look like incredibly complex 10 linkages beyond the simple version I just 11 described, to enable the bicycle to have a 12 suspension and bounce up and down without 13 having the user feel the difference in the 14 crank. 15 So they strive very hard to get 16 motion of the rear wheel that does not 17 effectively change the length of the chain 18 connection. So the derailleur does not have to 19 be moving back and forth to accommodate a 20 change in chain length, because that can cause 21 its own resonance, and then that would drive 22 not only the bicyclist unhappy, you can 23 actually cause a derailment in the chain, you 24 know, coming off the sprocket if you get a 25 weird resonance building up, and that's bad if	Page 245 1 Here's an example with a bike. 2 Like I said, I think I have my 3 blue Trek Liquid in there. I'd have to go back 4 and find it. I still have that bike. It's a 5 good one. 6 MS. BHATTACHARYYA: No further 7 questions for Dr. Slocum. 8 MR. DURBIN: No recross for me 9 either. 10 MS. BHATTACHARYYA: I suppose 11 that's the end of the deposition today. We -- 12 FOX reserves the right to review and revise the 13 transcript per the rules. 14 THE VIDEOGRAPHER: We are off 15 the record at 6:48 p.m. Eastern Time. This 16 concludes today's testimony given by 17 Dr. Alexander Slocum. 18 (Off the video record.) 19 (Discussion off the record.) 20 MR. DURBIN: We would like a 21 rush. I believe we are set up for Monday 22 delivery, and a rough would be nice also, 23 please. 24 MS. BHATTACHARYYA: And I 25 think -- can we get, like, five days expedited?

Page 246 1 I don't know if that's Monday or maybe a day or 2 two after. I don't need a rough. 3 (Whereupon, the proceedings 4 adjourned at 6:48 p.m.) 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	Page 248 1 Veritext Legal Solutions 2 1100 Superior Ave 3 Suite 1820 4 Cleveland, Ohio 44114 5 Phone: 216-523-1313 6 7 October 28, 2024 8 9 To: Arpita Bhattacharyya, Esq. 10 11 Case Name: Fox Factory, Inc. v. SRAM, LLC 12 13 Veritext Reference Number: 6933267 14 15 Witness: Alexander Slocum , PhD Deposition Date: 10/24/2024 16 17 Dear Sir/Madam: 18 19 Enclosed please find a deposition transcript. Please have the witness 20 review the transcript and note any changes or corrections on the 21 included errata sheet, indicating the page, line number, change, and 22 the reason for the change. Have the witness' signature notarized and 23 forward the completed page(s) back to us at the Production address 24 shown 25 above, or email to production-midwest@veritext.com. 26 27 If the errata is not returned within thirty days of your receipt of 28 this letter, the reading and signing will be deemed waived. 29 30 Sincerely, 31 Production Department 32 33 34 35 NO NOTARY REQUIRED IN CA
Page 247 1 C E R T I F I C A T E 2 I, Jill K. Ruggieri, Registered Merit 3 Reporter and Certified Realtime Reporter, do certify 4 that the deposition of ALEXANDER SLOCUM, PhD, in 5 the above-captioned matter, on October 24, 2024, was 6 stenographically recorded by me; that the witness 7 provided satisfactory evidence of identification, as 8 prescribed by Executive Order 455 (03-13) issued by 9 the Governor of the Commonwealth of Massachusetts, 10 before being sworn by me, a Notary Public in and for 11 the Commonwealth of Massachusetts; that the 12 transcript produced by me is a true record and 13 accurate record of the proceedings to the best of my 14 ability; that I am neither counsel for, related to, 15 nor employed by any of the parties to the above 16 action; and further that I am not a relative or 17 employee of any attorney or counsel employed by the 18 parties thereto. nor financially or otherwise 19 inter  action. 20 21 22 Jill K. Ruggieri, RPR, RMR, FCRR, CRR 23 24 Transcript review was requested of the reporter. 25	Page 249 1 DEPOSITION REVIEW 2 CERTIFICATION OF WITNESS 3 4 ASSIGNMENT REFERENCE NO: 6933267 5 CASE NAME: Fox Factory, Inc. v. SRAM, LLC 6 DATE OF DEPOSITION: 10/24/2024 7 WITNESS' NAME: Alexander Slocum , PhD 8 In accordance with the Rules of Civil 9 Procedure, I have read the entire transcript of 10 my testimony or it has been read to me. 11 I have made no changes to the testimony 12 as transcribed by the court reporter. 13 14 _____ 15 Date Alexander Slocum , PhD 16 Sworn to and subscribed before me, a 17 Notary Public in and for the State and County, 18 the referenced witness did personally appear 19 and acknowledge that: 20 21 They have read the transcript; 22 They signed the foregoing Sworn 23 Statement; and 24 Their execution of this Statement is of 25 their free act and deed. 26 27 I have affixed my name and official seal 28 29 this ____ day of _____, 20____. 30 31 _____ 32 Notary Public 33 34 _____ 35 Commission Expiration Date

63 (Pages 246 - 249)

1 DEPOSITION REVIEW CERTIFICATION OF WITNESS 2 3 ASSIGNMENT REFERENCE NO: 6933267 CASE NAME: Fox Factory, Inc. v. SRAM, LLC DATE OF DEPOSITION: 10/24/2024 WITNESS' NAME: Alexander Slocum , PhD 4 In accordance with the Rules of Civil Procedure, I have read the entire transcript of my testimony or it has been read to me. 5 I have listed my changes on the attached Errata Sheet, listing page and line numbers as well as the reason(s) for the change(s). 6 I request that these changes be entered as part of the record of my testimony. 7 8 I have executed the Errata Sheet, as well as this Certificate, and request and authorize that both be appended to the transcript of my testimony and be incorporated therein. 9 _____ Date Alexander Slocum , PhD 10 11 Sworn to and subscribed before me, a Notary Public in and for the State and County, the referenced witness did personally appear and acknowledge that: 12 They have read the transcript; They have listed all of their corrections in the appended Errata Sheet; They signed the foregoing Sworn Statement; and Their execution of this Statement is of their free act and deed. 13 I have affixed my name and official seal this _____ day of _____, 20____. 14 _____ Notary Public 15 16 _____ Commission Expiration Date	Page 250
1 ERRATA SHEET VERITEXT LEGAL SOLUTIONS MIDWEST 2 ASSIGNMENT NO: 6933267 3 PAGE/LINE(S) / CHANGE /REASON 4 _____ 5 _____ 6 _____ 7 _____ 8 _____ 9 _____ 10 _____ 11 _____ 12 _____ 13 _____ 14 _____ 15 _____ 16 _____ 17 _____ 18 _____ 19 _____ 20 _____ Date Alexander Slocum , PhD 21 SUBSCRIBED AND SWORN TO BEFORE ME THIS _____ 22 DAY OF _____, 20____. 23 _____ Notary Public 24 25 _____ Commission Expiration Date	Page 251

64 (Pages 250 - 251)

&	172:25 173:22	101 130:21	144 221:11
& 2:3	173:24 174:4	154:3 235:7	147 222:11
0	175:15,18	102 3:17	14726 247:21
0 46:14,17	180:10 184:23	1100 248:1	16 30:12,24
49:17 58:20	185:3,4,8,23	115 154:19	31:4 33:1
63:8 96:22,23	186:24 187:5,7	119 179:3	221:14
227:17	189:4,6,16,22	11:14 1:21 4:4	17 30:19,21,25
03-13 247:8	190:1,3,8	12 1:13 23:23	31:25
1	227:20	24:2 171:19,24	171 3:19 221:8
1 4:14 27:25	10,000 14:1	172:8 175:24	18 30:24 31:23
29:16 30:1,15	10/24/2024	178:1,5 184:19	32:1,21 33:6
33:9 34:2 40:6	248:8 249:3	184:20 190:5	33:10,16 37:13
40:9 46:9	250:3	194:22 213:19	38:4 53:11
51:12 53:8	100 14:2	123 181:21	189:5 227:22
64:18 70:13	1001 3:11 8:17	124 181:20	228:1,4
74:2,4,13 80:1	8:19 15:7	125 183:15	180 35:1,3 97:3
81:21 82:7	20:18 25:18	126 154:6,9	123:24,24
84:1 90:21	40:7 42:21	12:00 47:18,25	134:4,8 142:21
91:5,10 103:15	46:4	48:4,5	142:22 143:4
118:23,23	1003 3:12 9:3,8	12:23 50:17	143:11,12,14
119:4,5,7,9	9:20 10:1 11:4	12:31 50:20	227:7,16,22
120:7 122:15	23:24 126:17	13 218:9	1820 248:2
134:5,6,6	158:21 172:4	133 154:20	19 222:11,15,23
145:14 150:9	190:20 199:10	134 203:11,12	223:9
166:24 177:23	210:9 222:12	203:14 207:2	190 41:8
182:5 204:8	1005 3:16	210:9	1982 203:22
229:2	84:13,16,21,23	135 211:12	1998 211:16
1.2 190:18	85:14	136 213:16	1:37 93:9
1.2. 191:1	1006 3:19	137 217:20	1:40 125:22
1/2 118:23	170:24 171:2,4	14 26:3 31:17	1:43 93:5
10 67:7,9 68:3	171:8	217:20	1:49 93:12
68:6,9,17,20	1007 3:17	141 154:18	2
78:16 119:3	102:7,10,15,22	181:25 182:4	2 34:3 53:8
150:8 172:18	103:1 162:20	182:15	70:13 81:5
			85:22 87:5

104:17,21 109:6 112:24 120:7 122:16 145:16 165:16 165:17 173:5 175:14 182:1,7 185:1,18 200:16,24 201:4 20 27:1,2,9 37:14 52:8,15 52:17 249:16 250:22 251:22 200 14:3 41:9 232:7 234:8 2004 1:12 232:11,15 235:2 2006 1:13 2007 217:2 201 173:6 175:8,14,23 178:2 190:5 194:23 237:18 2022 204:8 205:4,10 217:25 2024 1:21 4:5 247:5 248:4 207 9:1,23 10:10 15:1,5 15:10,13 16:7 20:20,23 21:15 22:2 25:17 29:17,25 30:12	30:20 33:9 36:5,13 40:6 42:15,21 46:4 53:15 54:7 65:14 84:2 89:24 90:18,21 90:23 91:11 94:1 104:14 177:23 201:21 201:25 232:10 20th 106:20 216-523-1313 248:3 22 25:24,25 26:9,17,21,25 27:21 28:7,15 31:11,14 32:3 34:8 36:1,21 38:17 43:10 52:8,15,24 55:8 63:18,21 64:1 66:1 76:24 77:4,5 94:2 116:13 24 1:21 3:7 4:5 35:9,23 37:13 109:9 247:5 25 109:10,12,13 115:10 116:1 116:21 151:3 157:24 2500 2:14 26 153:19 279 127:3,8 128:8,17	129:22 152:20 152:23 159:17 179:11 181:8 181:17 183:11 191:6,21 193:7 197:4 202:12 202:16 228:19 235:17 279's 126:24 128:12 136:4 152:16 179:6 182:18 28 248:4 2:10 125:22 2:40 126:3 3 3 107:18 187:13 189:2 201:5 227:12 227:15,18,25 228:4 30 55:5 64:23 302 174:23 31 116:14 176:21 314.444.7600 2:16 32 116:14 176:3,13,16,18 33 105:13,20 110:1,13 111:9 116:8,12 3300 2:6 34 86:5,11 87:1 88:6,12,18,21	88:24 89:11 90:2 91:20 92:1 93:19,22 94:2,3,20,23,24 95:6 96:7,17 103:12 108:23 109:7 110:2,9 111:9 116:3,10 119:14 128:5 176:12,18 188:16 203:10 34.4 86:5 35 108:23 109:5 116:2,19 36 67:9,10 213:16 360 36:6,14 49:17 59:17 67:6,7,12 79:24 101:5,17 38 215:16 3:00 98:10 3:11 126:6 4 4 1:12 61:8 113:21 188:1 188:21 189:5,7 189:11 218:14 227:11 232:11 40 215:25 42 150:25 155:18,21,23 155:24 157:1 217:2
---	--	--	---

43 108:13 109:21 110:1,8 110:12,19 111:7,8,12 116:7,9 117:19 118:18 128:18 151:4	119:9,12 121:15,21,23 128:20 151:3 4:11 162:12 4:15 162:15 4:49 184:12 4:57 184:15	35:8,22 36:22 36:23,25 52:18 61:11,12 63:2 63:22 128:11 56 27:7,16 28:2 28:6,13,19,21 29:2,8 30:5 32:3 34:11 36:16 37:1,12 52:16,17 61:6 61:9 62:14,16 63:1 86:4 90:2 92:11 94:11 128:6 158:20 160:14 199:16	132:13 154:2 162:18,21 188:15 189:21 194:5 210:8 214:15 6,360,857 3:16 84:24 6,491,146 3:19 171:5 60 26:18,22 27:22 28:8 66:2 85:19,25 86:1,10,12,23 88:16,24 89:11 89:16,21 90:5 91:15,23,25
44 113:23 114:4 116:9,24 117:15 118:13 119:16,22 121:3 128:18 129:22 151:1 155:19,21,25 157:1,3,9,17,22 160:13	5 5 36:19 55:5 65:23 67:12,13 78:16 85:17,18 86:3 96:16,19 96:20,22,24 100:9 115:13 116:7 132:13 193:18 194:5 207:1 241:10	58 86:2,2,13,23 87:1 88:16,24 89:11,16,21 90:5 91:15,24 91:25 95:20 152:15 160:15 182:16	600 2:14 63 36:20 190:19,22,24 63101 2:15 64 127:1 65 193:15 200:25
44114 248:2	500,000 14:10	5a 54:6,10,23 55:6,11,13,22 56:19	650.849.6600 2:9
45 113:23 114:3 116:11 117:14 118:13 119:10,16,22 121:4	51 151:13 153:14 154:24 155:14 157:23 158:6,17,20 187:7 189:1,25	5b 54:13 56:13 57:4,24 74:6 83:2,5 84:8	66 28:14 34:9 36:3,21 63:22 95:19 129:25 139:3,23 193:24 196:6 197:1 224:21 229:1 232:23
455 247:8	52 26:11 152:3	5c 54:6,10 56:13,17,19	67 140:3 141:2 141:14 142:1 143:5,21
46 154:2	53 152:13	6	
47 107:22 108:2,6 111:6 111:12 154:12 154:17 157:3	54 27:3,10,13 27:17,20,24 28:5 29:11 33:21,22 34:2 34:12,13,18,25	6 3:6 30:1 33:9 55:13 86:3 111:4 112:16 112:22 115:3	
48 107:18 108:7 112:3 121:24 122:3,7			
49 107:11,15 108:8 109:21 109:25 112:4 114:11,17			

144:23 151:14 233:4 68 27:13,17,17 28:1,3,6 61:3,5 61:11,18 62:4 62:7,10 95:13 139:3,24 140:3 143:6 156:14 196:6 197:2 198:15 233:4 6933267 248:7 249:2 250:2 251:2 6:00 98:9 6:06 224:1 6:15 224:4 6:48 245:15 246:4 6a 54:23 55:6 55:13,13,22 56:19 6b 55:11 57:4 57:24 83:2,5 84:8 6c 29:16 56:17 56:19	70 25:3,12 27:25 28:18,22 28:23,23 29:7 30:4 33:10 37:10 38:4 53:23 64:18 65:24 74:8,15 81:22,22 70s 203:23 72 67:13 720 46:17,18 47:5 58:20 59:18 63:8 74 64:20 75 158:19,22 159:4 76 64:19 152:3 160:4,9,12 199:9,22 77 152:4 160:24 161:3,5 161:9 79 152:12,13 7a 33:15,19 34:17 35:6 36:5,13 37:1 46:3,6,16,24 48:10 49:3,13 58:1,7,13,15 61:13,24 62:13 63:1,17 64:4 7b 35:16,18,24 36:24 61:13 63:1,17 64:4	7c 34:18 35:16 35:18,24,25 36:5,13 46:3,6 46:16,24 48:10 49:3,14 58:13 58:16 61:13 63:1,17 64:5 8 8 3:11 154:13 185:22 187:5,6 83 158:17,19 84 3:16 33:25 37:11,21 63:25 857 84:25 86 33:25 37:12 37:22 88 151:12 155:14 158:22 9 9 3:12 65:23 154:13 185:22 187:6 189:24 189:25 197:17 211:13 90 58:2 62:1 98:6 91 126:16 127:25 128:1 92 127:25 128:16 172:3,5 180:2 184:20 93 129:17 94304-1203 2:7	95 95:19 100:23 196:14 200:6 96 100:14,14 993 14:21 9:00 98:11 a a.m. 1:21 4:4 abilities 67:17 127:16 ability 23:8 44:16 66:23 68:12 69:23 71:1 76:23,23 77:3,20 78:17 123:23 147:23 151:25 180:18 181:13,13 183:17 191:20 194:12 195:9 202:5 209:17 217:5 230:25 234:22 247:14 able 71:5 77:10 77:15 78:24 110:5 112:1 146:9 177:13 177:15 178:7 209:25 227:23 228:1 above 95:19 100:14,23 103:21 111:4 112:10,17 128:7 196:13
7	7 30:2 45:20 61:8 92:8 115:11,14,19 115:22 154:2 176:1 194:5 201:21 7,147,207 1:11 3:11,15 6:20		

212:16,18 213:11 247:5 247:15 248:17 abrupt 101:15 absolutes 134:23 absorber 20:24 24:16 32:6 52:20 76:16 77:14 78:24 85:3 88:21 102:18 103:24 112:23 166:8 168:19 171:16 171:25 173:1 220:10 227:6 242:22 244:4 absorbers 24:20 74:24 75:1 76:18,21 78:5 117:8 159:14 171:22 195:18 absorption 205:1 academy 217:3 acceptable 7:23 80:25 accident 19:21 accolades 203:19 accommodate 243:19 accompanied 135:22	accomplish 101:25 133:5 accordance 60:22 98:18 249:5 250:5 account 113:16 169:23 accuracy 80:6 80:8 accurate 14:1 247:13 achieve 33:22 39:7 72:25 114:10 120:10 168:18 181:14 186:8 achieved 112:12 113:5 115:8 163:13 acknowledge 249:11 250:16 act 151:23 249:14 250:20 acting 30:18 action 4:25 247:16,19 actions 162:1 activate 194:7 activates 24:10 25:5 activating 25:12 40:4 active 13:18 23:5,7	activities 13:20 204:21 acts 77:6 actual 31:15 35:5 52:25 57:21 95:24 125:1 147:16 153:21 actually 35:2 35:12 36:1 38:5 45:8,16 45:21,23 100:5 101:2 107:19 114:23 151:13 153:20 157:12 171:17,18 177:1 193:23 193:25 205:15 216:16,25 222:18,21 232:5 233:15 239:21 240:13 243:23 actuatable 152:18 actuates 77:5 actuating 26:1 30:12 31:4 33:1 51:21 52:7,14 53:3 82:15,17,20,23 83:6,12 88:4 88:19,23 89:2 91:20 108:19 108:22 175:15	179:5 actuator 40:13 128:11 add 90:6,7,11 90:25 100:16 124:16 130:4,9 130:10,24 146:17 150:7 156:18 161:9 178:22 179:2 179:15,21 180:16,21 181:11 186:9 191:7 195:5 198:24 202:9 205:7 220:24 228:18 230:24 230:24 added 90:13,16 129:25 136:19 139:6 156:11 158:12 160:10 186:16 193:19 238:2 adding 51:24 129:22 151:23 179:14 191:22 192:10 199:15 addition 20:11 136:15 137:21 140:2 additional 127:17 136:20 183:10
--	---	--	---

additionally 154:18	43:7,13,15 44:4,7,15	71:17 73:21,22 74:15,16 82:24	126:25 127:24 128:13 131:8
address 90:20 248:15	45:23 53:10 64:18,22 81:20	91:3 101:21 103:21 104:12	166:19 167:15 168:17
addressing 123:13	81:24 82:8,13 83:7,9 85:2	105:5,7,11 111:15 112:11	adjusts 93:19 105:7,8
adds 136:15	88:15 89:12,15	112:14,24	administer 4:24
adjacent 154:20	89:19 90:3 91:4,14,21	113:5 114:7,10 114:16,18	admit 99:17 168:8
adjourned 246:4	93:15,16 126:24 128:7	115:5,7 119:6 128:4,22 129:1	advance 116:11
adjust 21:22 22:3,17 23:13	128:10,12,17 129:23 175:19	129:4 133:2 135:12 136:19	advanced 87:20 148:20
23:15,19 64:24 65:20,21,21	175:22 177:22 178:2,16 179:6	136:20 150:17 152:5,7,10	advancement 116:12
70:25 71:11 104:1 110:2	179:9 182:18 adjusting 69:21	154:4,23 156:6 159:11,20	advantage 131:19 180:23
111:6 114:14 162:5 168:10	82:15 83:9,13 102:19 116:13	161:7,10,13,18 161:22 162:2	affect 26:14 43:17,24 78:9
169:11 173:24 183:18 226:17	146:3 154:6,9 164:14,16	162:24 163:1,4 163:7,8,13,17	86:10 110:5 117:2 133:2
adjustability 117:14 144:18	172:18 174:4 175:15 184:23	163:23,24 164:7 167:11	190:2 218:3 affected 34:13
226:10	185:3,4,8 186:24 189:6	168:16 170:2 173:15,21,24	affecting 68:10 108:24
adjustable 111:20 171:15	adjustment 23:8,21 24:25	175:18 177:18 178:8,10	affects 32:3 80:19 98:18
adjusted 103:22 111:11	25:7 30:15,17 32:2 43:12	179:10 180:10 180:18 182:20	139:17 140:6 149:19 165:4
164:8,10,11	54:15,21 65:4 65:5,8,9,10,13	188:16 191:5 191:11,13	affiliations 5:7
adjuster 25:1 28:11 30:19	66:6,7,12 67:3 67:7 69:24,25	200:13 201:20 adjustments	affirmative 72:21
31:22 32:1,21 33:6,10,16,17	70:3,7,8,10,15 70:18 71:1,13	69:3,4 91:1 104:1 114:24	affixed 249:15 250:21
33:20 37:13,20 38:4,7,15 43:7			

afraid 200:21 aggressiveness 169:21 ago 11:5 12:10 200:18 205:5 agree 4:13 15:3 76:8 85:13 102:25 127:2 136:22 171:8 agreed 20:19 ah 168:11 201:2 219:6 aha 66:5 151:8 175:8 177:20 229:11 ahead 153:3 169:22 231:1 ahold 112:4 air 241:3 alcohol 7:5 alex 20:7 alexander 1:20 3:5,12 4:15 5:17 19:11,22 245:17 247:4 248:8 249:4,9 250:4,13 251:20 allege 88:4,22 89:14 91:9,13 alleged 89:19 allow 70:12 99:10,10 128:8 181:17 183:12 200:5 222:19	241:14 allowed 144:1 allows 21:16 126:24 128:4 128:12 191:11 220:14 aloud 165:23 alter 43:14,15 94:4 148:25 alto 2:7 8:3 amazing 125:12 amount 11:20 13:22 14:24 19:17 21:22 22:3 23:15 26:14 32:9 37:2 74:9 87:3 109:14 111:23 114:15 117:12 137:2,12 138:1 138:21 144:8 148:2,13 167:25 168:12 169:20 208:11 208:16 220:22 220:23 226:14 amounts 112:11,15 113:5 115:5,7 127:7 163:13 163:23 167:10 181:7 236:14 amplified 80:19	amplifies 68:13 amplify 68:14 68:23,24 69:1 analogous 227:4 analysis 170:18 220:21 ancient 234:11 angle 28:16 63:25 80:16 113:19 137:2 137:12 138:1 142:8,13,14 145:9,14,16 177:4 angled 25:9,10 28:14 34:8 36:2,21 57:7 63:22 74:8 104:13 106:12 131:17 149:13 149:14,25 167:9,20 angles 104:24 167:5 angular 34:21 39:19 44:12 45:22 46:7,12 46:13,17,18,22 47:13,16 48:6 48:11,12 49:2 49:4,16 53:15 54:11,24 55:23 56:12,16 57:3 57:16,19 58:16	58:19 61:12 63:2,13,14 65:1 68:17 79:16,22,25 80:14,17 81:14 81:17 84:9 95:5 98:23 101:14 124:11 137:5 138:14 140:3 145:24 146:2 185:6 186:22 annotated 24:1 24:4 172:7 193:18 annotations 25:19 172:10 answer 7:10,13 10:18 12:3 18:8 29:6 47:2 66:11 70:9 72:21 75:5,20 76:3 104:16 136:7 149:9 165:24 232:19 answered 47:1 91:17 186:18 233:25 answering 7:7 153:7 anticipated 30:6 anticipates 90:18
---	--	--	--

anticipation 91:10 198:21 anybody 79:4 210:6 212:19 anyway 108:6 149:23 230:17 240:16 242:19 244:3 apologize 79:7 158:12 186:21 apparatus 40:13 appeal 1:3 appear 103:7 205:17 249:11 250:15 appearance 5:4 appearances 2:1 5:7 appearing 1:18 7:25 appears 99:20 179:16 appended 250:11,18 applicable 238:23 244:25 applicant 45:5 application 132:5 208:3,5 applications 228:8 apply 28:20 192:1	applying 220:13 223:12 appreciate 75:9 75:14 appreciated 50:7 approach 42:5 approximately 145:15 arabia 206:13 206:17 arc 85:24 123:24,25 area 154:10 159:13 209:4 arm 44:12 187:7,12 arpita 2:4 5:13 6:22 10:2 12:24 14:18 15:15,17 16:12 16:16 50:12 75:8 125:18 172:13 204:12 248:5 arpita.bhattac... 2:8 arranged 38:25 154:5 arrangement 128:11 176:24 arrived 170:18 arrow 26:4 64:20	arrows 85:23 art 10:5,7,10 14:16 17:4 18:15,18,20,24 41:11 86:19 87:13 101:3 103:18 110:23 118:19 135:21 195:16,19 197:18 198:4 209:11 229:5 230:17 232:8 234:4,11 235:1 244:6 artfully 219:9 articles 204:14 222:17 arts 235:16 aside 170:25 asked 10:12 47:1 56:7 58:9 60:24 75:19,23 91:17 153:22 157:14 158:14 165:12 224:21 225:5 asking 55:16 61:22 62:5 76:4 135:24 145:1 158:9 202:25 assemblage 21:14 assemblies 149:15	assembly 25:1 26:1,7,12,13 30:12,19 31:4 31:18,23 32:1 32:21 33:1,6 33:10,16,17,20 37:13,21 38:4 38:7,15 51:21 52:7,14 53:3 53:11 55:21 81:20,25 82:8 82:14,15,18,20 82:23 83:6,7,9 83:12,13 88:4 88:15,20,23 89:2,13,15,19 90:3 91:4,14 91:21,22 108:20 126:24 128:8,12,17 129:23 154:3 175:16,19,22 177:22 178:2 178:17 179:5,7 179:9 182:18 assess 78:5 assign 213:13 assigned 85:4 assignment 249:2 250:2 251:2 assist 233:14 assistance 71:6 assistant 210:19 211:1
--	---	--	--

associate 210:20,21 213:6 associated 33:10 44:11 137:11 139:2 139:23 208:17 211:15 226:13 associates 172:16 assume 12:23 96:9 108:3 142:13,20 assuming 77:24 225:3 229:3 attached 34:6 44:3,14 56:3 57:22 85:21 86:1 94:12,15 116:3 184:18 242:10 250:7 attention 20:18 23:23 29:16 33:14 37:7 40:5 46:3 54:6 113:20 126:16 141:2 155:21 157:24 158:17 160:4,23 162:18 165:16 172:3 190:17 203:10 213:16 221:8,11 222:11	attorney 5:8 247:17 audio 4:11 author 222:17 222:20 authorize 250:11 authorized 4:24 automatically 183:6 automobiles 208:9 available 64:11 ave 248:1 avenue 2:6,14 average 183:2 191:16 228:9 award 214:2 215:23 216:1 216:20 awards 204:21 213:21,23 214:4 aware 45:4 awful 124:13 axial 26:15,17 28:21 34:11,14 35:7,10 36:7 36:16 39:3,20 44:5,8 48:21 55:7,14,16 59:12 63:18 76:25 77:11,15 77:23 78:9	80:19 81:6,16 86:11 88:17 95:2 96:19 98:16 105:3 119:3 130:10 139:17 140:8 150:1 154:8 160:16,20 167:16,19,23 167:25 174:3 180:13 181:1 185:3 186:23 189:7 190:3 192:20 193:1 199:23 201:19 201:24 202:18 225:12 227:9 227:25 233:2,3 235:9 axially 27:21 37:1 43:14 57:11 64:2 78:3 87:2 94:3 94:24 103:9,11 105:25 106:2 109:15 128:19 129:13 140:5 142:2,20 152:15 154:7 172:25 178:12 180:22 182:5 182:16 186:10 186:15 189:10 189:17 190:8 195:13 196:22	200:12 201:16 202:7,11 203:3 203:7 235:2,19 236:13 axis 27:13,17 27:17,21 28:1 28:3,6,8 39:10 61:3,4,5,5,11 61:18 62:4,7,9 66:2 85:20 94:5,7 96:17 134:5,11 142:2 144:25 145:3,5 145:19 147:18 152:17 174:5 201:16 202:7 202:18 214:19 axle 21:10 109:21,25 120:4 121:10 128:20 129:14 151:3 157:4,5 axles 13:6
b			
b 3:9 35:6 57:4 58:5 71:22 74:6 83:1 94:6 94:7 96:17 239:13 b2 1:11 bachelor's 203:21 back 10:13,20 11:14 21:10 25:6 33:14			

41:10 51:6 64:21 67:15 69:18 78:15 81:25 93:4,7 94:1 99:24 104:11 108:5 115:8 116:11 150:20 153:13 153:15 163:24 170:14,16 175:21 179:20 187:11,12 188:14 191:14 194:4 200:12 219:2 226:22 231:21 234:13 234:15 236:17 241:1 243:19 245:3 248:15 background 40:17,18,22 41:3,22 42:7 42:18,20 44:24 45:6,17,24 103:18 backgrounds 41:12,18 backlash 83:21 84:5 bad 124:18 243:25 244:2 ball 106:19 214:22 219:11 barrel 192:22 192:23,25	195:23,23 196:1 199:3 229:11,14,16 231:7,9,10,18 231:23,25 232:14 234:3 base 239:16 based 10:9 48:20 56:9 68:18 117:9 130:16,19 131:9 134:18 134:19 135:11 138:20 169:21 206:21 229:20 basic 68:4 87:24 88:2 90:8 91:4,5 100:25 132:20 160:2 224:22 225:3,7 230:23 235:15 239:14 242:3 244:4 basically 30:4 130:6 212:6 229:19 basics 99:7 basing 238:10 basis 49:10 127:20,23 135:10 bdc 96:5 bear 139:16 bearing 207:24	bearings 207:21 bears 166:11 beginning 5:8 157:2 190:19 begins 112:23 166:23 behalf 5:15 18:20 believe 13:1 15:19 37:16 55:15 69:15 118:9 127:9 129:6,21 153:7 157:14 163:20 179:13 228:25 237:13 245:21 bending 207:23 benefit 220:21 best 100:6 215:25 216:20 247:13 bet 108:16 better 68:25 70:25 71:12 76:7 111:25 170:13 180:1 209:3 bevel 176:21,23 177:2 beyond 89:21 101:17 128:10 181:19 183:13 207:16 232:17 232:17 243:10	bhattacharyya 2:4 3:7 5:13,14 6:14 16:1 37:23 46:25 47:21 48:16 49:5 53:18 55:1,24 58:17 61:19 63:3,19 66:14 71:19 72:1 74:20 75:11,16,22 76:14 77:18 90:14 91:16 92:5 95:7 113:10 114:8 125:19,24 131:10 132:9 133:19 134:9 134:20 135:14 136:5 140:14 142:25 143:24 144:10,21 146:6 147:4 149:6 150:18 156:2,7 161:15 162:6 163:9 164:2 177:24 184:2 185:9 186:25 192:12 197:22,25 198:8 202:20 209:6,8 220:3 224:9,13 245:6 245:10,24 248:5
--	--	---	---

bicycle 21:4 48:25 171:16 172:1 204:24 213:24 214:2 218:6 219:15 219:17,17 222:4,24 223:6 227:19 229:5 230:1 238:23 242:2,15 243:11 244:6 244:16,22 bicycles 78:7 171:23 218:7 223:4 238:17 241:6 244:10 244:22 bicyclist 243:22 big 32:17 40:2 99:25 108:12 204:4 213:14 bigger 32:9 bike 21:1,7 22:23 23:1 108:18 123:11 230:3 244:17 245:1,4 bikes 21:3,6,8 biking 168:12 billed 11:16 bio 50:6 93:1 bit 32:16 97:11 178:14 187:10 226:18	blazingly 201:13 blue 173:7 200:21,23 201:1 244:18 245:3 board 1:3 49:1 body 21:25 22:9 28:25 35:8,10 95:21 98:19 boilerplate 10:15 bolt 153:1 154:18,21 173:9 180:24 181:1,25 182:2 182:4,13,15,24 book 106:21 234:17 240:7 244:18 bore 95:22 139:18 bottom 24:17 26:7 58:23 62:2 96:2,4,7 96:12 98:7,9 116:7 138:17 142:23 144:19 145:8,13,17,21 147:7 152:13 154:17 225:8 225:18,21 226:7 227:2	bounce 240:20 240:21 243:12 bouncing 23:1 104:7 220:9 243:4 boy 57:4 brad 2:22 4:20 125:25 brand 211:1 break 7:18,19 25:20 50:6,8 50:25 93:1,4 125:7,14,16 126:12 128:22 184:3,9 223:20 223:23 breathe 241:4 brief 15:16 112:10,17 218:25 brilliant 234:24 bring 238:5 bringing 80:13 135:21 195:10 broad 51:23 74:22 147:24 149:2 153:16 195:22,22 broadly 20:22 76:17 103:7 105:2 150:25 154:1 166:20 192:4,7 193:21 222:14	broke 19:21 brought 139:15 219:2 building 243:25 built 205:15 bulb 170:20 bullet 139:11 bump 22:7,10 bunch 79:2 153:6 218:13 229:13 230:10 233:20 business 230:16 button 64:19 buy 212:8,14 c c 4:1 33:16 35:6 74:10 247:1,1 ca 248:25 cables 108:4 cad 99:10 calculate 132:16,17 calculations 120:16 127:7 127:18 181:7 california 2:7 8:4 call 15:18,22 27:3 36:20 76:5 93:18 103:15,17 125:2,8 136:18
--	--	---	--

141:6 147:14 181:8 221:16 227:15 232:14 242:6 called 22:13,22 24:7,14 64:15 69:8,13 88:17 93:22 94:1 96:12 97:4 101:8 106:18 109:8 141:11 141:13 177:1 180:25 192:21 192:23 195:23 196:17 200:4 201:7 204:1 206:21 208:18 211:23 221:21 230:4 239:12 239:12,13,15 239:18 241:19 calling 113:16 136:14 calls 177:25 209:8 cam 10:24 19:6 19:8,9 31:10 32:3 34:14 36:2,21 38:16 38:22,23 39:1 39:5,6,10,14,17 39:17 44:3,13 44:14 48:8,19 48:20,21,25 49:2 54:14,15	57:8,11 63:22 64:1 68:2 74:8 87:6,8,11,13 89:6 92:11,17 94:9,12,13,19 94:23 95:1,25 97:14,15 99:6 99:7,14 100:13 101:9,13,15 106:2,5,5,7,9 106:11,14,24 107:1,2,3 109:23 116:24 123:23 124:3 124:22 128:6 129:9,23 131:9 131:13,21 132:7,24 133:12,14,16 134:3,18 135:13,17,23 135:25 136:11 136:11,17 137:4,5,6,6,24 138:8,12,15 139:13,15 140:1,5,13,17 140:18,24 145:7,8 146:10 146:11,13,15 147:9,15,16,17 147:21 148:1,3 149:24 150:7 151:17,19,20 151:24,25	152:10 154:5 154:14 156:12 157:7 160:14 160:16 170:1 173:4,14,16,18 174:10 175:11 175:13 177:12 178:3,7,25 179:5,17 180:7 180:12,14,17 180:19 181:1,2 182:9 184:17 185:2,25 190:8 191:2,8 192:11 192:14,14,16 192:16,22 193:2,4,6,8,9,9 193:10,18 194:2,24 195:15,20,23 195:25 196:1 196:14,15,21 197:5,8,9,12,15 197:20 198:6 198:13,15 199:2,3,16,17 200:8 201:10 201:10,18 202:17,22,24 203:4,5,7 214:22 218:7 218:17 219:12 224:14,23 225:3,4,6,8,15 226:16 227:3	228:20 229:1 229:11,12,12 229:15,16,17 229:21,22 230:6,13 231:10,18,25 232:23 233:1 235:3,10,11 238:16,21 camera 4:8 camming 181:15 camnetics 99:9 229:18 cams 39:13,25 39:25 40:4 48:12 87:18 98:2 119:19 133:8 168:6 192:19,23,23 192:25 193:11 193:12 195:23 197:1 204:1 207:21 213:25 214:7,13 217:16 223:2 229:14,15,25 230:7,14,20 231:6,8,9,13,23 231:24 232:1 232:13,14,15 234:2,3,3,9,10 234:13,15,20 234:25
---	---	---	--

camshaft 24:11 24:12,13 25:5 25:9 26:25 27:7,10,16 28:2,6,13,19,21 29:2,4,8 30:5 30:14,18 31:6 31:6 32:22 34:6,7 36:16 37:1,12 39:6 39:10,19 46:14 46:22 47:11 52:16,17 56:2 56:3,6,10 57:18,23 61:6 61:9 62:9,14 62:16 63:1,23 63:24 81:25 85:21 86:2,4,6 86:12,23 87:1 88:5,16,24 89:11,16,21 90:2,5 91:15 91:24,25 92:13 92:14,19 94:14 94:14,22 95:10 95:10,20,21 152:15 154:19 156:19 160:14 172:21 173:5,7 173:10,11,12 173:18 175:14 176:3 177:7 180:6,22 182:1 182:3,5,16	184:22 185:1 186:15 201:15 201:23 202:6 202:17,19 203:2,6 camshaft's 152:17 camshafts 39:23 47:8 capability 67:3 129:1,4 136:19 151:9 161:22 191:13 captioned 247:5 car 39:6,11 72:7 220:17 225:17,17 240:19 care 10:16 208:4 careful 215:6 241:15 carefully 45:15 122:2 case 1:15 4:19 6:16,18 16:7 16:15 19:25 34:11 38:19 57:4 92:11 131:8 172:23 194:21 204:10 248:6 249:3 250:3	cases 7:20 41:16 56:20 145:23 cause 27:10,20 28:1,7 31:11 36:7,15 38:2 38:17 69:6,17 84:9 97:21 103:10 119:13 123:25 154:6 172:21 202:10 235:9 241:17 243:20,23 caused 29:6 causes 25:13 28:12 34:5 38:5,7 39:18 39:21 94:24 107:5 116:13 119:9 150:1 201:23 225:25 235:10 causing 37:1 192:21 202:4 center 24:15 28:21,22 43:8 61:9 62:9 96:5 96:7,12 97:4 97:12,15,16 98:7,7,9,10 138:17 145:1,4 145:13,17 146:12,14,14 146:15 147:7 147:12 173:19	225:8,9,17,18 225:22 226:6,7 227:1,2 centimeter 122:15,16 central 39:9 century 106:20 certain 21:19 94:24 239:2 certainly 123:10 certificate 250:11 certification 249:1 250:1 certified 3:17 247:3 certify 247:3 chain 21:9,17 242:11 243:6 243:17,20,23 244:1 chair 211:24 chaired 211:20 212:6 chamber 115:16,20 188:3 change 26:13 32:17 38:16 57:7 60:4 74:9 83:7 101:16 117:12 119:3 169:22 201:23 243:17,20
--	--	--	---

248:13,14 250:8 251:3 changed 57:18 177:21 changes 60:3 65:2 248:12 249:7 250:7,9 changing 117:10 176:4 243:5 chapter 241:10 characteristic 32:15 174:2 characteristics 44:17 64:4 65:22 66:3 82:16,19 83:8 110:3 128:9 173:25 176:4 181:18 183:13 characterizati... 195:22 charge 212:1 chart 212:16 cheap 221:23 239:24 check 56:22 83:3 109:2 185:14 choices 237:24 chunks 20:1,2 circle 95:11,12 95:23 96:3,3 97:15 107:3 192:16	circles 87:25 98:1 100:22 102:3 106:14 130:1 131:22 139:5 circular 131:14 136:11 138:12 circularly 39:9 circumferenti... 38:25 citation 217:4 cite 196:2 civil 249:5 250:5 claim 12:14 42:13 45:20 51:4,10,12,23 82:7,12 84:1 90:20,21 91:5 91:10 92:8 103:15 112:24 166:24 177:23 190:18 191:1 229:2 claimed 51:20 52:3 81:19 177:23 claiming 21:15 46:1 claims 10:4,12 51:24 52:3 90:23 103:16 clapping 38:9 clarification 52:9 61:14	117:4 197:24 216:23 class 87:17,20 209:13 226:3 240:8,9 244:22 classes 244:8,9 244:12 clean 8:23 cleaned 172:13 cleaner 76:3 cleanliness 72:11 cleanup 84:14 102:9 131:13 clear 120:20 153:7 clearly 107:17 clears 190:12 190:12 cleveland 248:2 click 64:25,25 64:25,25 177:16 clicked 9:16 cliff 101:18 clock 47:19 48:1,2,7,19,25 98:8 clockface 49:23 clocks 48:14 234:20 clockwise 36:7 36:15 close 60:11,23 99:15,21	closed 33:2 77:7 closer 35:23 99:23 145:19 closes 43:21 closeup 240:17 closing 43:24 60:6 clue 211:17 coarse 64:12 65:15,16 69:25 70:2,3,4,8,10 70:16 73:22 74:13 155:16 176:1 code 118:1,5 cold 66:24 67:8 collar 116:14 colleagues 210:10 colloquial 47:9 color 25:3 colored 26:9 151:2 156:13 200:16 colorer 172:15 coloring 25:19 95:24 139:7 colorization 91:19 172:12 colorized 151:18 179:25 184:20,24 colors 141:8
--	--	---	--

column 36:19 40:6,9 55:5 65:23 185:18 188:1 combination 34:10 38:24 39:22 89:15 91:23,25 101:3 107:6 140:9,12 156:1,6 158:5 160:11 199:5,5 combinations 178:14 230:8 combine 179:4 182:17 combined 198:14 combines 233:1 combining 157:11 231:11 come 21:9 41:10 93:4 99:15,20 100:13 201:12 218:23 219:5 220:20 231:25 comes 53:10 111:12 200:9 215:23 244:1 coming 101:10 108:5 153:18 176:10 243:24 commensurate 49:24	comment 43:5 44:20 74:24 186:1 192:7 commission 249:19 250:25 251:25 committees 210:25 212:11 213:13 common 76:25 118:20 119:12 129:8 131:1 commonly 43:12 231:7 commonwealth 247:9,11 communicate 17:23 209:24 209:25 communicates 52:21 companies 13:17 company 20:13 69:13 215:24 230:11 comparable 144:8 comparative 140:20 compare 76:11 80:10 142:15 142:22 144:17 compared 36:25 74:17	220:23 comparing 55:6 70:19 71:5 72:7 77:1 139:4 152:2 comparison 66:20 71:17,25 72:13,23 76:19 80:12 113:9,17 114:23 138:23 compensation 11:21 13:22 competition 240:8,10 competitive 228:10 complete 36:22 36:25 49:15 81:5 completed 248:15 completely 7:8 7:10,14 10:19 143:15 complex 229:24 243:9 complexity 124:17 243:1 complicated 146:25 216:25 components 88:3 123:18,19 124:25 compress 22:7 22:11 24:20	59:24 compresses 32:7 compressing 22:12 compression 22:6,18 23:20 103:23,24 104:2 105:8 110:5 114:19 115:15,17 128:5 149:17 159:21 161:25 164:9 165:2,7 166:8,11 168:1 169:2 170:8 172:24 176:5 182:6,20 187:22 189:18 190:4 191:12 224:16 228:17 228:21 236:2,5 236:12,23 237:7,15 comprise 89:1 197:19 198:5 comprised 52:8 88:23 comprises 154:4 computer 183:5 199:19 201:12 concave 109:14 116:20 149:21
---	---	---	---

concepts 244:23	connect 52:24	contain 198:11	116:24 123:5
concerned 22:18 188:13	connected 24:12 27:4,6,8 28:12 82:14	contained 21:13 115:10 241:21 242:23	124:1 133:4 136:16 138:21 140:18 142:14
concludes 245:16	83:17,23 84:1 86:22 91:24	content 16:25	149:21 183:1
conclusion 177:25 209:9 220:20	92:4 103:9 107:16 173:7	contention 90:17	189:18,19 190:1,4 198:23 202:5 215:2,6 215:9,12
concur 6:23	connecting 242:12	contents 150:21 153:13	218:16 227:5 227:24 228:2,6 229:24 230:25 236:2,12,13,17 236:19 237:1 238:4,11 239:10 241:17 242:23
condition 7:6	connection 4:9 27:5 83:18 84:3 92:20 243:18	context 64:9 66:22 67:19 71:2 72:15 74:3,25 84:1 85:8 107:13 113:15 135:5 135:19 149:3 163:8,15,21 175:7	controllability 40:3 124:10
conduct 7:16	consider 62:12 240:22	continual 65:5	controllable 188:12,12,14
conducted 4:7	considered 60:10,13	continually 239:6	controlled 26:24 54:14 72:20 116:23 160:19 183:6 199:19 201:12 240:19
cone 109:13,14 116:19 141:7 196:18 199:25	considering 58:12 59:5,17 62:25	continue 4:12 156:17 189:13	controller 73:6
cones 109:15 109:17	construction 12:14 181:19 183:14 240:1	continuous 111:16,16	controlling 24:18 40:13 45:23 88:7 111:11 124:6 149:16 159:21 161:25 164:23 165:1 168:1
conference 8:2	constructions 51:4	continuously 111:11	
configuration 44:11	contact 26:12 34:7 94:22 113:13 145:6 147:6 163:25 173:16	control 32:5,23 52:22 53:23 67:1 69:2 70:21 76:23 77:3,11,15,20 78:15,24 105:3 108:17 110:24 111:2,5 116:16	
confuse 188:4	contacting 167:17 184:25		
confused 168:23	contacts 24:13 106:4 116:9,10		
conical 116:20 196:15,17,18 197:1,5,8,9,12 197:20 198:6 198:13 199:2 201:9,10 202:22 229:12 229:15,15 231:24,25 232:15,23 233:1 234:3			

190:8 218:23 238:1 controls 24:16 24:19 26:16 48:21 52:23 83:13 189:4 215:11 227:3 236:22,23 convenient 125:9 244:23 convention 175:1 convert 218:9 230:14 convex 109:13 116:19 149:21 cooperate 154:5 coordinate 29:7 copy 8:23 9:10 corner 142:1 142:19,20 143:21,23 144:8,9,12 correct 19:1 27:14,15,18,19 27:22,23 28:3 28:4,8,9,19 29:8,9 30:1 31:1 33:13 34:19,20 36:19 46:24 49:16,17 56:6,7,14 57:17 62:11	71:14,15,18,21 73:18,19 81:10 85:14,15 86:24 86:25 87:2,3 88:25 89:17 101:16 103:2 105:15 109:23 110:3,4,9,10,13 110:14 113:6,7 114:5 117:17 122:22 126:25 127:1 141:14 145:1 146:2 147:3 173:3 174:7 175:16 175:17 186:24 187:2 197:21 198:7 206:18 210:16,17 211:14,21 236:6 237:12 corrections 248:12 250:17 correlated 168:13 correlating 99:5 correspond 96:14 99:2 185:7 186:5,6 corresponding 82:16,19 101:24 corresponds 44:14 95:5,21	110:8,12 227:7 cosine 145:14 cosines 147:1 cost 183:7 195:6 216:18 220:21,25 221:3 costs 199:16 counsel 2:10,18 4:16 5:5,10,22 50:25 126:10 247:14,17 count 35:4,16 46:10 47:16 counterclock... 36:7,15 counting 35:18 county 249:10 250:15 couple 11:9,18 11:25 12:2 145:11 148:22 coupled 92:22 110:14 coupling 92:15 221:22 course 11:1 33:1 courses 148:20 court 4:22 12:5 12:7,10 16:7 51:6 125:5 162:8 171:10 249:7	cover 20:10 53:15 covered 31:6 35:20 crank 242:11 243:5,14 crankshaft 225:17,19,20 225:22,25 226:22 create 11:25 32:16 60:21 99:5 199:2,24 217:1 created 10:24 139:25 156:15 cross 46:20 47:10 49:18 59:14 60:25 85:18 86:7 141:11,13,19 141:21 154:10 174:13 189:14 194:18 232:17 crosshatched 173:12,13 174:10,20 180:6 crosshatching 35:9 174:17,19 crr 1:24 247:22 cummins 211:25 cumulative 80:8
--	--	---	---

current 41:8	201:10,18	43:15 44:17	238:11 239:13
currently	205:21 206:9	52:23 53:9,10	244:14,20
205:11	225:4 229:1	54:1,2,3 64:12	damping's
curriculum	230:8,23	65:3,21 66:2	177:20
203:15	239:22	74:9 77:8	data 205:15
customize	d	82:15,18,25	date 1:12,13
44:16	d 3:1 4:1 85:22	83:7,14 85:2	204:23 205:4
cut 174:15,16	85:23 86:10	94:4 102:19	232:10 248:8
174:23,25	87:5 200:16,24	103:20,22,25	249:3,9,19
175:9,10 200:3	201:4,5	104:2 105:8,9	250:3,13,25
200:7 201:6	damp 189:11	110:3 111:6,10	251:20,25
cutting 201:14	damped 74:5	112:23 116:25	dated 204:7
cv 203:12,13,15	damper 31:15	117:12 128:5,9	dates 211:15
204:12 238:14	48:25 64:3,4	138:21 154:3	davinci 234:12
cycle 22:6	85:19 108:17	165:2 166:16	day 47:23 48:3
172:24 176:5	154:2 159:16	166:18 168:13	246:1 249:16
cylinder 35:12	160:2 174:3	169:3 171:15	250:22 251:22
35:13 37:13	192:2 202:5	172:17,25	days 11:9 14:15
39:2 97:17	205:3,7,12,18	173:15,21,24	99:25 245:25
98:17,20 145:4	206:9 216:9,14	173:24 174:2,4	248:18
176:13 192:17	228:5 236:2	175:15,18	dc 15:20
196:16 202:1,2	237:2 238:16	176:4 180:10	dead 96:4,7,12
231:2	238:21 239:11	181:18 182:6,7	97:4,12 98:7,7
cylinders 176:9	241:1,21	182:20 183:12	98:9,9 138:17
224:24 239:25	242:23	183:18 184:23	138:17 145:13
240:2	dampers 214:1	185:3,4,8,17,24	145:17 147:7
cylindrical	214:6 217:12	186:2,7,24	225:8,9,17,18
95:20 131:16	229:6	189:5 205:23	225:21 226:6,7
140:5 151:19	damping 21:13	208:1 215:11	227:1,2
156:12 157:7	21:22 22:3,5	220:6 224:16	deal 213:14
175:10 179:16	22:14 23:15	226:14 228:17	244:9
193:1 196:14	24:23 25:1	228:21 236:5,5	deamplify
196:21,24	26:14,16 32:9	236:12,13,23	68:14
197:15,16	32:12,17,20	236:24 237:7,9	dear 18:3,3
199:2 200:8	33:4 43:6,14	237:15 238:2	248:10

december 1:13 12:9 204:8 217:25 decide 49:1 211:17 declaration 3:12 9:10,21 9:25 11:4 12:6 12:22,24 14:15 17:3,21 23:23 51:4 73:18 76:13 87:15 89:20 90:4 120:16 121:4,8 126:17 127:20 127:23 129:2 129:17 130:17 135:9 137:17 137:25 138:22 150:16 153:23 158:20 172:3,6 178:11,15 181:6,16 184:21 190:19 191:7 195:15 196:2,5 197:2 197:20 198:6 201:1 203:11 207:2 210:9 213:17 217:21 221:12 222:12 232:18 decrease 146:4 deed 249:14 250:20	deemed 248:19 deep 52:19 88:21 206:24 deference 125:10 define 142:5 146:9 defined 136:23 defines 137:3,4 definition 148:21 deformation 148:11,12,14 degree 68:3,19 73:10 80:1 98:6 100:16 123:24,24 142:21,22 150:8,9 203:20 203:21 227:7 227:16 degrees 35:1,3 36:6,14 46:19 47:5,16 49:17 58:2 59:17 62:1 64:23 67:2,3,8,9,12 68:6,9,17 73:10 78:16,16 79:17,18,19,22 79:24 96:19,21 96:23,24 97:3 134:4,8 143:4 143:11,12,14 145:11 227:20	227:22 delete 135:25 delivery 245:22 denver 16:22 denying 174:11 department 213:12,12 248:22 depend 40:1 123:8,17 dependent 133:11,15 174:3 depending 28:10 68:15 107:7 115:23 130:11 132:14 149:15 156:23 161:24 178:7 depends 4:8 66:24 94:6 100:20 123:12 132:4 133:1 147:2 148:12 191:15 deponent 8:21 29:20 30:22 42:23 50:13 55:3 65:18 105:22 107:25 113:1 126:20 141:4 159:7 160:6 161:1 165:21 166:3 166:25 178:18	184:8 187:24 188:8,17 196:7 197:13 199:12 deposed 6:6 deposes 5:18 deposing 14:22 deposition 1:20 4:6,15 6:9 8:1 14:13 15:1,13 17:2,17,21,25 18:5 75:3 85:9 126:12 237:22 245:11 247:4 248:8,11 249:1 249:3 250:1,3 derailleur 243:18 derailment 243:23 desalinate 206:7 desalinated 206:18 describe 37:17 40:23 41:21 45:5 59:3 62:15 106:10 144:1 166:6 209:23 219:15 219:19 described 24:7 48:13 52:12 103:21 106:16 216:7 241:8 243:11
---	---	---	--

describes 185:18 237:23	designing 13:19 79:4	112:20 157:18	67:17 74:17
describing 41:24 47:17	191:16 240:20	165:19 166:24	76:11,20 80:9
95:11 105:4	designs 10:25	182:3 191:23	104:5 105:11
111:19 153:25	66:8 222:3,7	192:1 218:3	105:11 113:18
157:10,13	232:5 244:10	devices 204:15	114:15,16
222:4 238:25	desirable 21:24	213:22 223:3	117:1,6 118:7
description 3:10 62:12	183:17 239:9	dexterity 198:18	139:12,15
descriptor 194:6	desired 111:7	diagram 62:8	144:13 145:7
design 19:6,8	111:13	diameter 69:9	145:22,25
19:10 20:12	detail 42:13	69:16 121:17	158:8 161:18
39:25,25 43:6	87:22 153:10	121:20 122:6	161:19,23
73:3,6,15	155:2 188:2	122:11,13,15	162:2 164:18
87:17 99:7,11	detailed 11:1	122:16 133:17	164:19,20,21
100:9 101:23	20:3 221:2	180:9 225:6	166:9,14,18
106:22 119:18	detecting 111:8	diameters 97:2	167:10,24
124:18 132:12	detent 66:10	121:19 122:17	168:3,6 169:3
134:18 136:3	86:16 89:7	diametrical 121:23	169:6,10,11,15
140:17 191:15	detents 64:23	differ 47:5	169:17,24,25
207:8,14	65:1,12	140:12	170:1 185:23
208:22 210:3	determine 74:18 109:15	difference 47:7	186:5,6,7,19
212:2,5,8	determined 21:4	50:2 55:7,12	188:10 189:3
214:3 217:5,5	determines 156:23	57:5,9 63:11	190:6 202:2,25
217:6 218:17	develop 244:5	123:10 177:14	221:4 229:14
223:7 230:9,13	developed 106:19	177:15 201:13	233:3 236:1,14
232:8 233:18	device 58:1	206:11 243:13	differential 164:13 239:16
233:20,21	66:23 70:24	differences 169:12	differentially 116:16,17
235:8 240:4,5	71:10 99:4	different 21:24	differentiates 243:2
241:9 243:1	101:9,10	21:25 31:10	differing 103:25 104:24
244:4,7,22	102:18 103:19	38:21 39:12	167:5,9
designer 124:16 148:1	104:18 112:9	46:18 49:20	dimension 55:8
		54:11 58:8,24	59:5 79:12
		63:18 64:5	

133:23 180:8 180:10 dimensional 49:20 50:1 59:10 61:16 100:11,15 234:21 dimensioning 32:15 dimensions 57:9 58:13 59:4,8 60:4,13 99:24 117:21 118:7,18 137:16 194:1 diploma 209:21 direct 37:6 155:20 162:17 directed 223:10 direction 29:1 29:3,9 36:17 47:3 61:17 62:5 104:10 115:23 116:8 189:8 202:18 directional 208:14 directions 105:12 directly 46:23 58:14 68:10 124:8 150:2,3 151:10 218:5 disagree 45:2 76:9	disclose 22:2 138:7,14 184:17 191:2 194:2 196:25 197:5,8,11,20 198:6 disclosed 20:22 30:12 33:15 103:4 149:12 193:2,6 196:11 197:1 217:23 221:14 discloses 23:14 159:15 disclosing 103:8 222:8,24 disclosures 181:24 discrete 65:2,3 65:8 66:10 78:1 111:16 185:16 discretionary 212:7 discuss 59:20 73:17 126:10 150:25 241:6 discussed 18:10 18:13 33:11 43:1 48:5 49:23 50:23 81:22 128:6,21 138:6 152:7 180:15 219:24 223:1,12	discussing 45:10 52:5,13 72:23 103:8 120:17 139:9 150:14 157:16 discussion 9:13 42:6 45:3 47:9 80:21 109:5 111:15 138:11 153:9,16 155:8 155:15 162:10 179:20 180:20 194:9,20 204:19 219:3 245:19 discussions 11:1 16:17 diseases 101:12 displace 37:2 154:7 displacement 137:7 150:2 154:9 167:10 172:21 displacing 128:19 129:14 182:5 disposed 189:6 dispute 13:8 dissipate 21:19 22:8 32:4 206:2 216:11 dissipated 24:22	dissipating 220:8 dissipation 31:16 distance 35:10 145:5 district 12:5,7 12:10 16:7,15 51:6,16 dive 206:24 divided 67:8,12 227:25 228:4 docking 176:10 doctoral 209:12 doctors 99:1 document 8:25 9:18 12:13 15:10 29:21 30:23 42:24 55:4 65:19 102:14 105:23 108:1 113:2 126:21 141:5 159:8 160:7 161:2 165:22 166:4 167:1 178:19 187:25 188:9,18 196:8 197:14 199:13 204:7 documents 17:1,9,10,14,17 18:7
---	---	---	---

dog 35:11,11	52:12 53:2,14	140:24 141:1	draw 232:25
doing 38:24	54:5,23 55:15	141:25 146:23	drawing 87:6
69:19 81:18	56:11,15 57:2	152:1 153:22	119:18 133:23
88:8 115:1	57:13,25 63:13	154:25 156:5	134:12 140:19
135:5 139:1	64:8 75:2	158:24 161:11	140:20 142:11
154:1 157:13	76:11 78:11,18	162:17,23,25	172:8 175:2
164:21 169:14	79:10 81:7,11	163:3,6,22	224:22
189:12 191:15	81:19 82:7,13	165:13,13,18	drawings 95:16
207:9 213:1,8	83:16 84:11,21	166:21 168:8	112:10,18
216:5 223:15	88:3,22 89:12	170:22 172:2	117:23 138:11
236:15	89:14 93:14	172:11,17	drawn 11:12
dollars 14:2	94:19 95:4	173:4 184:17	61:7
double 83:3	102:5 104:16	186:19 187:4	dreamt 234:21
109:2 185:14	104:21 105:13	187:17 190:13	drew 193:5
downs 58:25	105:19 106:7	196:4,25 197:7	200:21 232:22
downward	107:9,9,10	197:11,18	drill 208:18
46:23 96:15	112:21 113:21	198:4 199:8	drilling 208:12
189:12	113:24 114:6	201:15 202:6	drills 208:14
downwards	115:2 117:13	202:12,15	drink 50:15
34:18	118:11 120:15	203:9 207:1,5	drive 69:18
dozen 41:16,17	120:24 121:1,2	210:8 213:15	100:12 148:7
217:25	121:8,14 122:1	217:19 219:7	236:16 243:21
dr 6:3,5,25 7:11	122:5,10,24	221:7,10 222:2	driven 34:12
8:1,13,25 9:6	123:17 124:21	222:6,10,23	100:2 101:19
9:18 15:3,5	125:12 126:8	223:8 224:6,10	104:11 121:24
19:16,22 20:14	126:15 127:6	224:14 232:12	157:4 162:4
20:17 23:22	127:19,22	233:24 245:7	170:2 176:3
24:1 25:16	129:2,16	245:17	177:12 194:21
28:17,18 29:5	130:13,15	draft 9:25	230:6
29:15 30:9,11	131:3,6 132:3	drafted 10:11	driver 24:14,14
31:19,22 34:17	132:6,6,23	drafting 10:23	24:18 25:7,24
36:4,9,12 37:6	133:11,16	11:3	25:25 26:9,17
43:2 46:2	134:3 135:9	dragged 57:23	26:21,25 27:12
47:18 50:12,22	136:2 139:20	drags 116:1	27:21 28:7,15
51:3,20 52:4	139:22 140:11		28:16 31:11,14

32:3 36:1,20 38:17 39:7,15 39:21 43:11,23 48:21 52:8,15 52:21,24 53:23 55:7,14,17 63:18,21 64:1 66:1 68:11 76:24 77:4,5 77:11,21,24 78:2 86:5,6 94:1 98:4 drivers 77:16 78:10 drives 108:12 163:18 167:19 195:6 235:25 236:1 driving 28:13 108:12 110:22 112:6 133:7 135:16 168:5 237:4 dual 182:4 due 30:15 117:15 163:23 duly 5:18 dumb 204:4 dunner 2:3 durbin 2:13 3:6 5:9,10 6:2,14 6:22,24 8:15 8:24 9:5 50:11 50:21 75:8,13 75:19 76:8,10	84:19 93:13 102:13 125:17 125:21,25 126:7 162:6,16 171:6 184:5,16 223:19 224:5 224:18 226:19 228:22 232:16 234:5 235:4,20 236:7 237:10 237:19 238:13 245:8,20 dynamic 207:19 215:14 dynamics 240:23,25	224:21 225:5 229:18 237:21 238:13 242:3 early 106:20 153:16 easier 32:10 131:19 171:10 226:23 easily 67:2,10 67:12 118:15 181:25 eastern 4:5 184:12,15 224:4 245:15 easy 102:4 120:10 200:2 233:11 239:24 239:25 eccentric 39:16 87:25 95:11,23 98:1,19 100:22 102:3 106:13 107:2 130:1 131:22 138:11 139:5 154:5,14 176:12 192:16 192:17 202:1 224:24 eccentricity 97:1 106:17 107:8 146:10 146:12 economically 223:14,18	edification 25:22 effect 80:22 112:9,20 114:23 177:7 193:17 effective 170:10 effectively 83:23 124:7 228:2 243:17 effects 173:20 efficiency 132:18 efficiently 18:8 eighteen 228:3 either 23:8,16 24:9 36:6,15 36:17 39:16 43:13,17 53:7 77:6 80:14 85:11 102:24 118:12 122:5 144:14 148:19 201:5 236:4 245:9 elected 217:2 electric 21:2 108:4 electricity 206:3 220:11 electronic 108:15,17 123:5 183:1 229:24
	e 3:1,9 4:1,1 171:10 247:1,1 earlier 24:7 33:12 37:5 38:3 49:23 54:18 57:1 70:14 80:21 88:10 92:12 94:16 98:9 104:5 111:14 124:5 127:15 131:22 138:6 146:16 151:18 152:7 156:15 157:15 161:12 180:15 183:4 194:10 216:8 223:1,12		

electronics 186:12 230:7 234:9 238:10 elegance 243:1 element 26:11 103:12 111:21 115:11 175:7,9 elements 51:24 73:2,5 87:20 88:19 89:4,10 90:21 107:14 116:4 132:20 157:14 179:6 182:17 183:19 183:25 eliminate 112:3 ellipse 85:24 98:21 ellipsis 192:18 ellipsoid 196:21 ellipsoidal 196:20 225:2 elliptical 85:24 98:21 email 248:17 emanating 62:3 embodiment 23:10 24:6 25:14 30:2,3 30:15,16 32:19 33:2,7,8,15 34:13 36:4,9 36:12 37:9,21 38:12 44:23,25	52:4,13 53:4,6 53:21,24 64:17 74:2,4,13 81:21 84:7 89:24 92:8 171:25 175:24 176:2 embodiments 29:24 37:11 171:21 188:11 201:20 employed 247:15,17 employee 247:17 enable 92:14 243:11 enabling 189:25 enclosed 248:11 encoder 111:22 endowed 211:23 ends 85:24 105:13,20,21 110:1,13 134:16 energy 21:20 22:8,13 24:22 32:4 205:1,25 208:1 214:1 215:16,17,20 215:22,23 216:6,10,12	217:12 220:6,8 220:22 223:13 239:4,7,10 244:15 engage 37:12 116:3 engageable 44:4 94:19 184:22 engaged 28:24 engagement 13:14 34:5 63:24 95:1 109:14 128:6 185:2 engagements 13:12,13 engages 36:21 38:5 43:8 63:21 64:1 81:23 106:2 engaging 28:15 74:7 103:10 109:11,12 122:12,16 engine 204:5 engineer 19:23 20:9 148:10 212:1 engineering 50:4 203:14 207:4,7 210:14 217:4 221:2 235:7 239:19 241:3	engineers 239:17 engines 99:25 208:9 enhance 68:11 enhancement 198:24 enhancing 69:10 entered 250:9 enters 215:10 entire 35:10 112:22 147:13 249:5 250:5 entitled 85:2 envision 60:6 60:12,23 68:9 equal 37:2 77:21 78:6 145:15 equation 98:16 146:25 216:14 225:7 239:16 equations 72:18 99:12 equipment 19:19 208:12 212:8,14 240:2 equivalent 106:24 109:22 124:3 ergonomic 72:19 78:17 168:19
---	---	---	--

ergonomically 70:20	exactly 13:9 43:3,25 44:15	185:12,20 189:22 191:18	17:18 20:18 23:24 25:18
ergonomics 40:4 78:21 101:21	44:22 59:2 87:10 101:12 110:12 203:24 227:12	194:17 198:14 199:19 200:3,6 206:3,7 213:6 218:8,12	40:7 42:21 46:4 84:12,13 84:16,20,23 85:14 102:6,7
errata 248:13 248:18 250:7 250:10,18 251:1	examination 3:6,7 6:1 224:12	221:17 226:3,3 226:23 229:7 232:22 234:3 238:3 241:11	102:10,15,22 103:1 126:17 158:21 162:20 170:23,24
esoteric 232:2	examiners 41:10	244:16,17,19 245:1	171:2,8 172:4 190:20 199:10 210:9 222:12
esq 2:4,13 248:5	example 13:6 19:25 22:20 29:2 34:2 35:1 35:16 36:23	examples 48:5 87:14 214:10	exhibits 8:13 17:15,22
essentially 111:19 158:10 168:5 182:24 193:20 225:10 225:11 226:7	44:3 46:9,16 53:13 54:1 64:17,22,23 68:19,20 69:11 74:10 79:13,22 80:5,6 83:1,2 83:21 84:7 87:25 89:5 90:2,20 93:25 97:7,7 99:9 100:3 104:15 114:6 118:23 119:10 123:25 131:15 132:13 138:17 139:7 146:18 149:20 160:15 164:13 174:23 175:3 176:2 178:13 179:15,25	exciting 212:13 excuse 44:13 54:15 60:11 67:20 75:16 96:23 97:13 110:16 128:11 158:19 167:17 181:13 203:10 221:8 229:8 232:4	existed 195:16 exists 42:1 44:25 90:9 exits 215:10 expedited 245:25 expensive 186:13 experience 41:1 45:7 170:17 203:18 209:23 expert 19:15 41:16 expertise 20:3 209:5 expiration 249:19 250:25 251:25 explain 99:21 128:16 155:24

181:17,21 183:15 explained 121:7 237:21 242:3 explaining 30:7 127:14 130:22 201:6 205:20 explains 113:4 explanation 25:21 112:10 112:17 183:11 242:19 explicit 137:10 explicitly 90:19 119:21 191:22 202:13,16 219:14,16,18 219:20 222:4,8 222:9,24 223:9 238:17 exploring 161:8 extend 147:8 extends 24:15 26:1 43:7 61:17 extension 103:23 104:2 105:9 115:19 115:21 external 17:8 19:9 extra 212:7	extract 205:25 216:9 extraction 208:1 214:1 217:13 extraordinarily 212:23 213:2 extreme 64:11 65:25 77:7 97:7 226:8 extremes 74:10 97:18 extruded 196:22 eye 101:11,11 eyeballs 210:5 eyes 60:6,12,23 62:4 f f 247:1 fact 95:9 161:20 163:23 169:24 239:8 factor 25:1 148:15 factory 1:5 4:17 5:15 12:19 13:4,11 13:23 16:3,19 16:23 85:4 248:6 249:3 250:3 faculty 203:15 fair 19:17 56:18 109:24	208:11,16 228:15 fairly 168:13 fall 101:17 116:13 familiar 84:20 family 192:22 212:3 far 16:14 111:25 194:23 195:8 farabow 2:3 fast 13:20 22:8 201:13 father 221:20 fcrr 1:24 247:22 feature 92:19 92:23 featured 163:1 features 39:16 89:3 92:14 192:25 feed 109:21,25 120:4 121:10 128:20 129:14 151:3 157:4,5 feedback 111:21 134:1 210:2 feel 10:6 19:3 32:17 64:25 70:20 78:22 99:2,2 101:20 118:10 123:9	127:16 138:4 177:20 243:6 243:13 female 80:17 109:13 116:20 fewer 168:21 fidelity 64:15 67:10 69:1,22 100:19 101:1 108:11 120:23 218:19 field 159:18 160:1 207:3 208:21 210:11 fields 239:18 fifth 128:2 154:16,17 figs 55:6 figure 12:2 19:20 25:16 26:19,22 27:25 30:2 33:19 35:24,25 36:10 36:10,24 37:1 45:20 58:1,1 61:24 84:8 85:17,18 86:3 86:3 89:18 91:20 94:8,11 96:16 98:15 100:23 107:18 109:6 113:21 113:24 142:18 142:19 171:19 171:22,24
--	--	---	---

172:8 176:1	200:18 245:4	177:13,17	117:14 122:25
178:1 184:19	248:11	178:9 179:9	123:2 124:10
184:20 185:12	fine 23:13,15	180:18 181:18	127:24 128:22
185:14 187:13	24:24 30:15,17	182:6,10	130:5,25 131:7
188:15,20,21	31:13,14 32:2	183:12 186:16	132:8 133:7
189:2,21,25	32:22,23 50:9	194:25 195:9	135:12 136:18
190:5 193:18	51:14,18 54:14	198:17 200:13	137:22 143:22
194:5,22	54:21 64:8,13	202:4 204:20	154:23 156:6
197:17 201:21	64:14 65:3,5,9	228:16,21	156:21 167:15
figures 29:16	65:10,12,15,16	230:25 236:4	179:11,19,22
29:19,23 30:1	66:6,6,12,19,19	236:17 237:3,6	181:14 191:5
30:8 31:9 33:9	69:4,7,10,24	237:8,15,24	191:13,20
33:15 34:17	70:3,4,4,7,15	238:11	194:13 198:22
35:6 36:5,13	70:18 73:17,20	finely 164:15	236:19
37:19 46:3,6	73:21 74:16	164:17 183:18	finest 98:11
46:24 48:10	82:24 85:7	226:17	finish 7:21
49:3,13 54:6	89:3 90:25	fineness 67:6	finnegan 2:3
54:10,23 55:22	93:3 110:19,24	68:11 71:24	5:14 8:3 15:20
56:2,13,17	111:15,24	72:12,23 76:12	finnegan.com
57:4 58:12,15	112:5,11,14	76:20 77:17,25	2:8
61:8,8,13 63:1	113:4 114:7,10	78:3,14,25	fire 213:2
63:17 64:4	114:18 115:5,7	79:8 80:10	firm 4:23 5:11
83:5 103:6	118:12 120:9	81:13 90:7	5:14 8:3 213:5
107:12 154:2	125:16 126:24	138:23,24	first 8:15 30:2
154:13 185:18	128:9,13,25	142:24 144:8	33:6,8 37:12
185:20,20,22	129:4 131:19	144:18 146:1,4	42:13 52:4,12
187:5,6	131:23,25	147:2 148:2,25	53:4,6,17,21
file 17:5,7	147:23 148:8	149:5 150:17	90:17 91:7,9
filed 4:17	150:4 151:9	215:2 228:6	91:13 115:14
filing 1:12	152:5,6,9	finer 11:7 14:7	130:8,8 131:12
finally 170:3	155:8 159:11	51:23,24 67:23	132:22 133:25
financially 5:1	161:7,9,13,21	70:4,12 71:1	148:5,18 151:6
247:18	162:5,23,25	71:12,16 74:18	151:13,14,21
find 51:17 99:1	163:3,7,8,12,23	91:3 97:24	155:17 156:10
197:9 200:17	164:7,11 165:8	101:1,1 111:2	157:25 159:3

166:23 172:12 203:20 204:9 221:18 240:10 240:12 fit 109:9 fittingly 189:6 five 50:13 67:2 67:3 93:4 214:19 245:25 fixed 28:19 56:5 80:14 86:12 flange 29:7,8 flash 206:21 flat 22:24 86:16 200:10 201:11 211:1,11 flew 14:17 flexural 207:22 flour 43:20 flow 24:20 32:10,11,13 117:3,11 149:20 169:4 170:6,11 215:6 223:2 flows 165:4 fluid 109:16 117:7 169:4,7 169:18 172:22 215:7,10,13 218:22 fluidic 169:17 fluids 216:17 218:21 239:24	focus 12:15 15:17,17,25 207:18 focused 17:20 23:20 focusing 215:21 follower 39:14 39:16,18 following 193:24 follows 5:19 42:7,17 foot 124:15 133:17 134:5,6 force 102:19 103:21,22 111:6,10 112:24 124:13 148:13 154:3 166:14 forced 32:6,24 forces 28:21 103:25 104:3 120:10 132:17 166:10 182:6,8 foregoing 249:13 250:18 forensic 19:17 forgot 12:10 227:12 241:9 form 10:3 47:22 48:17 49:6 53:19 58:18 61:20	63:4,20 65:9 66:15 68:23 71:20 72:2 74:21 75:24 76:5,15 77:19 90:15 92:6 95:8 113:11 114:9 131:11 131:15 134:10 134:21 135:15 135:17,23 136:6,11 140:15 143:1 143:25 146:7 149:7 163:10 164:3 185:10 187:1 192:13 195:23 197:23 198:9 199:3 202:21 203:4 216:12 220:4 228:23 242:13 format 42:18 formatting 10:15 formed 21:11 37:14 104:25 forms 22:4 65:12 67:22 229:14 formula 146:16 forte 209:16 forth 10:14,20 25:6 82:1 200:13 231:21	236:18 243:19 forward 85:11 189:14 242:10 248:15 found 18:17 19:5 139:24 170:9 199:6 foundation 228:23 237:20 four 210:12 fox 1:5 4:17 5:15 12:18,23 12:25 13:3,7 13:11,23 16:3 16:19,23 85:4 85:6,7,12,12,17 89:2,15 90:18 90:19,24 91:6 91:10 93:14,21 94:9 95:4,10 122:25 123:3 124:21 127:8 127:24 138:7 138:14,16,25 140:12,13 156:13 157:6,9 157:15,22 158:2,12,14 159:16 160:10 172:19 178:3 182:21 186:9 191:2,4 192:10 193:3,18 196:11,12,12 196:25 197:3
--	---	---	---

198:15,17 201:15,17,18 202:1 224:15 224:23 226:15 228:16,25 230:23 245:12 248:6 249:3 250:3 fox's 6:19 123:18 128:3 128:10,11,14 129:23 130:1 136:3 152:15 157:17 160:14 182:19 191:8 191:11 228:7 228:20 frack 208:18 fractions 73:10 frame 41:25 242:4,17 framework 59:19 fred's 192:2 free 10:6 19:3 240:4 249:14 250:20 freedom 100:16 freshmen 209:12,13 front 242:5 full 36:6,14 101:5 115:3 119:8 123:25 146:21 147:17	165:13 166:11 200:1,14 210:23 211:16 225:10 226:8 227:10 fully 74:5 fun 100:10 function 37:10 80:23 93:22 98:1,19 99:5 100:19 101:24 110:1 137:1 138:10 functionally 109:22 236:22 functions 33:21 168:6 fundamentals 100:8 132:12 233:19 240:3,5 241:9 244:18 funds 212:11 funnel 174:9 further 10:8 65:21 83:13 91:15 128:13 136:16 152:24 154:13 155:15 159:15 224:7 228:20 245:6 247:16 furthermore 123:5 furthest 96:16 97:5	g g 4:1 gain 68:14 169:18 gamut 20:10 233:21 gap 36:2 109:19 116:18 117:10 164:25 garrett 2:3 gas 208:12 gear 107:11,18 107:20,21,21 108:12,12 109:21,25 111:1 114:17 121:15,15,18 121:18,21,23 122:6,13,14,16 122:18,21 123:4 128:20 129:14,19 130:2,5 151:3 151:5 152:9 176:7,15,20,23 177:1,2,3 gearbox 176:19 geared 177:12 gearhead 204:6 gearing 183:1 gears 176:21,21 gee 12:8 14:11 16:10 41:19 232:24	general 76:17 133:9 192:22 206:20,22 231:17 generalization 147:25 generalize 147:14 generally 157:20 201:5 218:1 generate 206:3 233:12 generating 220:11 generation 204:16 209:2 220:7 generic 39:14 137:23 231:22 generically 106:10 gently 113:6,8 113:13 163:25 geometric 147:10 geometry 118:3 getting 83:14 143:3 186:2 231:19 giant 221:5 give 13:10,25 23:13 31:13,14 32:22 41:13 58:6,21 61:1
--	--	---	--

67:13 70:21 72:24 75:25 77:23 78:24 79:18 91:2 98:22 118:1 120:5 121:5,11 121:22 123:16 123:21 133:7 133:23 138:3,4 138:9 140:19 142:16 146:18 147:23 150:4 152:9 155:9,13 168:21 194:13 194:14 195:9 213:13 214:10 214:22 215:8 215:13 218:18 225:11,22 227:20 228:4 236:18 given 44:12 50:24,25 72:13 80:14 81:14 90:2 95:5 108:14 110:7 110:11 114:16 118:2,6 124:11 126:11,12 145:9 146:2,8 149:1 167:18 174:2 186:22 211:4 225:14 245:16	gives 25:6 32:2 32:22 54:19 70:15 92:20 122:18 153:17 154:22 198:17 215:1 236:17 239:15 241:19 giving 7:1 185:16,24 gloved 66:24 67:8 gloves 67:11 227:18 go 4:13 7:17 10:20 19:9 22:7 29:12 31:9 35:4 36:19 46:16 52:2 54:19 55:5 60:20 65:23 70:10 73:2 74:6 80:3 88:11,12 90:22 93:25 97:3 99:23,23,24 100:11 101:17 103:17 107:12 115:8,12 132:11 146:19 150:20 151:12 152:12,21,24 153:3,10,11,12 153:12,15,19 154:24 155:1 155:10,14	157:12,23 159:3 169:22 171:12 175:20 175:21,25 176:1 180:2 182:12 184:10 187:8,11,12,15 188:14,21 189:5 190:5,10 193:22 194:22 207:16 212:21 214:17 215:15 217:15 219:13 223:21 226:22 231:1 234:12 234:18 241:25 242:9,11 244:3 244:14,24 245:3 goal 38:16 goes 21:10 28:21 32:14 44:2 46:17 61:9 63:8 144:25 145:3 177:3 215:13 234:15 240:4 going 4:4 10:25 18:2 29:1,4 31:20 34:1 38:20 44:6 47:23 50:14 53:7 54:18 63:6 75:6 77:6 83:20 84:11	86:10 90:24,25 115:24 116:6 116:18,24 131:23 143:9 145:2,14 151:11 153:12 153:18 155:1 166:17,19 168:14 169:16 169:19,20 170:25 178:3 179:8 180:21 183:5,6,22 188:1 190:2 191:5 194:4,19 195:1,7 198:23 202:9 210:3,4 212:10 215:20 217:17 218:25 219:10 220:22 227:11,17 228:11 231:1 231:14 232:25 241:25 good 4:3 6:3,4 18:6 45:1 90:12 99:8 102:3 119:20 120:11 125:24 141:23 170:5 170:18 184:3,7 210:7,13 219:1 228:8,14 229:4 233:15 245:5
---	---	---	---

goodbye 18:3 governed 33:5 34:15 governor 247:9 grabs 112:4 graduate 244:13 granularity 14:8 graphically 139:3,12 233:15 great 221:1 greater 32:9 69:9 81:12 100:16 120:23 123:22 133:18 149:5 210:24 greatest 98:4 greatly 180:18 green 95:20 96:3 97:16 98:17 139:14 141:9 143:16 143:16 145:1,4 147:19 173:15 184:25 greenwich 234:19 grind 201:8,10 grinder 201:7 grinders 201:8 grinding 199:20	ground 22:9 91:7,9,13 104:6 grounds 190:18 197:19 198:5 198:11,17,21 group 191:15 groupings 155:17 guess 14:23 52:1 120:19 125:2 178:13 184:6 guy 20:8 guys 211:3 h h 2:13 3:9 ha 177:8 half 15:23 41:17 69:16 125:20 184:9 hall 50:14 93:7 hand 38:9 99:3 100:22 142:18 142:20 143:21 143:23 144:7,9 144:12 150:7,9 151:10 handle 22:20 27:3,4 170:6 194:23 201:23 202:4 237:18 handling 170:10 239:23	hands 47:19 48:1,6 hanging 35:6 46:13,21 96:10 happen 11:12 45:14 139:6 170:15 229:19 happened 12:8 happening 55:21 82:25 185:11 happens 42:13 139:4,9 221:4 happier 168:22 happy 9:12 171:9 191:17 hard 22:25 99:18 165:3 243:15 hardware 20:12 harnessing 220:10 harrison 234:18 harrison's 234:20 harvest 220:23 harvesting 223:13 244:15 hatching 174:14 hazel 211:24 head 19:8 60:22 62:1	176:15 213:12 213:12 233:6 234:23 headed 22:9 heading 165:19 hear 11:14 heard 4:10 hearing 16:21 heat 206:2 216:11 220:9 heavier 220:17 heavy 19:19 held 221:19 helical 101:8 131:16 202:24 help 61:23 226:4 helped 230:9 230:14 helpful 60:2 95:17 146:24 helps 60:12 henderson 2:3 high 69:8 134:7 170:11 209:20 237:17 higher 81:7,8 81:11 123:16 132:24 134:18 136:4 170:6,7 highfalutin 233:11 hillview 2:6 hinged 21:8,9
--	---	--	---

hire 212:13 history 17:6,7 100:10 234:24 hit 22:10 hitting 104:6 hmm 52:6 88:14 142:4 190:14 hold 30:21 40:8 54:8,25 84:14 95:14 115:11 150:20 151:12 155:22 158:18 187:7,15 188:6 188:19,20 190:21 200:8 200:17 holds 242:17 hole 28:22 208:18 holes 43:21 hollow 115:12 115:14,19,22 115:25 189:7 honesty 133:22 hopefully 18:8 209:2 hot 203:25 204:5 hour 7:18 15:23 50:6 60:20 92:25 125:20 233:9 hours 206:25	housing 154:19 huge 50:2 229:16 232:2 human 38:18 66:22 67:19,21 68:4 69:22 70:20,23 71:5 71:10,21 72:15 72:20 78:21 97:20 111:25 112:2,3 123:23 124:12 150:3,4 181:14 227:18 228:1 human's 97:20 hundred 230:6 234:7 hundreds 207:15 229:22 hurt 48:24 hybrid 21:3 39:22 hybrids 193:12 hydraulic 32:24 102:18 112:23 115:15 115:20 117:3 159:14,16 205:24 214:14 214:20 218:15 219:4 223:2 240:2 hydrogen 204:15 218:2	hydrostatic 215:4 hypothetical 133:20 134:10 140:15 143:1 146:7 hypotheticals 134:13 135:7	imagine 96:6 133:21 immediately 40:15 impact 20:4 imparted 156:20 implementati... 170:16 200:15 implementati... 182:17 implies 51:13 70:3,3 importance 159:11 important 47:6 221:25 importantly 214:25 improper 47:11 improve 128:13 182:20 228:20 inch 80:24 81:3 81:8,12 133:18 134:7 136:24 include 12:4 42:15 52:14 88:17 89:20 90:3 93:14 94:9 108:19 120:15,18 134:24 135:10 137:17 175:19 177:22
		i	
		i.e. 160:2 196:1 idea 212:13,14 221:1 identification 8:20 9:4 84:17 102:11 171:3 247:7 illustrate 140:5 193:21 244:23 illustrating 139:18 image 24:2,4 25:8 28:3 96:2 141:9,15,25 143:20,22 144:9 145:18 145:21 174:5 175:5 180:13 200:24 images 36:18 39:4 63:15 127:12,13 139:8,19 151:3 151:17,19 156:14 180:16 233:4	

included 17:14 29:25 89:5 130:16 139:10 204:22 217:11 248:13 includes 37:25 38:4 52:17 58:20 91:14 128:17 129:7 154:3,18 178:16 including 5:6 73:5 81:16 197:16 203:25 incomplete 133:20 134:10 140:15 143:1 146:7 incorporate 219:2 incorporated 30:5 250:12 incorrect 6:17 49:3 increase 108:10 128:24 129:4 130:2 146:4 147:23 151:24 180:18 181:12 181:13 199:16 231:2 increased 90:7 increasing 69:22 140:13 140:16 183:17	incredibly 243:9 incrementally 31:12 indefinite 51:9 independent 114:22 237:2 independently 82:18 indicate 35:21 37:20 46:21 59:11 119:15 indicated 180:7 indicates 65:2 119:17 indicating 26:6 86:9,16 173:14 248:13 indication 85:23 153:18 individual 198:12 individually 236:4 individuals 19:15 industries 230:12 industry 19:18 148:22 170:9 170:17 195:7 208:13 infer 56:4,9,11 56:15 57:2	infinite 53:25 54:4 78:2 106:13 148:8 177:10 207:17 infinitely 65:10 66:6 111:20 influence 7:4,9 27:11 information 59:13 61:1 87:5,11 175:13 194:14 224:25 240:15 inherent 129:21 148:14 150:6 inherently 67:22 69:3,7 89:4 110:23 123:20 124:10 128:22 131:24 132:7 135:12 136:18 147:22 149:5,11 150:3 150:8 181:11 192:14 initial 10:23 127:2 input 38:18 69:18 81:14,17 124:11 137:2,6 137:13 138:1 138:14 142:8 142:13,14 145:24 146:2	168:7 231:15 236:16 237:1 insertion 101:11 inside 52:20 88:21 205:21 insignificant 220:23 instance 147:11 instances 35:7 instant 147:7 instructions 6:8 instruments 208:10,11 integrally 37:14 integrated 182:1 intend 67:20 125:3 intended 67:20 215:14 intensive 177:9 intent 52:21 intents 86:21 89:9 128:25 183:8 211:2 226:9 inter 3:14 9:22 interact 165:9 interaction 16:14 26:24 67:21
---	--	---	---

interest 207:3 208:21 interested 5:1 247:19 interesting 204:3 231:12 231:15 234:15 interfaces 31:10 intermediary 55:11 57:24 71:23 90:1 183:9 intermediate 33:23 54:13 70:13,15 194:18 intermediately 178:6 internet 4:9 interpret 70:17 interrupting 99:22 intervention 112:7 interviewing 45:10 introduce 8:12 8:16 9:7 84:12 102:5 147:16 170:23 introduced 132:22 introduction 87:16 235:8	introductory 87:16 invent 232:24 inventing 236:25 invention 24:6 25:15 40:17,19 40:21,25 41:4 41:12,22,22 42:6,10,11,16 42:20 45:5,11 45:16,17 64:9 inventions 45:15 135:6 inventor 102:17 inventors 45:7 45:10 investigate 159:24 involved 12:18 19:12 20:14 67:15 68:1 166:10,15 203:24 involving 16:7 19:25 146:25 ipr 6:18,20 12:7,13,16 51:5,17,19 ipr2024-00491 4:19 ipr2024-00492 1:15 6:19	irrelevant 199:21 ish 141:7 isolate 60:3 isometric 144:14 isometrics 141:17 issue 1:13 225:6 issued 247:8 issues 209:24 item 109:9 207:1 210:8 211:13 214:15 215:25 217:2 218:9,14 221:14	130:25 136:4 136:15 152:16 152:20,22,23 159:17 161:6 179:6,11 181:8 181:17 182:17 183:11 191:6 191:21 193:7 197:4 202:12 202:16 228:19 229:7,8 235:17 jp's 129:22 178:22 jp2516279y2 3:18 jr 19:11,22 20:8 judge 16:22 judgment 127:11 jump 22:7 jumping 168:25 june 203:21 junior 87:21 148:17 216:3 justify 221:3
		j	
		japanese 102:16,20,23 103:1,6,14 jill 1:24 4:22 125:25 247:2 247:22 job 209:21 233:22 jocie 216:2 john 20:7 jonathan 19:16 20:14 journal 222:16 jp 110:16 126:24 127:3,8 128:8,12,17	
			k
			k 1:24 239:12 247:2,22 keep 13:16 51:24 74:2,25 115:24 116:6 128:15 195:4,8 207:9

key 128:15 kids 235:14 kind 13:25 25:2 42:18 59:25 98:23 100:24 101:6 125:11 150:13 159:24 187:13 230:15 kinematic 221:21 kinematics 241:19 kluger 216:2 knob 23:12,17 25:3,4,12 27:25 28:11,18 28:22,23,23 29:7 30:3,16 33:10 34:15 37:10 38:4 53:11,23 54:16 54:22 57:7 64:18,22,24 65:2,24 67:5 73:21,22 74:8 74:13,15,16 81:22,22 82:2 82:3 84:9,9 89:25 103:9 119:12 knobs 168:20 168:21 know 7:20 8:8 10:14,19 11:5 11:12,20,24,24	13:15,18 14:5 14:16,19,23 15:23 16:13 18:7 22:24 45:19 48:3 51:10 55:21 60:16,16,19 61:2 63:6 65:16 66:18 70:5,9 72:8 73:4 78:6,8 79:24,25 87:4 87:7,13 90:23 91:1,5 93:18 93:21 98:15 118:17 123:8 123:10 130:18 130:23 134:24 140:20 142:10 143:13 145:11 146:11 148:17 149:17 150:10 155:1,5 166:10 168:12 169:21 174:8,8,12 175:4 176:19 179:9,18 183:2 186:4 187:21 192:1 194:23 205:2,5 207:15 208:22 210:14 211:10 212:7 212:10,23,24 213:11,14 216:18 218:20	220:2 221:6 222:17 225:1 227:18,19 228:9 232:24 233:8 235:7,9 235:10,12 240:6 243:24 244:12 246:1 knowledge 131:1 known 40:20 41:24 45:25 66:7 152:14 181:23 183:19 195:24 202:16 206:16 228:19 230:21 231:7 232:2,4,15 233:1 234:3 235:2,17 knows 132:2 I label 86:17 labeled 25:2 26:3,18 27:6 28:14 86:3 88:9,25 89:17 89:18 94:7,11 102:14 110:2,9 173:8 176:11 lag 9:15 land 22:6 landed 125:15 large 220:14	larger 107:20 122:21 145:21 largest 134:6 lasts 207:13 late 14:17,19 latest 101:9 lathe 199:19 200:3 201:6 latitude 211:5 laughter 62:21 launch 209:14 law 5:11,14 8:3 213:5 239:3 lawyers 41:14 45:9 lead 69:8,8,15 118:22 130:5 145:25 leading 224:19 226:20 228:23 232:17 235:5 235:21 236:8 237:20 learn 209:22 leaving 124:25 lectures 233:21 left 25:11 28:2 28:13 29:2 34:6 36:17 57:23 58:22 63:25 70:24 71:10 94:5 97:6 100:22 141:8,15 142:1 142:18 143:5,6
---	--	--	--

143:21,23	lever 23:9,11	116:13 138:20	61:17 65:23
144:9,13 173:2	23:16,17 24:7	173:6,10,17	94:5 128:2
173:21,23	24:10,12 27:3	175:14 178:2	147:12 154:16
174:5 212:3	27:4,10,13,17	184:18 185:7	154:17 173:19
224:22	27:20,24 28:5	186:3,6,23	184:4 189:5
leg 35:11,11	29:11 32:20	187:7,12 189:1	240:12 248:13
legal 10:14	33:3,21,22	189:2,9,24,25	250:7 251:3
177:25 209:9	34:2,6,12,13,18	190:5,6,7,10	linear 78:20
248:1 251:1	34:25 35:8,22	225:11,15	79:11,12 98:14
legos 235:15	36:8,21,23,25	226:13,18	99:13,15 100:1
len 230:11	37:25 38:18	227:7,17	100:12 101:7
length 146:17	44:3,12,13,14	lever's 56:8	107:6 124:4
243:6,17,20	45:21,22 46:7	57:6	129:10 131:15
leonardo	46:8,22,23	levers 58:15	131:20 137:6,7
234:12	49:4,14,15	189:3	137:24 187:2
lesser 114:4	51:8 52:18	lewis 2:12 5:12	193:12 203:5
117:15 161:13	53:16 54:11,24	lewisrice.com	218:10 230:8
letter 248:19	55:23 56:1,3,5	2:17	231:11,15,20
level 71:1,12,16	56:8,12,16,20	liberty 206:14	231:20
76:12 77:17	57:3,10,14,21	life 13:19	linearization
81:13 88:1	58:3,14 59:4	207:17	100:7,17
111:2 118:12	59:11,17 61:11	lifetime 41:5	linearize 98:22
122:25 123:2	61:12 63:2,22	light 62:3	lines 31:13
130:8 137:16	67:5 68:2,23	170:20	150:14 176:17
142:24 146:1,4	74:4,12 85:19	likely 168:23	181:22,22
147:2 148:18	85:21 86:1,10	limit 89:7	link 242:13
148:25 179:12	86:12,23 88:5	limitations	linkage 241:13
179:19 208:20	88:15,23 89:11	229:2	241:18
208:24	89:16,21 90:5	limited 111:21	linkages 243:10
levels 74:18	91:15,23,25	148:4 198:18	244:14
76:20 144:17	92:13,15 93:24	limiting 148:14	linked 99:9
149:5 162:2	94:12,15,22,25	182:18	links 241:14
166:14,18	95:5 96:9,10	limits 44:16	liquid 244:18
169:25 170:7	96:11,18 97:11	line 26:4,18,22	245:3
170:11	97:20 109:22	36:20 55:5	

list 211:13	lockout 22:22	140:2 141:16	151:7 173:8
listed 204:23	23:2 24:9	141:17 147:21	176:9 181:10
207:1 210:8,16	32:20 33:23	150:9,24 159:4	loop 31:25
213:19 222:14	51:11 54:1,2,3	159:22 162:9	118:5
223:9 250:7,17	74:4 77:7 97:9	174:22 175:21	loose 134:16
listen 122:2	224:17 225:10	176:8 177:8	lose 209:15
listening	226:7 227:10	178:1 179:24	241:17
190:14	locomotive	185:12,17,22	loses 239:7
listing 250:7	100:4	187:6 188:25	loss 239:10
literally 229:23	logic 31:10	189:11 193:14	lost 20:1 219:6
little 14:5 26:10	long 6:8 50:11	193:25 194:11	239:5
32:16 35:11	93:2 208:18	196:13 200:6	lot 13:16 14:5
84:14 89:7	213:9 234:1	210:4 214:14	20:12 41:20
96:24 97:11,12	240:12	217:20 218:8	51:23 99:1
97:19,21 102:8	longer 30:3	220:19 229:3	177:20 188:4
131:13 187:9	184:10	229:15 230:2	204:14 207:25
189:20 200:21	longitude	230:22 243:9	208:10,23
200:23 211:9	234:17	looked 220:15	209:22,22
225:20,23	longitudinal	223:12	211:4 215:17
226:18 230:2	152:17	looking 37:19	217:14 218:10
live 58:25	look 11:14 25:8	57:25 58:2,7	218:24 222:18
200:4,5 201:7	29:11 34:23	58:14,21,22,22	222:19 225:25
llc 1:8 2:12	35:6 43:20	58:24 59:7,15	227:14 230:13
4:17 12:18	46:11 60:9	61:10,25 76:17	238:15
248:6 249:3	62:1,5,23	78:4 84:7 87:8	lots 41:6
250:3	66:18 68:15,19	96:20 101:6	louis 2:15
llp 2:3	74:23 80:4	114:13 120:6	love 108:15
loaded 64:19	86:20 95:9,18	120:21 127:11	211:19
lobed 39:6,17	96:1 110:21	137:20 142:11	loving 108:17
lobes 39:8	111:3 115:2	172:24 174:9	low 120:10
location 147:18	117:24 119:17	184:6 216:16	216:18 237:16
locations 148:5	127:10,14	229:5 234:23	lower 31:18
lock 53:7	129:11,16,25	241:11	115:16 141:15
locked 31:12	132:12 133:24	looks 26:10	143:22 144:9
64:10 109:19	134:13 138:4	79:3 145:13	144:13

lowered 115:14	140:22 147:25	map 74:14	mathematically
lunch 125:7	162:8 168:17	118:1	106:15 124:19
126:4	170:13,15	maps 42:12	170:14 239:11
m	172:10 187:23	mark 59:1	mathematics
m 239:12	198:20 207:12	211:16	88:1 135:1,2
machine 48:23	208:6 211:6	marked 8:17	144:2 146:21
48:24 87:20	221:23 223:22	8:19 9:3,8,19	148:6,20
106:21 132:20	229:11 230:3	17:18 84:13,16	216:14,24
199:20 200:10	233:8 239:8,21	102:6,10	223:2 238:25
201:14 208:5	241:22	162:19 170:24	239:20
216:9 240:23	makes 68:25	171:2	matter 4:17
machines 50:15	150:8 165:12	marker 59:1	5:10 6:6 10:1
208:6 221:17	201:13 219:12	market 123:12	11:4,17,22
230:5,5 240:25	230:12	125:2	12:5,8,18,22
madam 162:8	making 71:17	mass 205:22	16:4 17:19
248:10	113:17 114:23	206:8 216:14	18:16 19:12
made 43:12	199:16	239:2,12 241:1	20:15 127:2
72:23 76:19	male 80:17	241:23,24	247:5
104:1 113:12	109:12	massachusetts	matters 13:4,23
133:16 163:17	manual 112:6	247:9,11	maximum 54:1
163:25 199:18	152:17 153:4	master's	54:3 148:1
221:18,18	195:11	148:19	182:7,11
230:4 249:7	manually	material	mccauley 15:15
magnitude	152:25 153:2	174:14,15	16:16
123:22	181:3,3,3	materials 20:7	mdurbin 2:17
main 242:16	186:11 188:11	148:13 207:23	mean 13:17
major 221:16	188:14 238:6	math 106:25	16:9,11 40:19
222:2	manufacturable	206:10,11	51:22 57:15
make 45:15	134:25	208:4 220:14	58:5 59:7
68:18,25 73:1	manufacture	233:15 244:24	66:17 68:24
98:13 100:1	102:4 200:2	244:25	70:18 73:11,24
107:13 124:16	manufactured	mathematical	74:23 77:2,12
124:17 125:7	234:22	99:5 101:24	77:13 78:12
127:11 132:24	manufacturer	106:18 138:9	82:20 83:17
135:7,25	243:2	234:22	84:1 105:24

106:8 115:6 119:25 122:11 127:9 128:24 130:18,21 140:20 143:9 149:10 191:25 192:15 194:14 195:17,17,18 207:5 212:18 meaning 140:17 163:8 means 15:6 51:11 70:25 71:12,21 72:6 82:22 84:4 86:14 90:18 92:22 104:9,22 119:2,12 166:22 167:3 173:18 207:6 216:9 231:10 231:18 measure 66:13 66:17 78:3,19 79:11,14,16 80:12,25 mechanical 19:22 20:9 50:3 62:11 87:16 143:17 148:9 175:2 183:25 195:4,5 207:21 210:14 212:1,5 215:8 234:4 235:6,8	235:16 238:9 239:1 241:2 mechanically 123:15 mechanics 132:14 mechanism 20:4,8 21:12 21:13 40:14 43:9 48:8,19 48:20 49:21,22 50:1,2 52:25 59:22 64:16 69:1 72:10 73:15 78:8 81:18 83:8 87:8 88:7 92:9 102:19 103:21 108:21 112:24 116:15 118:22 124:15 128:19 129:1,5,13 133:21 137:20 148:16 150:7 152:18,19 154:4 159:25 160:2 167:22 167:22 168:24 182:19,21 187:2,10 198:23,24 202:3,25 207:9 220:24,25 224:15 235:18 237:1 238:12	244:5,19 mechanisms 49:10 66:8 79:5 100:10 114:19 120:2 127:10 138:6 159:20 164:7 164:21 166:17 169:1,12,24 206:19 207:21 207:22,23 208:23 209:15 210:15 214:7 217:1,7,8,11 220:12,13 232:6 238:16 238:22 244:15 media 4:14 medical 204:15 208:9,10 218:2 medications 7:5 medium 237:17 meeting 14:18 meetings 16:11 meets 229:2 member 173:20 217:3 members 205:21 membrane 206:6,22 memo 213:7 memories 219:1	memos 212:25 mention 157:9 160:18 161:4 mentioned 17:11 31:17 125:13 194:10 205:12 229:18 231:6 merely 140:12 merit 247:2 met 14:18 meter 80:5 michael 2:13 5:9 michigan 230:12 micromanipu... 214:15 218:14 microscope 73:21,25 74:14 74:16 mid 14:17 203:23 middle 54:18 83:6 115:13 midnight 47:25 48:5 midpoint 98:5 midway 115:13 225:24 midwest 248:17 251:1 mill 200:9 millimeter 81:2 118:23 119:4,5
--	---	--	---

119:7,9,13 120:7 millimeters 79:13 80:5 118:24 119:3 227:11,12,15 227:18,25 228:4 milling 200:9 million 14:2 millions 207:15 mind 51:9 62:22 mine 172:13 miniature 214:19 minimum 54:2 148:2 minus 96:23 145:14 147:1 minute 188:19 200:17 223:23 minutes 50:14 93:4 mischaracteri... 37:24 55:2,25 90:15 114:9 132:10 134:21 135:15 136:6 143:2,25 147:5 149:7,8 150:19 156:3,8 161:16 164:3,4 198:1 198:9 236:8,9	mississippi 72:7 missouri 2:15 misspoke 31:19 54:17 misspoken 56:25 mit 203:21 244:9 miter 177:1,3 mix 187:23 mixed 200:22 mm 52:6 88:14 142:4 190:14 mode 22:18 model 60:21 139:2,22 180:16 models 10:24 139:20 193:23 196:5,10 modes 22:5,16 23:15 modified 152:15 157:7 moment 15:16 171:1 monday 14:17 14:19 245:21 246:1 money 183:7 195:6 212:3,4 212:7,7 months 11:10	morning 4:3 6:3,4 14:17,19 50:6 motion 25:13 26:2,23 27:11 32:16,22 34:11 34:14 35:2 38:2,6 39:3,7 39:13,15,20,21 43:18 44:8,8,8 54:14 59:12 67:6 68:17,19 69:6,18 81:6 81:16 82:6 83:19 84:8,9 84:10 87:4,23 89:8 93:23 94:24 96:19,25 97:12,19,19,21 98:4 100:1,3 105:3 107:5 117:10 119:13 124:1 130:11 132:16 133:1,5 136:16 138:20 139:17 140:1,2 140:6,7,8,18 145:12,23 149:13 150:1,4 150:8,9 151:9 152:10 156:15 164:13 167:16 167:19,23,25 168:2 169:25 172:20 173:21	173:23 177:11 182:10 190:3 192:21,21 202:3,4 205:25 214:23 215:1,8 218:9,10,19,23 225:12,14,14 225:23,25 226:1,8,12 227:3,5,6,10,14 227:16,20,24 228:5 231:3,11 231:11,12,15 231:16 233:2,2 233:3 235:10 235:10,12 236:16,17,19 237:1 239:1 241:14,19 242:19,24 243:16 motions 31:11 116:18 139:9 165:8 225:11 225:21,24 227:7 229:20 229:24 motivated 182:15 228:18 motivation 195:4 motor 104:11 107:23 108:2,4 108:6,11 110:25 111:6
--	---	--	---

111:12 112:3 123:6 152:8,24 153:3 157:3 163:18 174:22 174:24 176:3,7 176:8,13,16,18 177:7,12,16,16 177:19 178:10 181:4 182:25 188:12 194:7 194:21 206:2 238:8 motorcycle 21:3 motorized 152:19 mountain 21:1 21:6 22:23 108:18 168:12 244:17 movable 104:10 189:7 238:6 move 21:17 22:20 23:10 26:21 27:9,21 28:7 33:22,23 34:1,6 38:8,17 39:18 43:17 54:4 64:2 81:25 83:11,19 84:6 86:9 87:2 88:6,6 92:10 93:23 94:21 103:10 105:25	110:1 119:2 130:21 140:4 142:2,21 150:5 151:5,5,10 152:15 154:21 156:19 167:18 168:2 172:25 178:6,12,24 180:22 182:16 182:25 186:10 186:15 189:10 189:17 190:8 200:12 201:16 202:7,11 227:17 235:2 236:10 241:16 242:15 moved 25:11 35:14 43:13 57:11 71:22 83:23 94:3 103:9 167:24 186:3 235:23 236:13 movement 28:1 28:6 36:8,16 59:4 moves 21:12 24:10 63:25 74:8 87:10 94:7 106:2,5,5 108:13 115:25 116:7 119:7 163:19 173:19 174:5 242:10	moving 34:4 68:2 83:24 85:11 103:11 104:13 111:7 115:22,23 119:19 150:2,3 188:2 195:13 202:13,16 203:2,6 235:19 240:23 241:24 242:15 243:19 multi 141:8 multiple 33:21 80:2 116:18 museum 234:19 mystery 183:24 n n 3:1 4:1 nagai 91:2 131:1 152:25 153:5,9,16,24 154:1,14,17 155:15 159:14 159:17 178:13 178:23 181:24 195:12 197:11 197:15,17 202:9 238:5,5 nagai's 154:2 180:24,25 181:24 182:2 182:13,15,18 186:14	name 4:20 5:9 15:19,22 69:12 102:17,21 215:24 234:18 248:6 249:3,4 249:15 250:3,4 250:21 named 106:19 222:20 names 85:15 naming 54:19 nanoradians 73:10 national 217:3 nature 98:2 137:21 169:3 nautilus 101:9 101:13 197:16 near 145:13,17 148:7,8 nearly 177:9 necessarily 98:20 131:4 necessary 144:5 need 7:19 10:8 19:2,9 50:12 51:5,18 54:25 61:1 70:25 71:12 73:7 79:25,25 80:3 81:15 89:24 90:8,10 91:18 93:2 100:18 101:5 105:11
---	---	--	--

114:21,25 123:7,14 127:9 132:4 134:12 138:4 152:6 155:5,14 161:7 164:19 166:19 168:10 169:24 170:8 175:5,12 178:10 179:1 181:4 182:25 204:20 209:24 215:19 227:14 238:11 246:2 needed 17:9 18:18 19:5 20:10 127:17 238:5 needle 101:11 109:1,6,8,11 112:12,13 115:8 116:2 117:5 163:14 164:23 169:15 170:4,11 needs 20:3 22:14 167:24 neither 247:14 never 60:24 108:16 217:10 new 21:2 205:7 211:1,4 217:9 219:17,25 221:16 222:3,6 223:6	newcomen 100:5,6 nice 67:11 93:1 103:3 183:9 216:17 239:22 244:6,16 245:22 nifty 216:21 night's 18:6 nominal 68:3 nominally 141:19 201:18 227:23 non 49:11 58:10 60:1 180:6 nonlinear 83:21 97:24 131:24 192:19 196:22 209:14 nonlinearity 241:17 242:25 nonsensical 134:1 144:4,6 147:9 noon 47:18 48:4 98:10 normal 66:23 notarized 248:14 notary 247:10 248:25 249:10 249:18 250:15 250:23 251:23	note 4:6 8:10 125:4 248:12 notes 233:18 noticing 5:8 november 1:12 232:11,15 235:2 number 4:19 6:16,19 26:3 31:17 53:25 65:1 72:25 78:2 80:9 81:7 81:11 121:12 121:15,18,19 137:10,14 138:3,4 188:20 214:14 215:15 218:21 221:17 248:7,13 numbered 94:18 numbering 83:3 numbers 9:23 13:10 72:17 121:5 155:6 187:16,18 190:11 229:17 230:12 250:7 numerical 201:12 nut 80:16 nuts 210:5	o o 4:1 oath 4:24 5:18 7:13 objected 75:21 objection 37:23 46:25 47:21 48:16 49:5 53:18 55:1,24 58:17 61:19 63:3,19 66:14 71:19 72:1 74:20 75:23 76:1,5,14 77:18 90:14 91:16 92:5 95:7 113:10 114:8 131:10 132:9 133:19 134:9,20 135:14 136:5 140:14 142:25 143:24 146:6 147:4 149:6 150:18 156:2,7 161:15 163:9 164:2 177:24 185:9 186:25 192:12 197:22 198:8 202:20 209:6 220:3 224:18 226:19 228:22 232:16 235:4,20 236:7 237:19
---	---	--	--

objections 5:2 76:6 144:11,22 234:5 237:10 objective 66:12 66:17 obvious 121:6 121:12 179:4 183:21 obviousness 198:16 199:5 occur 98:5 158:6 occurred 204:23 october 1:21 4:5 247:5 248:4 offense 134:2 144:3 offer 51:3 122:24 179:11 191:18 offers 74:18 110:19 office 1:1 4:19 222:21 official 249:15 250:21 officially 211:23 offshore 73:11 205:12,18 216:6 220:14 221:5	oh 30:7 46:12 54:12 55:18 105:1 109:4 120:21 155:7 177:5 190:25 200:16 ohio 248:2 ohta 102:16,23 102:25,25 103:4,8 104:17 104:22,23 105:15,16,19 108:19 110:18 112:10,22 113:4,21 114:3 114:7,13,18 115:3 117:13 117:18 118:13 119:15,21 120:3 121:14 121:16,20 122:5,24 123:2 123:15 127:4 127:24 136:15 137:8,11,12 138:2,24 139:24 140:12 149:12 150:25 151:15,22 152:4,6,8,23 155:23 156:10 157:10,13,20 158:4 160:10 161:12,23,24 162:5,18	165:16 166:7 167:3 168:9 169:13,14 170:25 179:11 179:14,18 181:5,9,17 183:11 186:10 191:6,21 192:10 193:7 197:4 198:14 199:1 202:12 202:15,22,23 203:2,6 228:19 229:8 230:23 235:18 236:25 237:2 238:3,8 ohta's 107:10 109:25 110:7 110:11 121:3 122:3 123:18 137:18 150:17 156:11,19 160:13 180:21 237:6,8 oil 24:20 31:16 32:5,10,24 115:15,17,20 115:20,21 117:3,11 154:10 165:4 205:25 208:12 215:7 oilfield 19:18 209:19	okay 8:10,11 8:14,21 9:14 15:9 20:21 22:4 23:25 25:25 29:15,22 31:5,20,24 33:17 40:8,9 42:22,25 43:11 44:1 46:5 50:10 54:8,9 54:25 55:8 56:2,24 62:11 62:22 63:5 67:24 69:9 75:4,7,19 84:18 85:5,10 93:6 95:18 96:1,13 99:23 100:13 102:8 102:12 103:5 107:15 110:20 112:25 113:3 113:22 115:4 115:17 118:24 122:23 126:1 126:18,22 129:18 131:12 141:3 144:16 145:17 150:20 150:24 152:11 153:11,13,24 155:7,12,22,23 158:1,18,22,25 159:6,9 160:5 160:8,25 161:3
--	--	---	---

162:21 165:5 165:14,17 166:2,5 167:2 170:20 171:4 172:5 173:14 177:5 181:20 185:14 186:21 187:6 188:6,21 190:21,25 193:16 196:9 199:11 209:18 213:18 215:3 215:14 216:19 217:22 219:10 219:13 221:13 222:13 224:8 224:20 226:21 227:3,8,15 228:24 232:21 old 217:8 230:14,17 232:7 older 211:3 once 11:12 22:9 31:19 114:24 168:10 181:10 186:15 207:11 ones 13:10 86:19 211:4 214:10 219:23 online 229:16 233:14,21 240:4 open 32:20 33:2,5 77:7	97:8,8 188:3 224:16 225:10 226:16,17 227:10 228:16 opened 8:22 opening 24:16 24:19,21,25 26:13 32:5,8 32:10,15,23 43:18,24 112:13 169:8,9 openings 44:1 opens 43:21 operable 153:1 operated 66:22 72:16 238:8 operates 25:21 53:1 92:9 operative 92:15 92:20 operatively 82:14 83:16,25 91:24 92:3 opine 10:12 49:7,9 108:14 opined 183:4 opinion 45:12 49:9,12,13 123:1 127:23 131:3,6 132:23 133:11 134:15 134:17,22 136:2 143:19 144:6	opinions 10:3,9 10:11 48:20 opportunity 219:8 opposed 68:2 151:9 168:16 optimization 120:13 optimize 125:1 optimum 182:7 options 238:1 orange 25:2 26:9 95:24 96:3 97:15 order 60:17 123:21 133:25 227:13 239:15 239:18 247:8 ordinary 87:12 209:10 org 212:16 organization 211:1,11 orientation 49:19,19 57:17 57:20 58:21 63:5,11,12,13 63:14 67:1 94:6 96:10 98:6 200:12 orientations 140:4 oriented 61:10 96:11	orifice 43:25 164:24 169:5 206:1,4 orifices 43:25 149:21 orthographic 62:13 oscillating 216:7 ostensibly 21:1 21:5 24:8 outcome 5:1 247:19 output 99:13 101:7,22 176:14,18 231:12 outputs 237:2 outside 35:13 overlap 20:5 own 19:7 25:21 39:25 41:9,13 60:21 62:12 166:6 192:3 243:21 owner 1:9 2:18 5:11 owners 41:21 p p 4:1 p.m. 50:17,20 93:9,12 126:3 126:6 162:12 162:15 184:12 184:15 224:1,4
---	--	---	---

245:15 246:4 packed 188:4 page 3:10 23:23 24:2 33:18 57:12 58:23,23 59:1 88:12 91:20 95:13,18 104:17,21 111:4 112:16 112:22 115:3 115:13 116:7 127:1 129:25 141:2,14 143:5 143:6,21 144:20,23 151:3,12,14 152:3,12,13 153:14,19 154:24 155:14 155:14 156:14 157:23,24 158:3,6 162:18 162:21 163:1,4 165:16,17 172:3,5,7 173:2 174:6 180:2,9 184:20 185:18 190:19 190:22,24 193:15 200:6 200:25 203:10 207:2 210:9 211:12,12 213:16,20	217:20 221:8 221:11 222:11 224:21 229:1 232:23 233:4 248:13,15 250:7 251:3 pages 139:3,23 153:12 155:6 158:17,20 193:24 196:6 197:1 200:22 201:3 paid 13:11 palo 2:7 8:3 paper 8:23 9:9 9:12 62:2,2 174:19 215:25 216:20 223:15 papers 84:15 222:24 223:9 paragraph 37:8 42:20 43:1 95:19 100:23 111:4 112:9,17,19,22 115:3,6,13 126:16,23 128:1,16 129:17 150:22 151:14 152:3,4 152:13 154:1 154:12 155:5 155:23 157:3,9 157:17,19,22 158:15 159:4	159:10,12 160:4,9,12,18 160:22,24 161:5 166:23 167:13 179:3 181:20,21 182:13 183:15 189:5 190:23 196:14 199:9 paragraphs 127:25 150:25 155:9,18,21,24 157:1 158:19 158:22 parallel 62:4 pardon 167:7 park 2:5 parse 198:10 part 10:16 20:25 38:7 95:20 114:25 157:5,8 160:16 199:23 233:22 239:11 250:9 partes 3:14 9:22 partially 240:7 participants 1:18 4:9 particular 38:23 44:19 87:5 93:21 108:24 113:17 152:8 169:4 175:24 180:13	187:12 189:2 203:25 204:18 208:9,15 210:13 213:21 216:20 219:5 221:15 particularly 40:3 220:16 parties 4:13 6:7 12:17 17:24 247:15,18 partner 213:5 partners 213:7 parts 230:1,2 230:13 party 4:25 12:21 pass 172:12 233:23 240:14 passage 115:17 115:21 154:11 passages 32:13 215:13 passes 115:16 115:20 173:9 past 171:7 205:6 patent 1:1,3,11 3:11,15,16,19 4:18 5:11 6:20 9:1,22 10:4,7,9 10:10 13:5 15:1,6,7,10,13 16:8 17:6,7,7 20:11,20,23
---	---	--	--

21:21 22:2 23:14 25:17 29:17,25 30:13 30:20 33:9 36:5,14 37:18 40:6,12,16 41:21 42:15,21 45:5 46:4 48:18 53:15 54:7 65:14 66:22 74:3,25 84:2,24 85:1,3 85:6,8,12 89:24 90:18,19 91:6,11 93:21 94:1 100:25 102:16,20,23 103:1 104:14 135:20,20 153:17,21 156:13 171:5 171:16,18 172:19,20 175:22 201:21 201:21 214:16 224:15 226:15 232:10 patent's 177:23 patented 208:23 patents 10:10 13:7 14:16,21 17:4 41:9,14 45:8 103:7,14 137:15 149:3	191:25 192:6 195:18 204:15 214:18 217:15 217:24 218:5 219:14,18,22 232:6 pause 60:14 82:10 150:23 185:15 187:20 190:16 200:19 pay 211:9 pedal 22:25 243:7 pedantic 73:24 131:13 peer 222:16 peers 216:21 pending 7:22 people 16:23 40:4 79:23 171:9 210:13 217:6 226:4,24 232:8 234:24 perfect 148:6 239:5 perform 18:15 18:20 performance 70:22 98:24 99:4 118:8 140:10 period 11:13 203:17 perpendicular 141:20	person 11:6,11 11:19,25 12:2 20:2 66:23 67:1 87:12 101:23 106:19 191:17 209:10 210:2 216:4 234:17,21 235:1 240:12 personally 249:11 250:15 personnel 203:15,18 perspective 58:14 61:3,11 61:15,16 petition 6:20 petitioner 1:6 2:10 16:3,19 phase 151:14 151:21 phd 1:20 3:5,13 4:16 5:17 19:22 247:4 248:8 249:4,9 250:4,13 251:20 phds 20:9 232:6 phenomenal 234:23 phone 16:12 125:7 248:3 phonetic 171:12	phrase 76:7 physical 49:9 140:17 174:24 226:4,24 physically 10:21 135:1 174:15,16 physics 49:8 pi 81:5 pick 32:19 47:23 73:4 118:3,9,20 119:4 120:9,12 121:6 125:1 145:10 227:11 picked 147:6 pickup 204:4 picometer 73:13 picture 85:22 95:12 119:23 134:14 200:16 pictures 46:20 120:6 233:6,8 240:6 piece 92:18 147:19 164:6 pile 171:1 pinion 107:19 107:20 108:7 121:24 122:3,7 122:12,16,20 152:9 pink 156:16
--	--	---	---

pipe 116:14 piston 43:8 100:1,2 214:21 215:1 218:18 219:11 225:21 225:23 226:1 pistons 218:15 218:22 223:2 pitch 34:23 37:3 60:16 68:18,20 80:7 80:15,23 81:2 81:6 106:13,17 107:7 118:22 118:25 119:5 120:3,8,9 121:9,23 122:17 130:12 136:25 137:1,8 137:11,18 150:10 pivot 242:7 place 4:12 151:6,11,13 192:5 places 153:7 192:8 plain 174:19 plan 62:14,16 62:25 63:9,15 144:15 planar 48:7 49:22,25 59:22 plane 59:25 231:20	plate 43:19,21 43:22,22 116:20 plates 43:19 165:3 169:5,16 170:4,6 play 60:20,21 212:7 playing 235:14 please 4:6 5:3 7:20 8:8 15:11 20:17 23:22 29:15,18 37:6 40:5,10 42:19 46:2 54:5 62:24 65:17 74:3,25 85:1 85:16 95:16 103:3 106:10 112:21 113:20 122:2 126:15 126:19 129:16 141:1 144:14 153:20 155:10 155:20 158:16 159:4 160:3,23 162:17 165:15 165:18 166:21 170:12 172:2 180:4 188:22 190:17,24 193:14 196:4 198:3 199:8 202:14 203:9 213:15 217:20	221:7,10 222:10 245:23 248:11,11 pleasure 168:22 plunger 139:11 139:16,17 140:6,8 143:10 145:6,12,19,23 149:15 156:16 plungers 149:19 plus 23:17 49:8 Pods 221:19,20 point 19:2 21:10 62:7 101:14 117:25 118:4,8,20 119:20 120:1,8 120:13 121:9 121:13 138:13 138:22 145:6 155:8 182:11 195:25 214:18 223:17 229:6 231:5 242:7 pointed 158:8 pointing 26:5 31:17 34:18 47:3,19 48:1,2 64:20 points 46:23 65:7 66:10 132:1	portion 28:14 112:12 163:12 163:14 180:6 portions 10:21 158:8 208:8 posita 66:4 87:8 117:25 119:18,24 120:7,12,21 121:6,12 125:1 127:10,14 128:2 130:21 130:23 132:2 135:5,5,11 136:3 137:19 138:5 140:23 147:20 148:21 148:24 150:12 151:7 152:14 156:23 176:14 176:18 177:8 179:4 181:10 181:23 182:14 183:16,21 191:9,12 209:4 209:10 228:17 229:4,10 230:22 232:5 positas 131:2 135:3 position 22:21 22:21 23:4,6,9 23:11 25:7 26:15,17,18 27:24 28:5
--	---	---	--

32:2,3 33:3 34:2,3,15,21 35:7 38:17 44:5,12,15 45:21,22 46:7 46:9,10,13,13 46:17,18,22 47:4,14,14,17 48:6,11,21 49:2,4,16,20 52:22 53:7,8 53:22 54:24 55:11,12,14,16 55:23 56:8,10 56:12,16,21 57:3,6,11,15,16 57:18,19,21,24 58:16,19 61:12 63:2,6,8,12 65:1 70:13 74:5,5,6 76:24 76:25 77:3,11 77:15,21 78:9 78:16 80:15,18 80:19 82:20,22 82:24 83:1,6 83:10,12,15 86:11 95:2,5,6 96:8,12,16 97:5 98:16,17 98:18 110:7,8 110:11,12,24 111:7,8,13 119:3 145:17 147:11 185:4,6	185:7 186:22 186:23 187:3 188:25 200:8 201:24 225:18 226:13,13,17 226:18 228:17 237:4 positioned 221:21 positioning 31:13,15 63:18 101:15 174:3 positions 24:9 33:24 34:3 35:20 48:12 51:7,12 53:2 53:14,16,25 54:11 55:7 65:25 66:1 67:9,13 70:13 70:16,16 74:11 77:23 78:1,2 82:17 90:1 94:25 98:11 111:9 138:18 139:12 175:23 178:6 185:16 185:24 186:5,7 194:6,8,21,25 224:16 225:9 226:8 227:2,23 228:1 237:16 237:17,23 positons 97:23	possible 59:6 59:21,23 101:2 124:20 128:10 132:24 181:19 183:13 potentially 40:2 power 32:14 212:20 216:6 powerpointic... 193:21 practical 124:20 136:10 170:16 practically 148:9 practicing 135:6 precision 106:21 207:4,6 210:14 predetermined 65:7 predicted 183:4 prefer 85:15 preferred 15:11 102:21 preparation 14:12 17:13 preparations 14:25 15:12 17:2,17,24 prepare 18:4	prescribed 247:8 present 5:5 8:5 8:9 31:7 president 212:25 213:1 pressing 182:2 pressures 170:7 pretty 42:12,12 68:4 148:23 170:18 172:14 233:8 prevent 7:1,6 previous 12:3 29:6 34:13 37:10 104:16 219:24 236:9 previously 8:17 9:8,19 29:24 84:12 102:6 170:23 primarily 16:16 22:17 127:13 primary 15:25 89:10 209:1 principal 207:3 principally 207:20 prior 10:5,7,10 14:16 17:4 18:15,17,20,24 41:11 101:3 103:18 132:10
---	---	--	--

134:21 135:21 147:5 149:7 156:8 158:7 161:16 164:4 195:16,18 197:18 198:4 234:6 priority 232:10 probably 11:6 11:10,18 14:14 14:24 21:2 41:8 45:2 123:11,21 125:10 191:17 223:24 228:11 234:8 problem 40:23 40:24 42:1,4,5 42:9 44:10 72:3 73:14 103:18 104:9 104:18,23 165:19 166:7 166:22,24 167:4 procedure 249:5 250:5 proceed 6:11 6:21 proceeding 5:3 proceedings 246:3 247:13 process 10:20 156:22 222:3	processes 221:16 222:7 produce 71:6 118:6 198:15 225:20 produced 247:12 produces 206:17 product 124:18 191:15,18 production 218:2 248:15 248:17,22 products 208:7 208:8 221:16 222:3,7 professional 123:10 172:15 191:19 professor 209:1 210:20,20,21 210:22,23 211:2,16,20,22 212:4,6 216:2 216:3 233:22 professors 240:13 professorship 211:25 profile 141:8 program 229:17 programs 99:8 99:10 233:14	progress 205:16 project 149:1 projecting 96:15 projection 62:13 promised 125:4 promotion 211:8 pronounce 171:9 pronounced 15:19 proper 133:13 133:14 proposals 212:10 proposed 140:11 156:1 160:10 protruding 176:12 provide 81:8,12 99:13 101:7 117:21 129:3 131:7 133:17 134:7 138:23 163:7 167:3,14 183:10 212:4 224:15 231:14 236:4 provided 18:18 18:22,23 87:14 114:7 118:12	195:14 196:5 247:7 provides 21:6 33:21 117:14 127:24 132:8 135:12 143:21 149:4 161:12 161:21 179:18 228:16 providing 65:25 167:4 public 247:10 249:10,18 250:15,23 251:23 publications 205:3,7 232:7 publish 230:18 230:19 published 205:13 223:6 pull 29:13 82:9 152:18 pulled 204:11 pump 206:5 punch 201:7,8 pure 39:17 107:6,6 148:6 195:3 purely 72:16 purple 24:11 purpose 182:4 212:24 purposes 86:21 89:10 128:25
--	--	--	--

177:10 183:9 211:3 226:9 push 29:1,4,5 29:13 53:12 69:14 105:13 105:19,21 106:1,6 108:23 109:7 110:1,12 111:9,9 116:8 116:10,12,14 117:10 129:12 133:3,6 151:23 152:18 165:4,9 pushes 28:16 149:14 181:1 206:6 214:21 214:22 pushing 29:7 29:10 put 6:15,17 40:1 42:6 45:9 76:6 124:2 135:4 142:21 157:6 159:25 170:25 174:14 174:16 199:1 199:22 202:9 209:17 230:15 241:20 putting 68:12 128:23	question 30:6 31:3 50:23 51:8 52:2,10 55:19 57:1 58:4,10 62:24 66:16 70:2,15 70:17 71:8 73:24 74:15 75:20,23 82:12 105:17 122:9 126:9 135:18 141:22 145:2 153:8 157:15 157:21 158:9 163:12 164:5 165:12 186:19 190:15 191:25 198:2 202:14 211:16 219:8 233:25 234:1,6 237:11 questioning 184:4 238:14 questions 6:9 7:7,14,22 18:8 75:6,6 76:3,4,4 76:7 144:3 150:14 158:13 165:25 223:21 224:7,10,20 245:7 quick 93:1 quickly 148:23 212:15	quite 20:12 102:2,3 203:24 207:25 208:10 217:9,14 218:10,20 225:25 228:13 quote 207:16 r r 4:1 205:17 208:23 247:1 ra 146:17 radial 104:10 116:8 radians 79:17 81:5 radii 146:18 radius 106:17 107:8 134:4,6 145:13,16,20 145:21 146:3,9 146:11 147:3,6 147:8,15 225:6 240:17 241:12 radiuses 146:25 railroad 100:4 raise 213:14 ramp 229:8 range 53:15,21 53:22 67:5 73:13 89:8 111:20 118:6 124:1 133:4 169:19 200:2 208:8 227:3,4	231:3 ranges 207:19 208:5 rank 210:18,24 211:13,23 ranks 210:16 rapidly 153:12 rarely 45:8 rate 12:1 73:6 rather 13:19 37:18 146:24 ratio 108:10 111:22 120:11 121:18 122:14 122:18 123:4 176:22 177:3,4 ratios 164:20 rattle 239:9 rays 62:3 rc 240:19 reaction 38:17 read 6:16 17:3 18:7,7 19:4 29:20 30:22 37:8,18 41:11 41:20 42:23 43:5 44:21 45:8,15 55:3 65:18 82:11 105:22 107:25 113:1,12 114:1 115:18 126:18 126:20 141:4 154:15,15 159:1,7 160:5
q			
quality 4:7,8 quantify 118:11			

160:6 161:1,3 165:18,21,23 165:24 166:1,3 166:21,25 167:2 168:9 178:18 187:24 188:8,17 196:7 197:13 199:12 199:14 249:5,6 249:12 250:5,6 250:17 readily 128:3 152:14 181:23 191:10 reading 10:9 56:23 104:17 105:1 127:12 128:16 155:4 248:19 ready 56:24 real 15:21 49:11 193:23 210:2 217:1 233:10 reality 49:10 realizable 135:2 realizing 215:19 really 45:14 70:5 100:18 102:4 110:23 110:24 132:19 178:9 204:5 206:22,24	212:18 215:19 216:21 218:3 219:12 221:5 221:23 234:16 238:10 239:25 244:5,5 realtime 162:7 247:3 rear 21:7 187:14 242:7 242:13,14,15 242:20,22 243:4,16 reask 55:19 reason 45:4 248:14 250:8 251:3 reasonable 92:25 100:19 rebound 22:13 23:19 103:25 110:6 114:20 149:17 162:1 164:9,24 165:7 166:9,13 167:23,24 168:15 169:2 187:22 189:19 190:2,6 235:25 236:5,13,24 237:8 recall 13:9 15:24 16:9,11 17:12 31:25 111:14 224:20	233:6 238:19 receipt 248:18 received 11:21 13:22 receives 108:7 recent 57:13 155:18 recently 6:5 recess 50:18 93:10 126:4 162:13 184:13 224:2 recipe 170:19 recite 146:20 recollection 12:11 16:15 record 4:4,13 5:7 6:15,18 8:10 9:13 20:12 37:24 50:17,20 55:2 55:25 62:18 90:15 93:9,12 114:9 126:3,6 135:15 136:6 143:2,25 149:8 150:19 156:3,8 162:10,12,15 164:3 184:12 184:15 198:1,9 203:15,18 224:1,4 236:8 245:15,18,19 247:12,13 250:9	recorded 4:11 4:15 247:6 recording 4:8 4:12 recross 245:8 red 139:11,16 143:10,16,16 145:6 redirect 224:10 reduced 239:1 reduction 111:1 176:20 refer 15:9 18:24 20:19 84:25 85:12 95:15 125:6 127:8 171:8 196:23 219:10 reference 19:10 62:12 85:13 91:10 129:19 185:19 199:7 228:19 237:14 248:7 249:2 250:2 referenced 17:4 17:22 19:7 106:22 249:11 250:15 references 18:24 91:2 124:23 159:20 197:19 198:5 198:12 199:6
--	--	---	--

referred 20:19 85:6 96:4 162:19 219:3 referring 37:4 85:13 127:4 161:6 180:19 200:25 refers 103:1 refill 50:15 refine 136:16 refinement 136:20 reflect 203:18 reflected 129:24 refresh 65:17 refuse 75:5 refused 75:20 regard 12:12 regarding 10:11 15:1,13 16:3 157:1 regards 158:14 207:20 213:25 region 173:13 registered 247:2 relate 20:4 157:22 204:24 213:23 214:4 218:6 219:22 238:17 related 4:25 11:21 169:21 218:1 238:16	244:10 247:14 relates 214:24 relating 13:6 51:6 relation 12:13 relative 38:2 69:24 71:24 72:12 76:12 77:16 116:22 121:17,19,20 122:6,8,10,13 123:18 124:24 127:7,15 161:18 164:12 173:1 181:7 242:19,24 243:6 247:16 relevant 214:11 220:2 reliably 227:21 relieved 166:14 rely 48:11 227:19 remember 15:21 16:20 31:16 52:19 68:14,24 69:12 97:14 114:13 124:3 135:16 136:11 141:18 142:7 188:11 200:22 203:24 209:11 240:6 remotely 5:6	renewable 215:17,20 repeatable 207:6,7 repeats 241:2 replaced 37:11 report 10:16,22 17:13,14 18:25 19:21 88:9,12 180:3 193:15 199:9 228:24 reporter 1:24 4:22 52:9 117:4 125:5 162:9 171:11 197:24 216:23 247:3,3,24 249:7 reports 16:25 represent 13:1 232:11 representations 139:2,23 represented 62:8 representing 4:21 represents 12:25 request 18:19 92:24 250:9,11 requested 247:24 require 118:17	required 155:25 156:5 248:25 requires 112:6 142:7 requiring 162:2 research 2:5 99:17 220:20 reserves 245:12 reset 101:18 resistance 24:19 32:11 109:16 117:2 172:22 resistances 169:18,20 resistor 117:6,7 resolution 11:7 77:22 78:12,13 78:18 79:1,8 79:11,19,21 80:1,1,9,18 81:9 90:1,7 91:3 97:21 98:3,5,12 101:1 108:10 112:5 123:16 123:22 124:11 130:3,25 131:20,23 132:8,16,25 133:8,18 134:7 134:19 136:4 136:23 137:1,3
--	--	--	---

137:4,22 142:5 142:7 143:14 147:24 148:8 148:15 151:25 155:8,16 156:21 177:10 177:11 181:14 186:1,17 194:13 195:1,9 198:18 202:5 215:2 227:21 227:24 228:5 231:3 237:3 238:11 resonance 243:21,25 resonators 239:5 respect 35:8 92:21 101:22 124:18 140:18 143:9,13 146:13,15 147:12,18 173:19 204:19 207:7 214:13 242:16 243:5 respects 148:18 responded 157:16 respondent 4:16 response 57:14 71:4,9 77:2 78:11 93:23	118:2 120:17 155:18 158:8 158:11 168:14 215:14 responsible 150:16 restate 202:14 resting 223:24 restrictor 117:6 restroom 93:7 result 49:15 64:3 167:9 183:22,23 resulting 66:2 retire 211:17 retract 116:11 retraction 116:12 return 22:13 returned 248:18 reverse 143:17 reversible 143:12,18 231:14 review 3:14 9:22 17:1,10 18:12 29:18 30:21 42:19 112:21 159:1,4 196:4 212:11 245:12 247:24 248:12 249:1 250:1	reviewed 17:16 41:4 222:16 reviewing 14:15 revise 245:12 revolution 36:25 81:5 175:3,6 revolutions 36:23 rice 2:12 5:12 ride 48:24 169:22 rider 44:16 45:1 48:22,23 52:22 53:1 65:2 66:4 78:23 79:3,4 100:20 123:11 152:18 166:12 168:17,22,22 177:10,13,20 191:19 195:10 198:19 228:9 228:10 rider's 44:18 166:13 riders 21:25 228:13 237:25 237:25 rides 66:8 riding 21:25 22:23 44:19 78:22 168:12	right 15:19 25:11 28:2,13 29:4 31:20 34:7 36:17 42:7,9,17 45:24 57:23 58:23 62:8,13 62:20 63:25 83:4,5 90:24 91:5 93:3 94:5 95:19 98:15 99:25 100:4,14 100:14 112:9 115:10 119:2 123:25 141:16 142:20 143:4,5 144:7,12 152:1 153:24 157:19 158:23 173:2 173:21,23 174:5 175:17 177:3 185:21 187:18 189:1 189:15 190:11 206:19 209:14 209:21 213:9 221:8 223:25 230:16 231:8,8 231:12 233:23 235:19 241:3 245:12 rightmost 96:16 rigid 83:18 84:3,4,4 242:5
--	---	--	---

rigidly 27:8 28:19 56:5 83:23 86:12,21 94:15 rings 244:1 rise 116:13 240:10 rises 115:19 river 72:7 rmr 1:24 247:22 road 22:24 robert 15:15 16:16 106:19 robot 214:20 215:3 218:19 robotic 214:15 robotics 240:8 240:10 robots 240:20 rod 24:15 25:25 26:15 34:8 43:7,10 43:13,15,17 44:4,5,7,9,15 45:23 52:24 76:24 84:10 86:5,11 88:6 88:18 93:15,16 93:19 103:13 104:12 105:7 105:13,19,21 106:1,6 108:23 109:7 110:1,2 110:13 111:9,9	114:12,19,20 115:12,14,19 115:22,25 116:8,10,12 117:10 129:12 133:3,6 151:23 154:6,6,9 167:17,25 172:18,20,25 173:15,22,24 174:4 175:15 175:18,23 179:6 180:10 184:23,25 185:3,4,8,17,24 186:2,7,24 188:16 189:4,6 189:10 201:24 202:10 225:12 225:14 226:13 227:5,10,17 233:3 235:25 236:1 rods 105:5,25 114:14,16 163:24 165:9 167:11 187:21 203:25 236:11 236:20,21 room 8:2,6,9 15:16 rotary 67:1 78:21 79:15 98:17 100:3 107:6 111:5,22	129:10 137:24 139:13 140:1,2 160:16 180:14 180:17 181:2 192:16 193:10 193:11,18 194:2 195:15 195:20,25 202:3,13,17,23 203:7 218:9 224:14 225:11 225:24 228:20 230:8 231:6,11 231:16,19 232:13 233:2 234:2 235:3 236:16 rotate 27:10,13 27:16 28:23 29:1,3 43:21 46:9 47:15 53:8 62:1 65:6 86:24 94:22 122:20 123:23 143:4 145:15 173:6,10,10,17 189:9,10,18,24 200:11 rotated 36:22 36:24 43:15,23 58:2 59:11 63:23 65:24 68:5 rotates 27:17 63:23 85:25	86:23 87:1 95:22 157:4 173:18,18 178:2 rotating 25:12 49:14 69:5 97:14,16 175:8 190:1 218:17 rotation 27:20 27:25 28:10,17 34:11,14 36:6 36:14 39:17 49:15 59:16 61:5 62:9 68:3 69:17 85:20 101:5 107:5 111:12 114:11 114:17 119:7,9 119:9,12 122:21 134:5,6 134:12 137:2 137:13 138:1 139:14 140:8 142:2,13,21,23 144:25 145:3,5 145:20 146:8 146:13,15 147:12,18 163:17 173:20 177:7 186:3 201:16,19,22 202:7,18 rotational 44:8 145:9 175:7,9
--	---	---	--

rotations 35:21 46:10 47:15 65:11 225:19 225:22 rough 245:22 246:2 roughly 98:6 round 28:22 39:9 95:22 124:3 196:18 200:7 201:9 routine 120:13 routinely 192:20 rpr 1:24 247:22 ruggieri 1:24 4:22 247:2,22 rules 244:7 245:13 249:5 250:5 run 13:17 50:14 93:6,7 233:21 244:21 running 41:7 rush 212:13 245:21	saw 30:8 104:14 saying 43:3 44:22,24 45:24 75:25 90:9 105:6 114:15 153:2 159:21 166:20 167:23 168:25 169:14 183:4 192:4 says 5:19 36:20 44:10,21 46:15 65:20 66:5 101:20 103:20 104:8 108:2 109:5 111:5 112:11 113:12 115:14 116:7 151:8 187:13 212:4 scale 117:23 scaling 142:10 school 203:14 209:21 scope 103:16 232:17,18 scrambled 201:3 scratch 15:1,4 18:22 28:17 30:9 36:8,10 38:12 40:10 41:1 61:4 89:13 91:8 114:2 120:25	121:1 122:9 127:21 130:14 131:4 139:21 140:25 156:4 162:24 202:13 screen 4:10 screw 23:17 25:5,13 63:7 65:11 91:1,3 106:11,12,18 106:23 107:2,4 107:16 108:13 110:21 111:23 112:5 114:11 118:22 120:22 123:20 124:2,8 124:9 130:5,11 130:12,20,24 131:4,7,13,16 131:18,25 132:8,25 133:6 134:19 135:11 135:16,22 136:15,21 137:3,9,13,18 137:21 138:1 149:4,11 150:5 150:16 151:5,8 152:9 153:1,4 155:25 156:5 156:19 157:1 158:2 159:11 160:19,19,22 161:4 162:4 163:18 178:12	178:24 179:23 181:12 182:23 195:11 202:23 210:4 218:11 230:4,5 235:9 235:18,23 236:16 237:4 238:6,8 screw's 136:23 screwdriver 69:13,14 screws 207:21 218:11 scribe 10:17 se 185:25 194:13 214:9 seal 216:19 239:24 249:15 250:21 search 10:6 18:20 19:3,4 231:23,24 233:19 235:13 searches 18:16 seat 21:8,16 22:15 109:10 115:10 116:1 242:8,9,17 seawater 206:5 second 23:6 30:2,16,25 33:15 37:7 42:22 44:23,25 53:24 89:23 92:8 97:4
s			
s 3:9 4:1 248:15 250:8,8 251:3 sapsis 216:2 satisfactory 247:7 saudi 206:12 206:17,17			

115:11 151:12 156:25 162:7 187:19 190:18 194:12 239:3 239:15,17 seconds 233:6 section 42:16 42:21 47:10 49:18 59:14 85:18 86:7 104:18,22 106:23 112:20 128:7 141:11 141:13,21 174:13 178:20 189:14 194:18 213:19 217:20 217:23 222:11 222:15,23 223:9 sectional 46:20 154:10 sections 41:4 60:25 141:19 219:24 see 9:11 10:8 20:11 24:1 25:8 26:3,8 27:2 28:11 30:24,25 33:18 33:24 34:22 35:5,23,25 37:15 47:10 57:8 59:23 60:8,18 61:8	64:18 67:4,19 81:21 83:19,24 85:20 86:14 94:11,18 95:20 96:2,24 99:3 101:22 107:15 107:17,23 108:4,22,23 109:4,6,9 110:21 113:23 115:9,9,12 116:4 121:23 125:22 130:23 139:8,12 142:9 145:18 147:2 159:23 169:13 173:8,11 174:20 179:3 180:5 185:13 189:16,16,20 189:21 190:25 192:6 193:4 197:17 201:1 211:14 214:18 215:25 229:6 234:19 240:1 243:8 seeing 60:22 seek 192:6 seeks 103:19 104:19 165:20 seem 217:8 seems 9:14 seen 4:10 233:7	sees 169:7 segment 123:13 select 64:14 67:10 70:12 204:2 selected 33:5 118:3 selection 64:12 67:17 selector 24:8 27:1,2,9 30:14 30:17 37:14 52:8,15,17 selling 206:12 semiconductor 221:18 seminars 223:16 send 204:12,18 206:2,4 sending 206:1 senior 87:21 148:18 216:3 244:13 sense 73:20 135:7,25 140:23 165:12 sensitive 96:25 170:5 228:12 sensitivity 97:24 225:7 sent 204:12 sentence 37:7 112:16 129:20 163:4,6,12,22	164:6 165:19 167:13 separate 34:15 89:25 104:1 166:19 167:11 sequitur 60:1 served 182:4 service 124:4 125:11 211:6 213:22 services 19:15 servo 72:22 73:1,2 111:18 195:6 servocontrol 67:15 servomechan... 72:17 servomechan... 208:2 230:15 servomotor 67:14 111:18 set 42:8 107:20 107:21 111:1 182:10 245:21 setscrew 27:5 86:15 94:16,17 setting 182:7 several 41:15 67:16 148:5 shaft 28:24 43:8 87:1 88:18,21,24 89:11 90:1 91:25 92:13,16
---	---	---	---

93:19,22 94:2 94:3,20,23,24 95:2,2,6 96:7 96:15,17,20,25 97:5,13,22 98:18 110:8 128:5 154:20 176:12,14,18 188:2 189:7,11 189:17 190:1 shallower 113:19 167:16 167:18 shape 25:11 39:5,8 87:6,11 87:13 89:5 90:2 92:11,16 98:19,21,22 99:6 100:14 103:9 133:14 137:5,7 138:7 142:8,9 146:14 147:17,22 148:12 156:12 175:4,12 178:7 185:25 196:22 197:16 198:13 199:20 201:9 201:14 219:12 229:9 shape's 147:17 shaped 139:11 197:1 215:1 221:22	shapes 192:19 196:11 197:5,8 197:12,20 198:6 share 8:18 sheet 248:13 250:7,10,18 251:1 shifted 57:22 shifters 108:15 shock 20:24 24:16,20 32:6 52:20 74:23 75:1 76:16,18 76:20 77:14 78:4,22,24 85:3 88:21 102:18 103:24 112:23 117:8 159:14 166:8 168:19 171:15 171:22,25 173:1 195:18 220:10 227:6 242:21,21,22 244:4 shooting 124:15 short 223:20 shot 58:11 shoulder 29:6,8 29:11 53:12 shoulders 33:11 81:24 82:5	show 29:23 35:15 39:4 49:3 54:10,23 55:22 56:7 63:17 95:4 100:9 106:23 147:22 151:2 156:15 172:7 193:25 194:16 194:17 196:12 229:1 240:6,17 244:17 showed 91:18 216:25 showing 24:5 31:9 32:18 36:1 85:19,22 86:5,8 100:15 124:24 131:21 185:19 187:9 187:13 shown 23:10 24:4 25:2 26:22 27:25 28:2 29:10 33:8 36:4,10 36:13,17,23 55:9 56:1 58:1 85:17 92:8 100:22 101:2 128:20 133:9 137:24 144:7 154:13 171:19 182:2 184:24 187:4 189:4	198:14 200:14 233:4 248:16 shows 95:13 119:24 121:16 137:11 196:13 234:13 shrink 220:15 side 23:21 64:21 103:23 103:23 104:2,2 105:8,9 115:17 115:21 141:8 141:17 144:15 144:18,19 166:9,9,11,13 169:2 187:14 sifter 43:20 signal 75:9 108:7 signaling 75:14 75:17 signature 247:21 248:14 signed 249:13 250:18 significance 210:18 signing 248:19 similar 11:24 56:20 140:3 142:15 168:18 172:19 178:3 186:8 192:9 196:11 238:22
---	---	--	---

similarity 213:9	125:1	slightly 202:2	118:11 120:15
simple 100:21	sizing 117:18	slocum 1:20 3:5	120:24 121:1,2
133:8 138:11	133:12,13	3:13 4:15 5:17	121:8,14 122:1
139:5 179:16	sketch 193:20	6:3,5,25 7:11	122:5,10,24
180:12,14,17	skill 87:12	8:1,13,25 9:6	123:17 124:21
182:23 183:19	208:20,24	9:18 15:3,5	125:12 126:8
192:15 194:24	209:1,11	19:11,16,22	126:15 127:6
195:9 200:7,15	skilled 86:19	20:14,17 23:22	127:19,22
201:18 202:3	110:22 118:19	24:1 25:16	129:2,16
216:18 224:23	235:1	28:17,18 29:5	130:13,15
229:1 231:2	skills 21:25	29:15 30:9,11	131:3,6 132:3
235:12 239:17	slamming	31:19,22 34:17	132:6,23
242:18 243:10	166:12	36:4,9,12 37:6	133:11,16
244:7	sleep 18:6	43:2 46:2	134:3 135:9
simplest 102:2	slice 141:11,12	47:18 50:12,22	136:2 139:20
simplification	slices 141:7,10	51:3,20 52:4	139:22 140:11
182:22	slide 25:5 182:9	52:12 53:2,14	140:24 141:1
simplify 182:16	182:10	54:5,23 55:15	141:25 146:23
sincerely	slider 104:10	56:11,15 57:2	152:1 153:22
248:21	104:25 106:8	57:13,25 63:13	154:25 156:5
sine 96:20,22	109:21 110:1,7	64:8 75:2	158:24 161:11
96:23,24	110:11,19	76:11 78:11,18	162:17,23,25
single 104:9,11	111:7,8,12	79:10 81:7,11	163:3,6,22
167:4 199:6	116:7,9 117:19	81:19 82:7,13	165:13,13,18
singularity	118:18 119:1	83:16 84:11,21	166:21 168:8
148:7	128:18,19	88:3,22 89:12	170:22 172:2
sir 144:16	129:7,12	89:14 93:14	172:11,17
248:10	133:18 149:4	94:19 95:4	173:4 184:17
six 181:22	149:11 151:4	102:5 104:16	186:19 187:4
size 32:5	164:1 167:4,8	104:21 105:13	187:17 190:13
118:22 124:21	179:7 195:13	105:19 106:7	196:4,25 197:7
140:13,16	slides 164:14	107:9,10	197:11,18
sizes 123:18	205:21	112:21 113:21	198:4 199:8
124:24,24	sliding 119:10	113:24 114:6	201:15 202:6
	195:11	115:2 117:13	202:12,15

203:9 207:1,5 210:8 212:20 213:15 217:19 219:7 221:7,10 222:2,6,10,23 223:8 224:6,10 224:14 232:12 233:24 245:7 245:17 247:4 248:8 249:4,9 250:4,13 251:20 slope 114:4 117:15 118:21 119:1,11,15,21 119:25 149:24 161:14,19 163:16 sloped 104:24 105:2 113:6,8 113:9,13,14,18 114:12 163:19 163:25 164:1 167:5,9 168:3 237:5,7 slopes 120:25 121:3 161:24 162:3 164:18 slot 189:20,21 slowing 22:8 small 32:16 108:11 145:9 225:10,19,22 230:13	smaller 24:21 32:8 107:19 145:20 smallest 134:4 snail 101:6 software 19:10 solid 10:24 60:21 139:2,20 139:22 174:21 180:16 193:23 196:5,10 solution 42:3 solutions 248:1 251:1 solve 103:19 104:19 165:20 166:24 solved 40:25 166:7 solving 104:9 104:23 166:22 167:3 somewhat 99:18 son 19:11,16 soon 101:10 108:16 sophomore 50:3 87:17 88:1 132:7,21 235:7 244:13 sophomores 209:14 sorry 25:23 30:7 33:18	35:19 52:10 53:20 54:2,12 55:20 60:1 64:1,6 71:7 74:22 78:15 86:2 95:19 99:21 100:14 104:8 105:17 107:8 109:9 119:1,10 134:2 143:6 145:2 146:14 151:14 152:13,22 154:17 160:14 168:24 171:17 177:6 181:20 182:13 184:20 189:24 196:16 237:22 sort 29:13 86:16 87:7 118:1 127:17 148:15 175:13 sound 38:9 sounds 125:24 221:1 source 195:12 space 40:1 211:10 spacecraft 176:9 spacing 34:24 116:22 spare 6:7	speak 15:14 18:9 98:8 speaking 16:24 20:22 156:14 192:5 222:14 special 204:1 specially 221:22 specialties 208:16 specific 72:17 72:25 121:11 121:22 137:14 219:12 220:13 specifically 12:12 57:15 112:11 152:5 153:25 158:14 159:16 160:15 166:10 177:1 214:2,8,21 215:18 217:4 223:5 241:11 244:14,21 specification 72:25 specificity 137:16 specify 47:13 speed 111:5 spend 11:3 212:9 spent 12:4 14:14
--	---	---	---

spin 35:2 80:2 206:3 spindles 215:5 spoke 124:5 spoken 16:2,18 spread 14:6 spreadsheet 118:1,15 120:18 spring 20:24 21:6,12 22:12 22:12 64:19 165:3 206:9 207:24 216:14 239:3 241:1,20 242:22 springiness 21:19 239:3,12 sprocket 243:24 squared 145:16 sram 1:8 4:17 5:10 12:18 13:7 32:18 172:20 201:21 248:6 249:3 250:3 st 2:15 stack 165:3 169:5,16 stage 42:8 130:6 136:20 standard 12:1 42:18 221:20	standby 171:1 stands 90:8 stanford 2:5 start 46:8,14 102:1 103:15 103:16 104:17 150:25 159:2,2 184:6 194:5 215:21 226:12 started 6:10 7:12 10:2 46:19 204:9 206:23 240:11 starting 6:8 19:2 26:12 100:21 117:24 118:4,8,20 119:20 120:1,8 120:12 121:13 128:1 132:1 138:13 158:6 181:22 193:24 214:14 215:18 231:4 starts 47:14 134:4 153:15 181:21 state 5:3,6 49:12 61:21 71:16 74:7 104:23 112:14 117:13 119:21 120:3 121:2,9 121:14,20 122:5 124:21	126:23 127:6 127:19,20,22 128:1 129:3 137:8,12,25 145:2 150:15 152:14,24 156:25 159:10 159:19 160:9 160:15 178:16 181:6 182:12 199:22 228:24 249:10 250:15 stated 40:15 57:14 71:9 90:4 141:20 155:17 statement 48:9 109:24 120:24 135:10 137:18 249:13,14 250:19,19 states 1:1 4:18 72:5,9,13 187:3 statics 240:24 stating 105:10 159:12 160:12 stayed 142:3 stays 21:8,9,11 21:16,17 242:8 242:11 steam 99:25 100:2,2 stenographic... 247:6	step 115:15,19 129:24 130:4 156:10,22,25 183:9 stepper 177:16 steppers 73:12 steps 130:6 stick 144:14 stiffer 24:22 stiffness 205:22 239:2 stop 34:3 65:7 75:13 89:6 162:7 stopped 15:16 stopper 154:18 154:21 180:25 181:25 182:2,3 182:13,15 stopping 65:7 straight 47:3 47:24 58:3,5,7 58:8 61:25 62:18 96:10 straightforward 184:1 stream 217:10 stretch 22:24 strewn 84:15 strike 110:16 190:15 strive 243:15 stroke 143:10 149:17 189:13
---	---	--	--

structure 35:23 115:9 172:22 172:23 174:24 235:11,22,23	subsequent 34:25 193:24 subset 231:9 substance 7:5 50:24	223:22 234:12 surface 25:9,10 34:9 36:2,21 39:2,19,20 57:8 63:22 86:4 92:11 94:10,11,14 100:15 104:14 105:2 106:2,8 106:12 110:20 113:6,8,9,13 114:2,3,4,12 116:9,10,21,24 117:14,15 118:12 119:16 119:22 124:4 128:6,18 129:7 129:9,10,11,22 129:23 130:1 139:14 145:7 148:11 149:13 149:14,25 150:1,5 151:16 151:19,23,24 152:11,16 156:20 160:13 160:14,17 161:10,12 163:25 167:17 167:18,19 173:15,16 174:10,21 175:3,6 178:3 179:8 180:7,17 181:15 185:25	191:2,3,8,8,22 192:11,11 193:2,6,19 194:3 195:16 195:21 196:1 199:1,2,15,16 199:23 200:10 201:11 202:17 214:22 218:18 235:3 236:11 237:7 surfaces 31:8 38:24 53:12 104:24 105:5 109:16 113:14 113:18,23,25 121:3 124:7 131:17 139:15 148:6,10 161:19,21 163:16,19 164:1 167:5,9 167:14,20 168:4 170:1 179:15 186:16 199:18 218:8 221:22 230:9 231:7 232:14 233:10 234:2 235:24,25 236:3,18 237:6 surgeon 19:23 20:8 surgeons 101:11
structures 73:12 142:15 142:17 205:12 205:18 207:22 208:1	sudden 170:11 sufficient 89:23 suggest 110:18 158:2 191:21 192:10		
struggling 73:23	suit 10:7 44:18 135:20		
student 148:19 212:13 216:1	suite 2:14 248:2		
students 39:24 132:7 209:12 209:13 240:19 244:13	suits 13:6 sum 13:14 205:17 208:23		
studies 20:4	summary 42:10 42:11,16		
study 133:24	super 209:4		
stuff 12:15 13:19 20:4 205:2,13 210:3 222:22 232:9	superior 248:1 support 3:13 9:21 215:8		
stupid 204:4 212:24 213:2,8	suppose 245:10 supposed 42:5 68:6 117:23 215:3 232:19		
style 44:19 230:14	sure 10:25 15:21 45:16 70:1 73:1 82:12 106:3 107:13 162:8 163:11 186:18 187:23 207:12 211:6 214:13		
subject 126:11			
subjects 125:15			
submitted 12:22,23			
subscribed 249:10 250:14 251:21			

suspension 20:25 21:7,18 23:3,5 40:14 44:17 128:4,14 159:15 182:19 191:11 214:9 219:15,19,21 220:17 222:25 223:10 238:18 238:23 240:18 241:6,12,12 242:2,21 243:12 244:11 suspensions 204:25 205:9 213:24 214:5 214:12 218:6 219:23 220:8 222:4,8,9 swinging 35:1 swiss 230:4,5 switched 64:10 79:7 swore 108:15 sworn 5:18 247:10 249:10 249:13 250:14 250:18 251:21 synonymous 78:14 79:2,9 81:1 93:20 94:2 149:25 synthesize 229:21	system 20:25 26:2 33:3 40:14 44:18 46:14,22 48:13 48:13 59:25 65:3 67:16,21 70:21 71:3,5 72:14 73:1,2,5 74:18 79:15 90:9 118:2 128:4,14 131:4 131:7,9 134:18 134:19 135:12 135:13 136:3,4 140:10 142:1,6 143:11 144:7 147:13 159:15 182:19 191:11 207:20 216:6 218:9,15,17 223:6 228:7,16 238:9,24 239:8 239:14 241:13 242:2 systems 71:25 72:4,6,19,22 73:7 74:17 76:12,16,17 77:1,14 80:11 127:16 132:18 140:18 143:17 205:3,24 206:10,21 207:14 210:15 214:14,20	215:5,17,20,22 217:13 218:22 219:4 220:5,6 220:14 221:16 222:3,7 223:13 227:13 238:18 239:18,22 241:7 244:11 t t 3:9 247:1,1 table 150:21 153:13 240:21 take 4:12 11:14 50:8 59:1 61:24 87:20 90:24 93:4 115:2 125:16 141:12,18 157:6 159:23 160:13 174:13 178:12 180:23 184:3 189:16 191:6 192:1 193:14 200:7 209:13 217:20 223:20,23 231:1 232:6 242:6 taken 4:16 25:16 takes 68:17 talk 44:6 59:16 149:16 154:14 157:3 160:22 178:11 190:9	205:14 220:7 223:16 230:20 talked 14:20 68:3 94:16 117:8 158:5 208:15 218:24 238:15 talking 43:4 47:7 62:19 69:20 71:3 78:8 80:22 85:8 88:10 104:4 105:15 122:18 133:3 133:22 151:18 152:6 157:20 158:4 160:20 163:16 178:4 185:23 190:7 192:2 205:2 206:23 218:4 talks 51:12 65:20 66:9 153:25 161:7 tally 11:23 tangent 96:3 taper 109:7,12 109:13 129:11 130:9 139:6 145:8 151:15 156:11 157:8 160:16,20 176:17 178:24 180:13,21,23 186:9,16 191:6
--	---	--	---

192:20 193:8 194:10,16 196:12,16 199:23,23,24 200:10,14 202:9,10 230:22,24 231:4 236:1 238:2,3,4 taper's 230:25 tapered 39:20 106:8 109:11 116:9,10 124:4 124:4,7 128:18 129:7,9,22,25 140:1,4 151:20 151:22,24 152:16 156:20 160:13 161:10 178:23,23 179:7,15 180:17 191:3,8 191:22 192:11 192:15 193:2,4 193:6,19 194:3 195:16,21 196:1,20 199:1 199:15 218:11 228:18 229:11 230:9 231:7 232:13 234:2 235:3,19,24,24 236:3 tapering 151:16	taught 128:8 132:20 152:19 240:7 244:9 teach 13:18 19:8 39:24 87:18 101:23 132:6,13,17 148:22 202:13 202:16,22 203:2,6 209:2 209:11 211:19 211:19 217:6 226:4 230:19 233:17,23 237:14 240:16 244:8,12 teaches 100:25 159:20 202:23 212:5 235:18 239:4 teaching 151:22 152:25 153:5 161:23 195:8 209:16 technical 16:24 159:17 technologies 238:22 teeny 230:2 teeth 34:25 121:15,18 122:6 tell 19:4 35:9 48:23 59:8,10 73:9,14 87:6	108:3 117:18 122:13 134:11 142:12 143:20 144:24 176:7 176:13 177:13 177:15 206:11 207:8,11 208:22 213:1 telling 40:20 83:4 85:25 111:1 124:23 137:15 174:18 175:5 177:5,6 180:11 213:7 tells 49:8,11 81:4 107:23 119:8 138:16 167:13 ten 50:13 118:21,25 119:1,11,20,25 211:18 223:23 tenth 119:13 tenure 210:21 210:22 212:24 213:10 tenured 210:23 212:22 term 39:14 53:20 78:13 83:25 93:20 109:1,2 124:14 137:23 140:16 152:5 162:5 164:19 169:17	190:18 191:1 231:10,18,22 terminology 134:1 140:22 terms 51:11,22 68:25 73:25 78:14 79:3 80:7 84:4 99:3 117:2 123:13 148:14 149:2 175:20 178:5 190:1 193:4 195:17,19 196:18 211:5,9 212:20 217:9 236:22 terrain 22:1 44:18 test 212:14 testified 29:24 testimony 7:1 50:24 126:11 132:10 134:21 147:5 149:7 156:9 161:11 161:16 164:4 236:9 237:22 245:16 249:6,7 250:6,9,12 text 46:15 54:19 56:22 120:6 127:12 240:13 textbook 19:7 100:8 132:12
---	--	--	--

230:20 233:18 240:3,4 241:9 textbooks 241:5 thank 5:21 6:22 9:2,24 51:2 57:19 107:9 126:14 170:21 171:13 224:6 thar 215:23,24 themselves 48:24 theory 106:18 106:19 107:4 130:16,19 thereof 140:9 thereto 196:11 247:18 thermodyna... 239:4 theta 145:10 thing 21:24 29:14 40:2 60:7,17 92:10 100:1,21 101:7 102:2 124:18 139:16 154:15 164:15 169:5 174:9 175:10 176:17 184:9 192:3 219:20 223:11 232:3 239:22 things 6:10 7:17 11:13 13:16,17 19:4	19:21 40:1 45:9 60:12 67:2 72:20 74:3,25 78:6 80:7 85:16 86:19 104:6 107:4 119:19 134:25 135:2 144:2 147:1 148:7 164:22 168:16 178:12 195:5 196:19 204:16 206:12 206:15 208:6 208:25 214:25 217:10 218:16 221:6 223:17 230:3 233:6,11 233:12 239:6 239:23,25 thingy 219:17 think 6:16 12:8 14:11 15:20 16:22 19:2,7 21:1 23:20 39:5 41:7 45:11 47:10 56:18 60:8,11 60:20 61:21 62:5 68:8 70:14 73:3,7 75:17 83:1 88:9 93:16 95:3,13 100:6 106:22 109:24	120:20 124:14 125:5 133:6,13 133:14 136:9 141:23 144:5 146:21 170:3 171:10 180:1 183:2,3,4,22 191:24 195:7 202:24 203:13 204:9,17,20,20 205:1,11 212:12 213:1,4 214:11 218:2 219:1 223:20 225:16 226:21 226:23 228:7 228:10 233:5 233:24 234:14 241:10 243:3 244:17 245:2 245:25 thinking 70:24 71:11 136:8 184:8 210:1 third 17:23 32:14 59:5 60:5 thirty 248:18 thompson 2:22 4:20 thought 55:20 130:22 150:13 155:3,7 158:13 216:21 234:7	thousand 67:16 thousands 41:15 thread 25:5,13 28:12 30:4 33:25 34:5,5 34:16,24 37:2 38:6 60:17 63:7,23 65:6 65:11 68:1,16 68:18,22,22 69:5,9,18,21,22 80:7,20 91:3 103:10 106:11 106:13 107:2 107:16 108:13 110:21 111:23 112:5 114:11 119:5,6 120:3 120:22 121:9 123:20 124:2,9 124:9 130:20 131:4,7,18,25 132:25 133:6 136:16 150:10 153:4 163:18 178:24 179:23 186:15 195:12 201:25 235:23 237:4 238:6,8 threaded 28:24 69:3 80:11 154:19,22 180:24
---	---	--	---

threads 28:25 33:11 34:22 35:5,17,19,19 37:11,12,21,22 38:1,8,11,14,21 53:12 59:9,9 80:13,16,24 81:2,2,8,12,23 82:5 91:1 106:23 136:24 153:2 181:2,4 three 9:23 14:20 19:24 35:18 49:8,20 50:1 60:12 88:18 99:24 100:11,15 175:23 178:5 181:22 193:25 194:6,8,20,24 234:21 237:16 237:23,24 238:1 throw 11:13 22:15 thrown 31:24 thursday 1:21 ties 106:25 time 4:5 5:3 7:19 8:8 11:3,7 11:16,19 12:4 12:11 14:24 15:24 31:7,21 40:21 42:1 48:23 50:16,19	59:12 93:3,8 93:11 114:14 125:6,13,14,16 125:22,22 126:3,5 159:3 162:11,14 164:10,15 169:23 184:3,7 184:11,12,14 184:15 203:17 204:11 211:8 215:19 220:19 224:1,3,4,7 245:15 times 9:16 11:25 69:16 80:3 145:14,16 168:9 207:12 timing 125:12 tip 147:11 tires 22:10 204:4 tissue 20:1,2 title 40:11,16 102:17 171:18 titled 104:18,22 today 4:22 6:11 6:18 7:2,13,25 18:13 52:5,13 125:14 152:8 161:12 218:4 220:1 222:1 245:11 today's 85:9 245:16	together 45:9 88:6,19 106:25 110:15 116:5 159:23,25 told 18:1 19:2 219:25 tomorrow 14:23 ton 206:18 took 10:16 12:12 141:6,10 147:10 151:19 164:6 184:9 198:25 233:5 tooling 200:4,5 201:7 tools 208:6,17 208:19 top 58:23 62:1 97:4,11 98:7,9 138:17 142:22 143:5,5,6 144:19 145:7 176:10 224:22 225:9,17,19 226:6 227:1 242:9 244:6 topic 100:9 241:10 topics 132:13 torquer 204:1 total 13:14,22 14:15 67:5 227:2,4,25	touch 26:5 148:10 touches 26:10 touching 86:6 96:7 103:12 235:11 toward 242:11 track 13:16 trade 69:12 trademark 1:1 4:18 trail 22:24 transcribed 249:7 transcript 245:13 247:12 247:24 248:11 248:12 249:5 249:12 250:5 250:11,17 transfers 172:20 transition 125:15 translation 3:17 102:20 109:3 transmission 67:25 68:12,22 68:23 80:22 81:17 108:9 111:22 120:11 123:4 128:23 128:24 129:3 129:15,20
--	---	--	---

130:7,13,16,19 130:24 136:21 164:20 179:21 179:23 181:12 235:18 transmit 26:2 trapezoidal 26:11 travel 227:25 traverse 22:1 treat 101:11 treated 211:2 trek 244:18 245:3 trial 1:3 16:21 triangle 21:11 200:21,23 201:1 242:5,7 242:13,14,16 triangles 242:20,24 tried 99:17 186:21 trigonometric 97:25 trigonometry 88:2 truck 220:18 trucks 204:4 true 13:2 169:1 196:18 223:22 247:12 truly 65:9 100:12	truncated 141:7 truthfully 7:7 7:10,14 try 45:14 trying 37:17 59:24 61:23 69:12 74:14 124:1 133:1,2 133:5 151:10 167:22 198:10 235:13 tube 242:9,17 tubes 21:14 216:17,18 tuesday 14:20 tunability 77:17 tunable 111:25 225:2 226:12 tune 146:5 147:23 205:22 tuned 69:4 tuning 64:8,13 67:22 68:12 73:17,20 74:19 81:13,15 110:19 118:12 122:25 123:3 127:7 128:9 138:24,25 142:24 143:22 146:1 179:12 179:19 181:7 181:18 182:6	183:12 191:20 228:16,21 236:4 237:6,8 237:15 turn 20:17 23:2 23:13,22 25:4 29:16 40:5 46:2 54:5 100:2 108:8 113:20 126:16 141:2 151:5 154:9 157:24 158:16 159:1 160:3,23 165:15 168:20 168:21 172:2 177:19 190:17 199:8 203:9 213:15 216:11 221:7,11 222:10 turned 57:7 153:2 turning 33:14 68:9 153:4 181:4 211:12 240:16 241:11 turns 24:11 108:7,8 150:4 twice 122:20 125:14 two 11:6,11 12:14 13:17 14:14 22:4,4,5 22:16,19 23:14	24:8 27:8 29:23 33:3 35:19,20,21 39:22 43:13 49:23 51:14,14 51:15,18 58:13 59:4,7,10 60:4 60:18 64:14 65:12,25 70:11 71:23,25 72:5 72:9,13 74:23 77:14 78:4 80:11 97:2,18 98:14 99:6 104:24 105:4,5 107:7 109:15 110:14 113:14 113:25 114:14 114:18,24 116:4,23 121:25 122:18 130:6,6 142:15 142:16 143:15 144:13 145:23 148:4,10 149:14 156:22 157:8 161:19 161:23 162:3 164:1,7 166:17 167:5,8,10 168:3,6,6,16,17 169:25 176:8 187:3 188:10 193:13 205:5,6 218:3 224:15
--	---	---	---

226:8 235:24 236:11,11,19 237:2 242:20 242:24 246:2 type 10:21 38:21 101:6 106:9,11,14 107:1,2,3,23 108:3 117:1,5 117:6 138:12 140:9 160:2 168:14 171:11 179:17 196:24 197:16 205:7 229:19 types 22:1 31:10 39:12 90:25 120:1 176:8 233:3 typical 43:6 47:19 48:1 118:20,21 119:2,25 120:8 176:23 227:13 typically 32:14 41:23 42:3 66:25 87:17 132:22 176:22 242:6,8	117:25 148:4 183:3,5 195:6 unartfully 58:9 uncontrollably 242:1 under 7:4,9,13 104:18,21,22 165:19 166:23 undergraduates 132:21 underlying 12:4 16:6 understand 7:12 12:17,21 15:6 52:1 53:20 61:22 66:16 68:5 70:1,6 71:7 73:23 75:2 79:5 86:20 87:9 95:17 99:19 106:4 127:15 133:10 135:11,18 137:20 138:5 138:10 140:21 143:8 147:21 148:24 149:10 149:23 158:10 163:11 164:5 168:10 170:3 183:16 191:9 191:24 198:10 209:25 229:10	understanding 48:11 49:2 87:24 120:7 224:23 226:5 226:25 understands 132:2 148:10 150:12 181:11 understood 62:17 128:3 157:21 175:2 191:10 unhappy 243:22 unique 96:8 unit 4:14 78:19 79:10,14 80:11 80:25 241:22 united 1:1 4:18 units 136:23 university 212:17 unusual 119:6 update 73:6 updated 204:18 uploaded 8:18 upper 115:20 142:1,18,19 143:21 144:7 144:12 145:18 208:25 usable 192:5 use 9:23 19:9 21:2 38:20,21 39:4 47:8	48:22 59:20 65:14 68:6,21 79:6 108:16 109:2 130:20 134:23 136:10 148:3 151:22 152:22 153:3,3 153:21 177:6 178:10,23 179:25 181:2 182:15 186:12 186:14 205:13 206:5,21 207:23 210:3,6 217:1 220:16 226:3 229:7 231:18 235:9 237:3 244:15 used 117:7 123:2 134:1 156:11 157:17 163:4 192:8 214:7 221:25 238:7 useful 216:12 user 32:19 101:20 104:5 118:9 123:8,9 125:2 133:4 149:23 156:24 182:24 183:2 183:18 226:10 243:13 uses 43:7 48:23 124:9 152:5,25
u			
uh 200:16 ultimate 111:17 ultimately 116:16,23			

162:5 163:7 168:3 using 53:10,23 69:21 99:13 101:12 105:2 108:25 113:5 128:19 129:14 151:8 152:8,17 152:23 156:10 157:15,22 158:2 180:24 188:13 194:7 201:25 202:1 206:20 214:20 218:21 221:19 221:21 226:18 237:18 usually 41:10 42:12 69:20 192:6	52:7,14,19,22 52:25 53:3 77:6 78:7 82:14,17,20 83:8 88:4,8,19 88:20,23 89:1 91:20 92:16 93:19,23 97:6 108:19,22,24 108:25 109:1 109:10 112:13 115:10 116:20 117:2,5 167:24 168:1 169:15 172:21,23 175:15,17 179:5 valves 77:24 valving 162:1 valvings 169:15 variance 169:8 169:9 variations 118:7 varies 154:10 164:25 various 31:8 66:1,2 171:21 vary 34:7 44:4 95:2 172:22 185:3 vast 230:12 vehicle 205:9 214:5,8,11 219:19,21,23	220:5,7,9,16 222:8,9 223:10 238:17,23 241:6,13,24 244:10 vehicles 205:19 240:17 velocity 237:16 237:17,17 veritext 4:21,23 9:11 248:1,7 251:1 veritext.com. 248:17 versa 143:7 version 44:7 179:25 191:18 195:21 202:24 211:22 224:22 225:2 243:10 versus 48:12,13 142:19 vertical 69:17 76:24 141:7 225:20,23 viable 223:18 vibrate 239:6 vice 143:6 video 1:20 4:11 4:15 245:18 videographer 2:22 4:3,21 5:21 50:16,19 93:8,11 126:2 126:5 162:11	162:14 184:11 184:14 223:25 224:3 245:14 videos 240:5,14 view 59:10 62:14,16,25 63:9,15 141:20 144:15,18,19 187:14 views 141:17 187:8 viii.a.1.c 128:7 virtually 4:7 199:20 201:8 visual 49:18 visualize 226:24 visuals 68:7 vitae 203:16 volumetric 59:25
v			w
v 1:7 4:17 248:6 249:3 250:3 vacuum 206:21 vague 75:23 76:4 value 121:3 values 118:6 valve 24:17,19 26:2,6,12,13 30:11 31:3,15 31:18 32:25 40:14 43:9,18 43:18,19 51:20			w 55:12 57:9 wafer 73:12 wait 187:18 194:11 waived 248:19 walked 222:21 walking 158:7 wall 11:14 walter 211:24 211:25 want 6:15,17 10:6 22:17,21 23:2,5 59:2

62:23 66:5 68:15 70:22 73:3,4,15 76:2 77:9 78:25 82:11 87:23 90:11,22 98:13 98:23,24 99:1 99:2,3 100:12 100:17 101:20 101:21 104:5 107:13 114:15 114:24 118:16 125:4 130:10 132:15 136:17 140:10 146:20 146:21 147:15 148:25 149:16 153:3,20 154:16 156:17 159:23 162:8 165:8,23,24 168:2,14 169:10 178:9 186:11,12,13 187:16,18,23 188:3 191:5,12 191:19 193:22 194:25 195:3,5 198:20,22 201:9 206:23 207:8 211:6 212:4 214:23 215:14 217:17 223:21 228:11 229:19,20	231:2 233:16 237:25 238:9 239:9,10 wanted 55:20 155:7 186:9 190:10 wants 87:19 100:20 118:10 156:24 161:24 warm 67:11 washington 2:14 watchmakers 234:16 water 206:18 215:7 wave 216:6 waves 221:6 way 10:19 20:15 23:11 25:6 29:12 33:24 34:4,4 34:23 43:5 59:3 62:15 89:23 92:7 97:1,8,8 106:16 109:18 141:23 144:24 165:2,10,11 168:15 170:10 182:10 186:20 192:22 209:12 214:25 216:22 226:21 234:13	ways 22:19 43:13 we've 20:19 52:5,13 62:23 150:13 220:15 223:12 wear 207:10 219:13 wedge 25:11 28:15 38:25 39:2,3 103:8 103:10,11,12 106:12,24 107:1 108:13 110:22 112:6 114:12 120:22 123:21 130:21 130:23 131:14 133:7 135:17 135:17,23,23 136:10,12,17 137:22,23,23 137:24 147:22 149:24 151:6,9 152:10 160:19 160:21 161:22 178:23 179:21 193:9 195:11 201:4 203:4 218:11 228:18 229:7,8 231:1 235:19 236:10 236:18 237:4,6 237:8	wedges 119:19 131:14 236:11 week 11:6,11 18:2 211:18 weeks 11:19,25 12:2 weight 166:12 166:13 220:24 241:22 weights 22:1 weird 243:25 welded 84:5 went 10:13 100:24 204:13 238:14 wheel 21:18 241:15,16,20 241:23,23,25 242:10,15 243:4,16 wheels 100:4,4 whirlwind 13:20 wife 18:1 wiggle 96:18 97:11 willing 184:10 wind 216:6 wish 58:25 70:24 71:11 wishes 71:22 withdraw 31:2 219:8 witness 3:3 4:10 5:15,17
---	--	--	--

75:9,14,18,20 76:3 247:6 248:8,11 249:1 249:4,11 250:1 250:4,15 witnessing 41:16 witness' 248:14 word 72:3 133:14,15 170:5 235:14 wordage 147:16 worded 58:9 219:9 words 32:25 33:22 39:13 40:24 41:19 43:16 59:15 65:14 72:20 77:22 83:22 84:6 106:4 119:23 120:5 153:1 162:23 162:25 163:3,7 166:6 177:14 188:5 190:4 200:1 210:12 work 16:3 19:14,17 45:25 47:12 73:11 75:1 82:3 98:25 125:17 138:6 144:2 205:16 207:15	207:25 209:18 209:19 210:11 212:8 214:6 215:16,22 216:19 218:10 222:19,21 234:15 238:15 241:23 worked 13:3 workers 209:20 working 13:23 70:23 71:10 82:4 116:5 162:8 204:10 205:11 206:15 223:4 works 125:19 125:21 144:25 147:21 157:10 180:1 244:25 world 222:1 232:1 worse 68:25 124:16,17 worth 220:21 223:14,15 wow 41:6 60:15 70:24 71:11 110:23 177:9 215:19 216:21 write 41:13 42:9 98:16 99:11 117:25 118:14 120:14 212:25 213:6	writing 212:10 written 240:7 241:6 wrong 122:1 188:19 wrote 12:24 240:13 x x 3:1,9 55:8 xirui 15:19 y y 55:12 57:9 171:11 yankee 69:13 yeah 31:24 52:17 86:2,7 93:6 94:6 101:18 109:4 134:14 234:14 year 87:21 132:21 148:18 212:9 232:7 240:9 years 14:4,6 148:22 205:5,6 211:18 213:22 229:23 230:6 234:8,8 yee 171:10 yellow 173:5,20 184:25 yesterday 7:17 204:13 205:12 205:20 208:15	218:25 yesterday's 219:3 yi 171:4,8,12 171:14,15,20 171:21,25 175:19,21 176:2 177:22 178:4,16,21,22 179:1,12,14,17 179:19,24 181:8,24 184:17 185:12 185:16,23,24 187:5 188:11 188:23,24 194:2,4,4,20,22 195:2 197:7,10 202:6,8,9,10 237:14,23 yi's 172:8 174:3 175:14 178:24 179:4 180:22 181:19 182:1,5 183:13 184:22 185:6,7 186:15 186:22,23 youtube 229:16 233:20 z zoom 1:18 15:18
---	--	---	--