

Petitioner's Demonstratives

FOX Factory, Inc.

v.

SRAM, LLC

IPR2024-00492

U.S. Patent No. 7,147,207

Oral Hearing to be held May 15, 2025

U.S. Patent No. 7,147,207



US007147207B2

(12) **United States Patent**
Jordan et al.

(10) **Patent No.:** US 7,147,207 B2
(45) **Date of Patent:** Dec. 12, 2006

(54) **ACTUATOR APPARATUS FOR CONTROLLING A VALVE MECHANISM OF A SUSPENSION SYSTEM**

4,488,704 A * 12/1984 Wicker 251/265
5,505,281 A 4/1996 Lee
6,279,703 B1 8/2001 Mete
6,360,857 B1 3/2002 Fox
2003/0234144 A1 12/2003 Fox

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FOREIGN PATENT DOCUMENTS

GB 1415608 11/1975

OTHER PUBLICATIONS

Mountain Bike Action Suspension Special, pp. 75-78, Feb. 1991.
Ceriani Product Catalog, Circa 1991.
One set of five pages of photographs of a Ceriani Fork.
Cross-sectional schematic of a Ceriani Fork.

* cited by examiner

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(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(22) **Filed:** Nov. 4, 2004

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(51) **Int. Cl.**
F16K 31/44 (2006.01)

(52) **U.S. CL.** 251/263; 267/64.18; 188/322.22

(58) **Field of Classification Search** 251/251,
251/262, 263; 267/64.15, 64.18, 293; 188/321.11,
188/322.15, 322.22

See application file for complete search history.

(56) **References Cited**

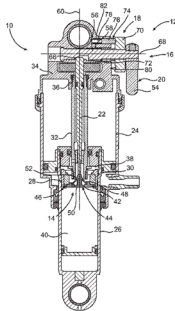
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4,036,335 A 7/1977 Thompson
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(57) **ABSTRACT**

An actuator apparatus controls a valve mechanism of a suspension system. The apparatus includes a valve actuating assembly and an adjuster assembly. The valve actuating assembly is operatively connected to the valve mechanism and is operable between at least two rider-selectable positions to adjust the valve mechanism between various suspension settings. The adjuster assembly is operatively connected to the valve actuating assembly for adjusting the damping characteristics corresponding to at least one of the positions of the valve actuating assembly independently of the damping characteristics corresponding to another position of the valve actuating assembly.

12 Claims, 18 Drawing Sheets



ACTUATOR APPARATUS FOR CONTROLLING A VALVE MECHANISM OF A SUSPENSION SYSTEM

Ex. 1001, Title

(57) ABSTRACT

An actuator apparatus controls a valve mechanism of a suspension system. The apparatus includes a valve actuating assembly and an adjuster assembly. The valve actuating assembly is operatively connected to the valve mechanism and is operable between at least two rider-selectable positions to adjust the valve mechanism between various suspension settings. The adjuster assembly is operatively connected to the valve actuating assembly for adjusting the damping characteristics corresponding to at least one of the positions of the valve actuating assembly independently of the damping characteristics corresponding to another position of the valve actuating assembly.

Ex. 1001, Abstract

Ex. 1001 ('207 patent), pg. 1

U.S. Patent No. 7,147,207: Claims

1. An actuator apparatus for controlling a valve mechanism of a suspension system, the actuator apparatus comprising:
a valve actuating assembly operatively connected to the valve mechanism, the valve actuating assembly including a camshaft rotatable between at least two positions to adjust the valve mechanism between various suspension settings; and
an adjuster assembly operatively connected to the valve actuating assembly for adjusting the damping characteristics corresponding to at least one of the positions of the valve actuating assembly independently of the damping characteristics corresponding to another position of the valve actuating assembly.

Ex. 1001, claim 1

25. The '207 patent is directed to an actuator apparatus for controlling the damping characteristics of a suspension system. Ex. 1001, 1:7-13, Abstract. While the '207 patent asserts that the disclosed actuator apparatus may be used with any type of bicycle suspension system, the exemplary embodiments are discussed with reference to a rear shock absorber. Ex. 1001, 1:22-29, 8:33-39.

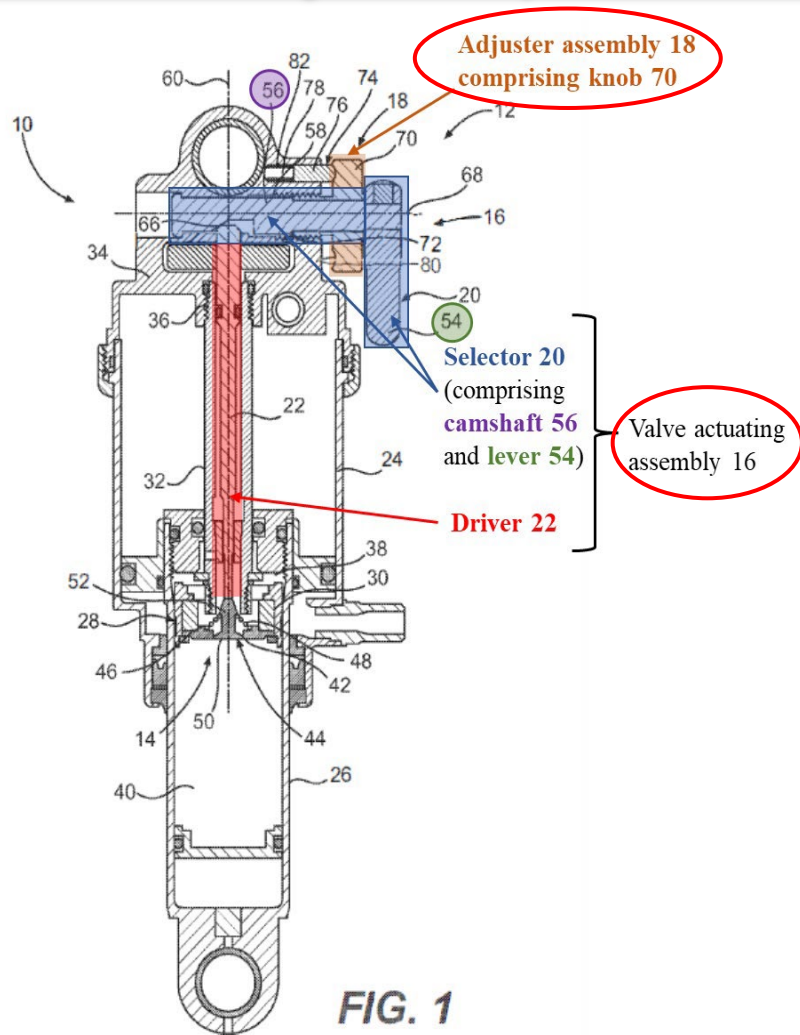
Declaration of Dr. Alexander H. Slocum, Ph.D. (Ex. 1003), ¶ 25

27. With reference to the embodiment shown in Figures 1-6, an actuator apparatus 12 for controlling fluid flow between chambers 38, 40 comprises:
(1) a valve actuating assembly 16 operable between at least two rider-selectable positions for adjusting valve mechanism 14 between at least two suspension settings, and (2) an adjuster assembly 18 operably connected to valve actuating assembly 16 to customize the damping characteristics corresponding to at least one suspension setting and independently of the damping characteristics of at least another suspension setting. Ex. 1001, 3:42-53, 1:51-62, 4:4-12. Valve actuating assembly 16

Ex. 1003, ¶ 27

Pet., 2-7

Key Features of the '207 Patent: Valve Actuating Assembly & Adjuster Assembly



suspension setting. Ex. 1001, 3:42-53, 1:51-62, 4:4-12. Valve actuating assembly 16 further includes: (1) a selector 20 for selecting between the at least two rider-selectable positions, and (2) a driver 22 that passes through piston rod 32 and is movable axially to adjust valve mechanism 14 to correspond with a selected suspension setting. Ex. 1001, 3:53-62, 1:63-67. Selector 20 includes a rider-operated lever 54 and a camshaft 56 rigidly connected to the lever 54. Ex. 1001, 4:23-25, 1:67-2:2. Driver 22 is biased against camshaft 56 at one end and is operatively engaged with valve mechanism 14 at the other end. Ex. 1001, 4:19-37. In the exemplary embodiment shown in Figures 1-6, camshaft 56 has three cam surfaces 62, 64, 66 engageable with driver 22, which correspond respectively to three rider-selectable positions: open, lockout, and adjustable. Ex. 1001, 4:27-34, 2:2-8.

Ex. 1003, ¶ 27

Level of Skill in the Art

Petitioner's definition

A person having ordinary skill in the field of bicycle suspensions and shock absorbers at the time of the claimed invention (i.e., in and around November 4, 2004) would have had (1) a Bachelor's degree in Mechanical Engineering or an equivalent degree, and 1-2 years of experience in design work related to bicycle technology suspension technology; or (2) at least a Master's degree in Mechanical Engineering or an equivalent degree with a focus on design of mechanical elements, and a good understanding of mechanical design principles. Ex. 1003, ¶23.

Pet., 9-10; Ex. 1003, ¶ 23

Patent Owner's definition

I agree that a POSITA for the '207 Patent is most appropriately connected to, and considers the particularities of, vehicle suspension designs. One of ordinary skill in the art at the time of the '207 Patent would include a person with a degree in Mechanical Engineering and approximately three years' experience in vehicle suspension technology, or a Master's degree or higher in Mechanical Engineering.

Ex. 2016, ¶ 48

- Petitioner's expert is a POSITA under either party's definition. Ex. 1003, ¶¶ 4-11, 23-24, Exhibit A
- Patent Owner deviates from its own expert's definition of a POSITA and argues that one of ordinary skill must have "a Master's degree or higher in Mechanical Engineering with experience in design of vehicle components **or like technology.**" Compare POR, 17, with Ex. 2016, ¶ 48
- Petitioner's expert meets Patent Owner's definition because he has extensive experience in the design of components that are technologically related to vehicle suspensions and other vehicular components. See Ex. 2019, 207:1-208:19, 213:15-221:6, 238:13-245:5
- Patent Owner's expert's CV does not show that he has any specific experience with the design of vehicle suspensions or other components. Ex. 2016, Appendix A

Reply, 3-4

Unpatentability Grounds

Ground	Challenged Claims	Basis	Prior Art
1	1-3, 7, 8, and 10-12	§ 102	Fox
2	1-3, 7, 8, and 10-12	§ 103	Fox, JP'279, Nagai
3	1-3, 7, 8, and 10-12	§ 103	Yi, JP'279, Nagai

Overview

- **Claim construction**
 - Neither party requested claim construction. Pet. 8; POR, 16
 - No claim construction by district court. Reply 4
- **Ground I: anticipation by FOX**
 - Fox discloses a “valve actuating assembly” with an open position and a closed position, wherein the damping characteristics of the open position can be adjusted independently of the closed position. Pet. 13-16; Reply, 4-6
 - Fox discloses an “adjuster assembly” that only partially overlaps with the “valve actuating assembly.” Pet., 16-19; Reply, 6-8
 - The ’207 patent specification permits partial structural overlap between the “valve actuating assembly” and the “adjuster assembly.” Pet., 16-19; Reply, 6-8

Overview (Contd.)

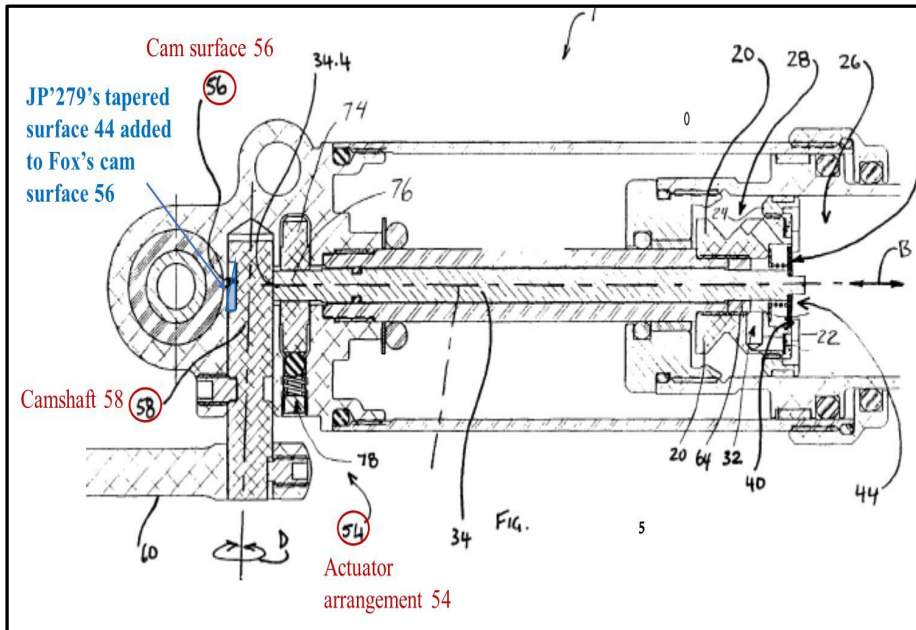
- **Ground II: obviousness based on Fox in view of JP'279 and Nagai**
 - The combination relies on Fox's "valve actuating assembly" modified in view of JP'279 to have a tapered cam surface. Pet., 45-51; Reply, 11-13
 - The combination provides a separate "adjuster assembly" based on Nagai for fine-tuning the damping characteristics of Fox's open position without affecting the closed position. Pet., 30-36, 48-51; Reply, 13-14
 - There is sufficient motivation to combine Fox, JP'279, and Nagai, and a reasonable expectation of success for the combination. Pet., 36-41; Reply, 14-19
- **Ground III: obviousness based on Yi in view of JP'279 and Nagai**
 - The combination relies on Yi's "valve actuating assembly" modified in view of JP'279 to have a tapered cam surface. Pet., 78-82; Reply, 20-22
 - The combination of Yi, JP'279, and Nagai provides a separate "adjuster assembly" based on Nagai for fine-tuning the damping characteristics of Yi's second compression damping position without affecting the first and third positions. Pet., 66-70, 82-86; Reply, 20-22
 - There is sufficient motivation to combine Yi, JP'279, and Nagai, and a reasonable expectation of success for the combination. Pet., 70-75; Reply, 23-25

Grounds I and II: The '207 Patent Does Not Disparage Fox or Similar Prior Art

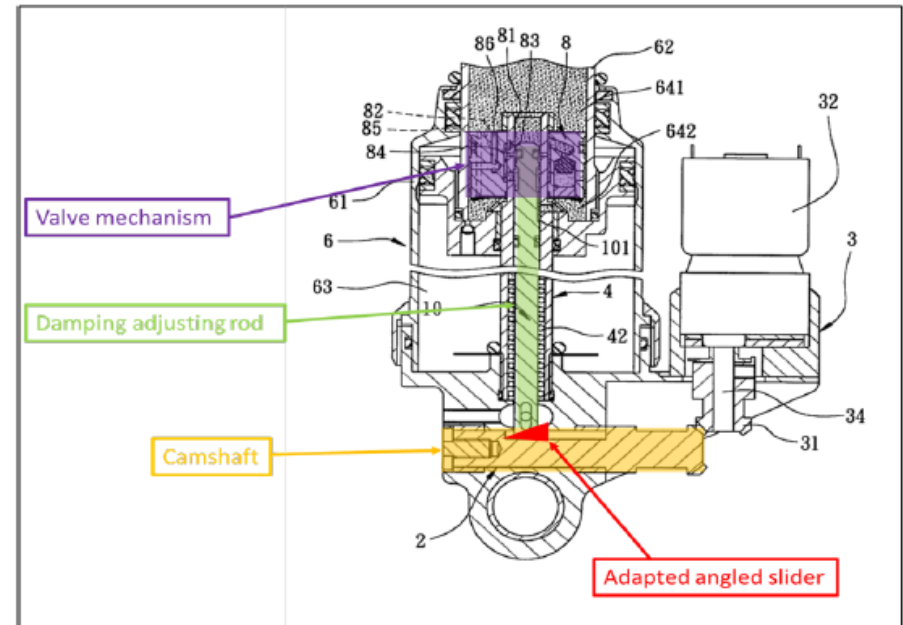
- Patent Owner incorrectly asserts that the '207 patent limits the scope of the claimed invention by criticizing prior art like Fox
- But nowhere does the '207 patent's specification identify Fox, or disparage Fox's mechanism. Ex. 1017, ¶ 13
- The background art discussed in the '207 patent is very different from Fox because Fox's camshaft 58 includes a rotary cam surface 56, which allows customization of Fox's open compression damping position. *Id.*; Ex. 1001, 1:30-43
 - **Nowhere does the background section describe a rotary cam surface that allows customization of damping characteristics in the open position, as in Fox**
 - Petitioner's expert did not agree that Fox is the same as the prior art discussed in the background of the '207 patent. *Contra* POR, 23

Reply, 9-10; Ex. 1017, ¶ 13

Grounds II and III: Tapered Cams Added to Only One Cam Surface of Fox and Yi



Ex. 1003, ¶ 79 (showing JP'279's tapered surface added to **Fox's cam surface 56** corresponding to the open compression damping position)

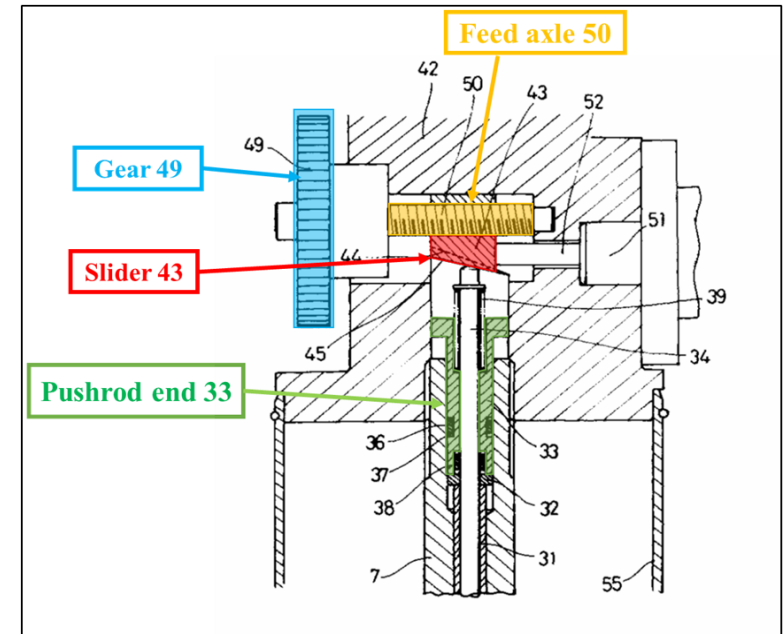


Ex. 1003, ¶ 134 (showing JP'279's tapered surface added to Yi's camshaft 2 at the **cam surface corresponding to the medium-velocity (second) compression damping position**)

Pet., 48-50; 84-85; Reply, 13-14, 20-22

Grounds II and III: A POSITA Would Have Been Motivated to Add JP'279's Tapered Surface to Fox's and Yi's Cams

- JP'279 discloses fine adjustments using **a slider 43 having a tapered (sloped) surface 44**. Ex. 1007 (JP'279), 5-6; Ex. 1003, ¶¶ 42-44
- A POSITA would have been motivated to add JP'279's tapered surface 44 to Fox's and Yi's cam surface to allow for fine adjustments and resolution of compression damping. Ex. 1003, ¶¶ 79, 92-93, 133-134; Ex. 1017, ¶¶ 22, 29



JP'279, Fig. 4

Grounds II and III: A POSITA Would Have Been Motivated to Add JP'279's Tapered Surface to Fox's and Yi's Cams

22. While it is correct that Fox's cam surface 56 and JP'279's tapered surface are each capable of adjusting compression damping characteristics within the open setting, JP'279's tapered surface configuration allows for fine resolution control as compared to the cam/lever arrangement of Fox. This is because the "adjuster assembly" in the Fox, JP'279, and Nagai combination would adjust the damping characteristics in a linear manner (as opposed to the non-linear adjustment by a rotary cam surface), thus creating fine adjustment. The "adjuster assembly" in the proposed combination would allow adjustments with finer resolution than is possible by just directly rotating lever 60. In other words, although a rotary cam surface and a tapered cam surface can each provide additional adjustments within the open setting, a tapered cam surface allows for better resolution and adjustment controls because one feature amplifies the other. A bicycle analogy is the rear

Ex. 1017, ¶ 22

29. The combination of Yi, JP'279, and Nagai allows for fine-tuning the damping characteristics of one position of the "valve actuating assembly." A POSITA would have clearly understood from the disclosure of Yi that switching between the three compression damping settings/positions would provide a coarse adjustment of compression damping characteristics. A POSITA would have further understood that additional adjustments within the second position — i.e., adjustments using JP'279's tapered surface 44 on Yi's cam surface corresponding to the second position and Nagai's means for axial movement of Yi's camshaft 2— would fine-tune the compression damping characteristics within the second position to account for the terrain, rider's weight, etc., and thereby improve the Yi shock absorber. Therefore, a POSITA would have been motivated to make the combination. Fine-tuning of damping characteristics was well known at the time the '207 patent application was filed. Indeed, JP'279 clearly teaches fine adjustment of compression damping using tapered surface 44 and rebound damping using tapered surface 45.

Ex. 1017, ¶ 29

Reply, 14-19, 23-25

Grounds II and III: Tapered Cams Were Well Known in the Art Prior to the Filing of the '207 Patent

- Tapered cams (also known as barrel cams or conical cams) have been known and routinely used since well before the filing of the '207 patent. Ex. 1017, ¶ 19
- Petitioner's expert testified that tapered cams have been known "[a]t least a hundred years. Probably 200 years or more." Ex. 2019, 228:15-234:25

25 The use of the modified cam 6', which is keyed to the camshaft 6A at 61, allows the effect produced by the cam to be adjusted simply by adjusting the position of the cam 6' on its shaft 6A. The cam adjustment is made as follows.

30 A rod 54 with an externally threaded middle portion 54A is connected to the cam 6' by dowel pins 55, and is received within an internally threaded sleeve 56. The right-hand end of the sleeve 56 is provided with an adjusting nut 57, fixed to the sleeve, and with a lock-nut 58.

35 A shoulder 59 on the sleeve 56 prevents inward movement of the sleeve and a circlip 60 prevents the outward movement of the sleeve. Accordingly, clockwise rotation of the adjusting nut 57 causes axial movement of the cam 6' to the left, and anti-clockwise rotation of the nut 57 causes movement of the cam 6' to the right.

40 The cam 6' approximates in shape to a cone frustum with a central cylindrical bore. The surface of the cam 6' may be visualised as consisting of a multitude of spiral lines all starting at the same level on line 64 and ending at different levels on line 65, which is inclined upwardly from the front 68 to the back 69 of the cam.

45 The leftward movement of the cam 6', as seen in FIG. 5, finally brings the rocker 10 to the spiral line which ends at the highest level on the line 65 (see FIG. 5), giving the greatest drop to the flat 62 from the peak 63 of the cam. The rightward movement of the cam 6' brings the rocker 10 to the spiral line which ends at the lowest level on the line 65, giving the smallest drop.

50 The right-hand end of the rod 54 is calibrated as shown to correspond to different positions of the cam 6' on its shaft 6A, and to correspondingly different amounts of cam relief.

Ex. 1019, Figs. 5-7, 4:23-55 (describing a **tapered cam 6' in the shape of a "cone frustum"** that utilizes axial movement to alter the point of contact between the cam and a rocker)

MR. SARGENT:—The engine was very noisy before it was changed over to constant compression and the change did not improve it. The camshaft presented a problem to its makers. They made two and shipped them before they found out exactly how to make them; and after they learned that the tapered cam was a warped surface and could easily be made with a milling cutter, they said they could make a camshaft nearly as cheaply as they could the ordinary typical camshaft.

Ex. 1020, 202-03, 216 (describing a **tapered cam z** and the ease of making a cam with a tapered surface and the associated benefits of such for an engine)

Figure 85 shows the device that will be used to position the Hall probe azimuthally or radially to 1 mil. The positioning device will consist of an 80-in. aluminum disk with precision slots every 4 degrees. The disk will be rotated slightly over 4° and then backed up by a tapered cam until the reference surfaces are matched. A similar cam will be used to position the probe radially. Ninety azimuth points will be measured at each radius. Two-inch increments will be used along the radial line, giving about 1800 data points over the whole poleface. The field can be measured in five hours if a point is obtained every 10 seconds.

Ex. 1021, 107 (using a **tapered cam** to finely adjust rotational position of a disc)

Turning concentrically inside the split ground connector is a tapered cam 6 which, in addition to rotating, is also free to move longitudinally within the ground connector in order to compensate for any dimensional variations, of either the plug 1 or the socket into which the plug 1 is inserted. The tapered cam 6 extends through a hole in the plug body 1 where the cam shaft bends at substantially a 90° angle to form a lever arm 8 of non-conducting material for positioning the cam.

Ex. 1022, 2:31-36 (disclosing "**a tapered cam 6**" for an electrical plug, "which, in addition to rotating, is also free to longitudinally ... to compensate for any dimensional variations")

Grounds II and III: Fine-Tuning of Compression Damping Was Well Known in the Art

In Examiner's statement of reasons for allowance, Examiner misstates that Wicker (US 4,488,704) discloses "an adjuster assembly for adjusting the characteristics of the valve mechanism independent of the valve actuating assembly." Contrary to Claim 1 of the present invention, the actuator nut 28 of Wicker is not an adjuster assembly that changes the damping characteristics corresponding to at least one position of the operating handle 32 *independently* of the damping characteristics corresponding to another position of the operating handle 32. Rather, the actuator nut 28 of Wicker is merely a fine tuning device that *necessarily* changes the damping characteristics corresponding to all positions of the operating handle 32. In other words, no damping characteristic corresponding to one

Ex. 1004, PDF pp. 8-9, 30-31 (Patent Owner admitted during prosecution that U.S. Patent No. 4,488,704 to Wicker (Ex. 2015) taught coarse and **fine-tuning** of damping characteristics)

(emphasis added) In other words, the independence is between the damping characteristics corresponding to two positions of the valve actuating assembly, **not simply the availability of alternative coarse or fine adjustments of the valve mechanism as in Wicker.** In fact, in Wicker, there is never independence between the damping characteristics corresponding to two positions of the valve actuating assembly 32, 14 through operation of the actuator nut 28. On the contrary, in the present invention, for example, the damping characteristic corresponding to positions 62 and 64 are not affected by adjustment of the adjuster assembly. Therefore, the rejection of claim 1 should be withdrawn.

Ex. 1004, PDF pp. 86-87 (Patent Owner admitting that Wicker taught fine-tuning of compression damping)

Relatedly, JP'279 discusses capabilities of "fine adjustment" of rebound and compression damping characteristics. Ex. 1007, 6. Patent Owner argues that JP'279's tapered surface 45, which is used for rebound damping adjustments, "provides 'fine adjustment amounts' relative to surface [44] because of the lesser slope." POR, 38 (citation omitted). That is incorrect. As Petitioner's expert explains, "the relative adjustment [between the two tapered surfaces] is different because of the two surfaces having a different slope," that **"even just one of those surfaces provides fine adjustment capability over having no wedge,"** and JP'279 is "teaching two of them with different slopes, because[] ... depending on whether you are controlling the compression or rebound valving actions, they may ... requir[e] different levels of adjustment, and you can get that by having the two slopes driven by one screw." Ex. 2019, 161:11-162:4 (emphasis added); *id.*, 163:22-165:10 (Petitioner's expert testifying that compression and rebound damping "are both being fine-adjusted [in JP'279]. One is not done relative to the other.... [Y]ou're adjusting one finely to do one thing and at the same time you're adjusting another one to do something finely."); *id.*, 235:17-237:13.

Reply, 16 (Petitioner's expert explaining that JP'279 teaches fine-tuning of compression and rebound damping)

Pet., 7-8, 30-33, 66-67, 71; Reply, 15-16

Grounds II and III: Patent Owner's Bodily Incorporation and Improvement Arguments are Legally and Factually Incorrect

See POR, 43. “The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art.” *In re Keller*, 642 F.2d 413, 425 (CCPA 1981); see also *In re Mouttet*, 686 F.3d 1322, 1333 (Fed. Cir. 2012). Here, a POSITA would have known that the combination of Fox, JP’279, and Nagai would have improved compression damping performance, and thus a POSITA would have been motivated to make the combination. Ex. 1017, ¶21. Moreover, a POSITA would have reasonably expected success in combining Fox, JP’279, and Nagai because they teach common mechanical concepts and techniques (e.g., cams, gears, feed axles, etc.), and a POSITA would have expected the combination of these known prior-art elements to yield the predictable result of fine adjustment of compression damping. Ex. 1017, ¶25; see *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007)

Reply, 18-19

Patent Owner’s argument that a POSITA would not have been motivated to modify Yi in view of JP’279 and Nagai because Yi itself could have been redesigned or resized to provide a finer level of adjustment is incorrect. POR, 50. To establish obviousness, “[i]t’s not necessary to show that a combination is ‘the *best* option, only that it be a *suitable* option.’” *Intel Corp. v. Qualcomm Inc.*, 21 F.4th 784, 800 (Fed. Cir. 2021) (citation omitted); see also *KSR*, 550 U.S. at 417. Because a POSITA would have reasonably expected the combination of Yi, JP’279, and Nagai to provide “a *suitable* option” for fine adjustments of compression damping, a POSITA would have been motivated to make the combination. *Intel*, 21 F.4th at 800 (citation omitted).

Reply, 23-24

Reply, 17-19, 23-25

Grounds II and III: Adjuster for Axial Displacement of a Camshaft was Known and Disclosed by JP'279 and Nagai

- JP'279 discloses a mechanism for axially displacing slider 43 (with tapered surface 44), using gear 49 and feed axle 50. Pet., 48; Ex. 1003, ¶ 92
- A POSITA would have been motivated to use a **simplified mechanism such as Nagai's stopper bolt 141** (in place of JP'279's gear 49 and feed axle 50) to axially displace Fox/Yi camshaft to combine the implementation of adjuster and limiting means. Ex. 1003, ¶¶ 97-98, 121-123, 133-134; Pet., 38-40, 50-51, 84-85; Ex. 1017, ¶ 17

A skilled artisan would also have readily known how to implement a manual or motorized mechanism to axially move Fox's camshaft 58 (modified to have JP'279's tapered surface 44) along the camshaft's longitudinal axis. See Ex. 1007, 5-6. In particular, a POSITA would have known to implement a mechanism such as Nagai's stopper bolt 141 threaded into Fox's camshaft housing to axially displace Fox's camshaft 58, which would be similar to JP'279's "adjuster assembly" (i.e., feed axle 50 engaged with slider 43). A POSITA would have been motivated to use Nagai's stopper bolt 141 to axially move camshaft 58 to simplify and combine implementations of the elements of JP'279's "adjuster assembly" and Nagai's limiting mechanism into Fox's suspension system to improve the compression damping adjustment mechanism of Fox.

Ex. 1003, ¶ 97

JP'279. See Ex. 1007, 5-6. Indeed, a person skilled in the art would have known to use a mechanism such as Nagai's stopper bolt 141, which may be configured to engage with Yi's camshaft 2, and would have been used to advance and retract the camshaft along its longitudinal axis (as I have discussed above).

Ex. 1003, ¶ 121

Pet., 38-40, 50-51, 84-85

Grounds II and III: Petitioner Expressly Identified an “Adjuster Assembly” Separate From the “Valve Actuating Assembly”

16. Dr. Parnell argues incorrectly that the combination of Fox, JP’279, and Nagai does not include an “adjuster assembly” and “a means for independent adjustment of damping characteristics for one position.” Ex. 2016, ¶ 77. But in my initial Declaration, I clearly discussed “a mechanism for axially displacing slider 43 [having tapered surface 44] using gear 49 and feed axle 50” as taught by JP’279. Ex. 1003, ¶ 92. I additionally explained that one skilled in the art would have been motivated to use a simplified mechanism such as Nagai’s stopper bolt 141 in place of JP’279’s gear 49 and feed axle 50 to axially displace Fox’s camshaft 58 (modified to have JP’279’s slider 43):

17. Thus, I fully explained that Fox modified to have JP’279’s tapered surface 44 and Nagai’s stopper bolt 141 has a mechanism to finely adjust the damping characteristics in Fox’s open position. Ex. 2003, ¶¶ 97, 98. Dr. Parnell completely disregards several paragraphs of my initial Declaration when he argues that the combination of Fox, JP’279 and Nagai does not have an “adjuster assembly.”

Ex. 1017, ¶¶ 16, 17

28. In my initial declaration, I also clearly discussed “a mechanism for axially displacing slider 43 [having tapered surface 44] using gear 49 and feed axle 50” as taught by JP’279. Ex. 1003, ¶ 133. I additionally explained that one skilled in the art would have motivated to use a simplified mechanism such as Nagai’s stopper bolt 141 in place of JP’279’s gear 49 and feed axle 50 to axially displace Yi’s camshaft 2 (modified to have JP’279’s slider 44). Ex. 1003, ¶ 134. Thus, I fully explained that Yi modified to have JP’279’s tapered surface 44 and Nagai’s stopper bolt 141 has a distinct mechanism—Nagai’s stopper bolt 141 threaded into Yi’s camshaft housing—to finely adjust the damping characteristics in Yi’s second compression damping position.

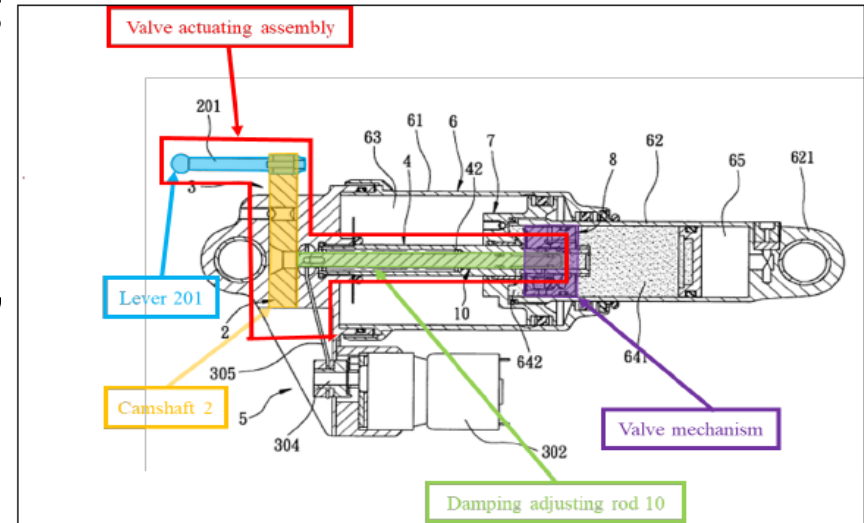
Ex. 1017, ¶ 28

Reply, 11-12, 21-22

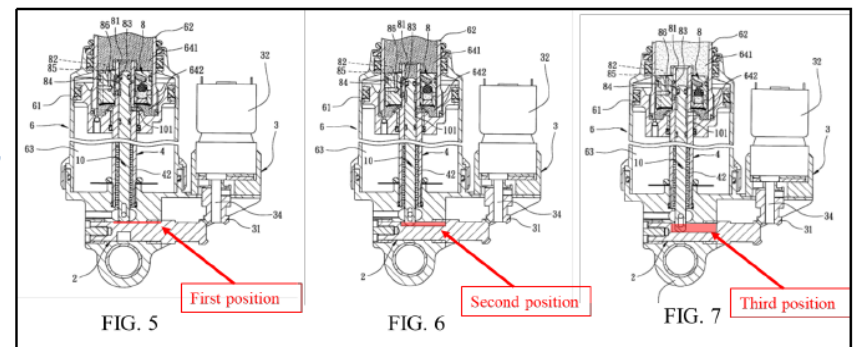
Petitioner's Ground III: Obviousness Based on Yi, JP'279, and Nagai

Yi in View of JP'279 and Nagai Discloses a “Valve Actuating Assembly” and a Separate “Adjuster Assembly”

- Yi has a “valve actuating assembly” comprising a lever 201, a camshaft 2, and a damping adjusting rod 10. Yi, 5:51-57; Ex. 1003, ¶ 129
 - Yi’s camshaft 2 is rotatable between at least three compression damping positions – low-velocity (first), medium-velocity (second), and high-velocity (third) flows. Pet., 78-82; Ex. 1003, ¶ 131
- A POSITA would have been motivated to add JP'279’s tapered surface 44 to Yi’s cam surface corresponding to the medium-velocity setting to allow fine-tuning. Pet., 82-86; Ex. 1003, ¶¶ 132, 134
 - Because the tapered surface is added to only the cam surface corresponding to the second position, axial displacement of camshaft 2 does not affect the damping characteristics of the first or third position. Ex. 1017, ¶ 26
- A POSITA would have also known how to axially move Yi’s camshaft using Nagai’s stopper bolt 141 (“adjuster assembly”). Ex. 1003, ¶ 134; Yi, Figs. 5-6.



Ex. 1003, ¶ 129 (Yi, Fig. 12)



Ex. 1003, ¶ 131 (Yi, Figs. 5-7)

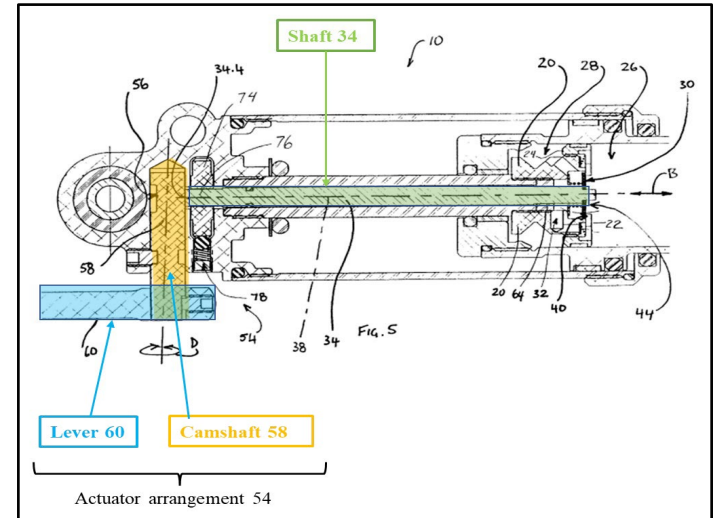
There is Sufficient Motivation to Combine Yi With JP'279 and Nagai and a Reasonable Expectation of Success

- Rotating Yi's camshaft 2 between the three compression damping positions would provide a coarse adjustment of compression damping characteristics. Ex. 1017, ¶ 29
- Additional adjustments within the second position—i.e., by adding JP'279 tapered surface 44 on Yi's cam surface—would **fine-tune the compression damping characteristics within the second position**. *Id.*; Ex. 1003, ¶119
 - Petitioner's expert testified that adding a taper to Yi's camshaft would provide "fine resolution." Ex. 2019, 194:2-195:13
 - Such fine-tuning of damping characteristics was well known when the '207 patent application was filed (see discussion in slide 14)
- A POSITA would have been motivated to fine-tune to account for the terrain, rider's weight, etc., and thereby improve the Yi shock absorber. Ex. 1017, ¶ 29; Ex. 1003, ¶ 120
- The proposed combination would have been simple, cost-effective, and would have yielded predictable results. Ex. 1017, ¶ 30; Ex. 1003, ¶121
 - The tapering process through machining (e.g., CNC machining) would have been simple to a POSITA, and tapered cams were well known and routinely used (see slides 12, 13). *Id.*, ¶ 24
 - Means for axially displacing a camshaft were also known (see discussion in slides 16, 17)

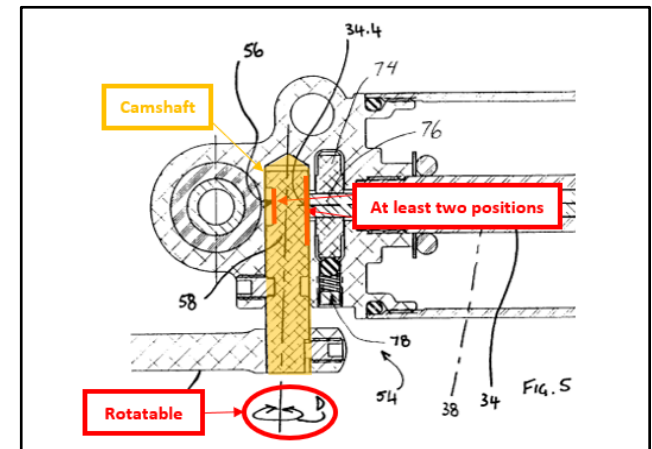
Petitioner's Ground II: Obviousness Based on Fox, JP'279, and Nagai

Fox in View of JP'279 and Nagai Discloses a “Valve Actuating Assembly” and a Separate “Adjuster Assembly”

- Fox has a “valve actuating assembly” comprising camshaft 58, lever 60, and shaft 34. Fox, 8:3-34; Ex. 1003, ¶ 87
- Fox’s camshaft 58 is rotatable between at least two compression damping positions – open and closed/lockout. Ex. 1005, 7:61-8:2, 9:59-10:14; Ex. 1003, ¶¶ 89, 90
- A POSITA would have been motivated to add JP'279’s tapered surface 44 to Fox’s cam surface 56 to allow fine-tuning. Pet., 49; Ex. 1003, ¶¶ 91, 92-93
 - A POSITA would have known how to make such a modification. Ex. 1003, ¶¶ 94-96
 - **Because JP'279’s tapered surface is added to only the recessed cam surface 56, axial displacement of Fox’s camshaft 58 would only adjust the damping characteristics of the open position and not affect the closed position.** Ex. 1017, ¶ 20
- A POSITA would have also known how to axially move Fox’s camshaft using Nagai’s stopper bolt 141 (“adjuster assembly”). Ex. 1003, ¶ 97



Ex. 1003, ¶ 87 (Fox, Fig. 5)



Ex. 1003, ¶ 89 (Fox, Fig. 5)

Pet., 41-51, Reply, 11-14

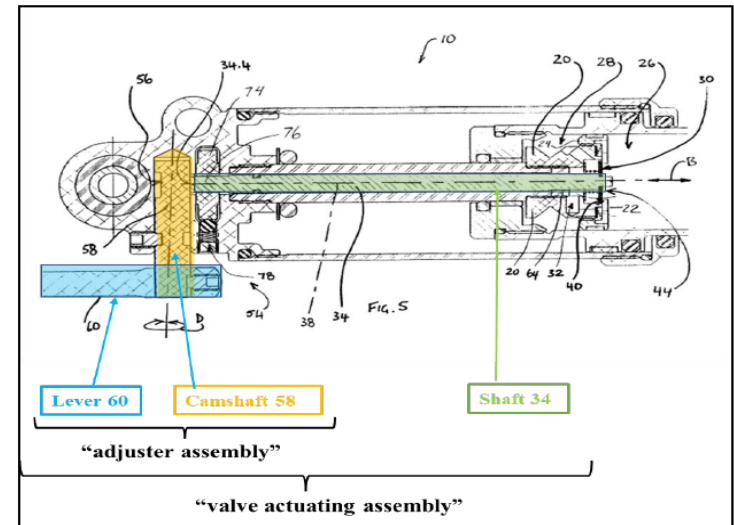
There is Sufficient Motivation to Combine Fox With JP'279 and Nagai and a Reasonable Expectation of Success

- Rotating Fox's camshaft 58 between the two compression damping positions would provide a coarse adjustment of compression damping characteristics. Ex. 1017, ¶ 21
- Additional adjustments within the open position—i.e., by adding JP'279 tapered surface 44 on Fox's cam surface 56—would **fine-tune the compression damping characteristics within the open position**. *Id.*; Ex. 1003, ¶ 91
 - Petitioner's expert testified that adding a taper to Fox's camshaft would provide “even without the gear **an increase in resolution**.” Ex. 2019, 129:2-130:12, 150:15-151:25, 156:5-24; *see also id.*, 132:23-133:10, 146:23-147:25
 - Such fine-tuning of damping characteristics was well known when the '207 patent application was filed (*see discussion in slide 14*)
 - Fine resolution is achieved because the Nagai “adjuster assembly” and JP'279's tapered surface 44 would adjust the damping characteristics in a linear manner (as opposed to the non-linear adjustment with Fox's rotary cam surface). Ex. 1017, ¶ 22; Ex. 1003, ¶¶ 80-82, 91
- A POSITA would have been motivated to fine-tune to account for the terrain, rider's weight, etc., and thereby improve the Fox shock absorber. Ex. 1017, ¶ 21; Ex. 1003, ¶¶ 76-79
- The proposed combination would have been simple, cost-effective, and would have yielded predictable results. Ex. 1017, ¶ 24; Ex. 1003, ¶ 83

Petitioner's Ground I: Anticipation by Fox

Fox Discloses a “Valve Actuating Assembly” and “Adjuster Assembly” With Partial Overlap

- Fox has a “valve actuating assembly” comprising camshaft 58, lever 60, and shaft 34. Fox, 8:3-34; Ex. 1003, ¶ 49
- Fox has an “adjuster assembly” comprising camshaft 58 and lever 60. Ex. 1003, ¶ 53
- Fox’s camshaft 58 is rotatable between at least two compression damping positions – open and closed/lockout. Ex. 1005, 7:61-8:2, 9:59-10:14; Ex. 1003, ¶¶ 51, 52
 - The open position corresponds to the recessed rotary cam surface 56 and the closed position corresponds to the non-recessed camshaft surface
- Within the open position, the rotary cam surface 56 allows for further adjustment of compression damping. Ex. 1003, ¶ 55; Ex. 1017, ¶¶ 11, 12
 - Because Fox’s open and closed positions correspond to different camshaft surfaces, varying the contact point of shaft 34 with cam surface 56 (having variable radii) does not affect the damping characteristics of the closed position



Ex. 1003, ¶ 87 (Fox, Fig. 5)

Partial Overlap Between the “Valve Actuating Assembly” and “Adjuster Assembly” is Permissible Because the Specification Teaches Such Overlap

- The presumption that the separately recited “adjuster assembly” and “valve actuating assembly” are distinct features is rebutted because the specification permits partial structural overlap between them
 - ’207 patent, 5:48-6:9 (embodiment shown in Figures 7a-7c allows partial overlap between the claimed features; claim 6 (“[T]he adjuster assembly is formed integrally with the selector [lever and camshaft] of the valve actuating assembly”))
- Nothing in the claims, specification, or prosecution history requires the “adjuster assembly” and “valve actuating assembly” to be completely separate

Patent Owner admits that “the ‘207 Patent states that the ‘valve actuating assembly’ may be integrated with the ‘adjuster assembly,’” and that those claimed features “overlap in physical extent” as shown in Figures 7a-7c. POR, 20. Patent Owner nevertheless argues that although these claimed features “may be integrally formed,” there has to be “something additional specific to the ‘adjuster assembly,’” such as threads 84, 86 in the embodiment shown in Figures 7a-7c of the ’207 patent. POR, 20-22. Patent Owner, however, does not cite any legal authority for its contention that the “adjuster assembly” must contain additional feature(s), nor is Petitioner aware of any. The specification of the ’207 patent does not state that the “adjuster assembly” must have more structure than the “valve actuating assembly.” Ex. 1017, ¶¶9-10. Nor does the prosecution history impose any such requirement. *Id.* Moreover, since Fox’s “valve actuating assembly” includes an extra component (i.e., shaft 34), the condition of incomplete overlap set by Patent Owner is met. *Id.*

Reply, 6-7