

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of:	Langlotz	Attorney Docket No. 49649-0058IP1
U.S. Patent No.:	12,233,871	
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Title:	VEHICLE GEAR SELECTION CONTROL	

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**PETITION FOR *INTER PARTES* REVIEW OF UNITED STATES PATENT
NO. 12,233,871 PURSUANT TO 35 U.S.C. §§ 311–319, 37 C.F.R. § 42**

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LIST OF EXHIBITS

TESLA-1001	U.S. Patent No. 12,233,871 to Langlotz (“the ’871 Patent”)
TESLA-1002	Excerpts from the Prosecution History of the ’871 Patent
TESLA-1003	Declaration and Curriculum Vitae of Jason Janet, Ph.D.
TESLA-1004	U.S. Patent Application Publication No. 2019/0233009 to Joos et al. (“Joos”)
TESLA-1005	European Patent No. EP2135788B1 to Kischkat (“Kischkat”), English Translation, Original Document, and Certification
TESLA-1006	U.S. Patent Application Publication No. 2019/0161086 to Bettger (“Bettger”)
TESLA-1007	U.S. Patent Application Publication No. 2007/0282502 to Bayer et al. (“Bayer”)
TESLA-1008	Abdallah et al., <i>Real-Time Vehicle Localization Using Steering Wheel Angle in Urban Cities</i> , 2023 IEEE International Conference on Mobility, Operations, Services and Technologies (“Abdallah”)
TESLA-1009	U.S. Patent No. 10,077,073 to Allexi et al. (“Allexi”)
TESLA-1010	U.S. Patent Application Publication No. 2014/0222252 to Matters et al. (“Matters”)
TESLA-1011	U.S. Patent Application Publication No. 2018/0201319 to Rogers (“Rogers”)
TESLA-1012	U.S. Patent Application Publication No. 2020/0369140 to McCarron et al. (“McCarron”)
TESLA-1013	U.S. Patent Application Publication No. 2018/0093655 to Healy et al. (“Healy”)

TESLA-1014	U.S. Patent Application Publication No. 2022/0355636 to Harmon et al. (“Harmon”)
TESLA-1015	U.S. Patent Application Publication No. 2019/0178998 to Pacala et al. (“Pacala”)
TESLA-1016	U.S. Patent Application Publication No. 2019/0146500 to Yalla et al. (“Yalla”)
TESLA-1017	U.S. Patent Application Publication No. 2020/0180633 to Wu (“Wu”)
TESLA-1018	U.S. Patent Application Publication No. 2020/0369262 to Suzuki et al. (“Suzuki”)
TESLA-1019	U.S. Patent Application Publication No. 2014/0200769 to Noh (“Noh”)
TESLA-1020	U.S. Patent No. 11,753,000 to Tashiro et al. (“Tashiro”)
TESLA-1021	U.S. Patent Application Publication No. 2007/0291130 to Broggi et al. (“Broggi”)
TESLA-1022	U.S. Patent Application Publication No. 2019/0291721 to Sakano et al. (“Sakano”)
TESLA-1023	U.S. Patent Application Publication No. 2021/0122387 to Hoop et al. (“Hoop”)
TESLA-1024	Parking & Reversing In & Out of Angled Spaces, A1 Driving School (Nov. 23, 2022), <i>available at</i> https://www.a1drivingschool.co.nz/guides/parking-and-reversing-in-and-out-of-angled-spaces/
TESLA-1025	How to Back Up, Safe2Drive (Sept. 26, 2023), <i>available at</i> https://web.archive.org/web/20230926120717/https://www.safe2drive.com/how-to/how-to-backup

TESLA-1026	U.S. Patent No. 11,932,230 (“Langlotz-230”)
TESLA-1027	U.S. Patent Application Publication No. 2020/0133272 to Chong (“Chong”)
TESLA-1028	U.S. Patent Application Publication No. 2022/0297744 to Watanabe (“Watanabe”)
TESLA-1029	U.S. Patent Application Publication No. 2019/0317516 to Zhu (“Zhu”)
TESLA-1030-1099	[RESERVED]
TESLA-1100	Original Complaint, <i>Bulletproof Property Management LLC v. Tesla, Inc.</i> , Civil Action No. 1:25-cv-00665 (W.D. Tex. May 5, 2025)
TESLA-1101	Amended Complaint, <i>Bulletproof Property Management LLC v. Tesla, Inc.</i> , Civil Action No. 1:25-cv-00665 (W.D. Tex. August 11, 2025)

LISTING OF CHALLENGED CLAIMS

Claim 1	
1[p]	A motor vehicle comprising:
1[a]	a frame having wheels;
1[b]	a motor connected to the frame;
1[c]	a steering control connected to the wheels to establish a steering angle;
1[d]	a brake control connected to the wheels;
1[e]	a drive system operably connected to the steering control, to the motor, and to the brake control;
1[f]	the drive system operable to selectably drive the wheels in a forward direction in a drive mode and in a rearward direction in a reverse mode; and
1[g]	the drive system operable in response to a sequence of detected steering and brake inputs when in a first one of the drive mode and reverse mode to change to the other of the drive mode and reverse mode, without operator indication of a direction.
Claim 2	
2	The motor vehicle of claim 1 wherein the sequence of detected steering and brake inputs includes detecting a steering angle in one direction while driving the vehicle in the first one of the drive mode and reverse mode, and detecting a steering angle in a second direction opposite the first direction while driving the vehicle in the other of the drive mode and reverse mode.
Claim 3	
3	The motor vehicle of claim 2 wherein the sequence of detected steering and brake inputs includes detecting a brake application.
Claim 4	
4	The motor vehicle of claim 3 wherein the brake application is a brake tap.

Claim 5	
5	The motor vehicle of claim 1 wherein the sequence of detected steering and brake inputs includes: detecting driving in a first direction with the steering control turned in a first direction, detecting application of the brake control, and detecting turning the steering control in a direction opposite the first direction.
Claim 6	
6	The motor vehicle of claim 5 wherein the sequence of detected steering and brake inputs includes while the vehicle is in a stopped condition, detecting turning the steering control in a direction opposite the first direction.
Claim 7	
7	The motor vehicle of claim 5 wherein the sequence of detected steering and brake inputs includes detecting releasing an accelerator pedal when driving in the first direction to slow the vehicle to a stop without driver application of force to the brake control, and then applying force to the brake control.
Claim 8	
8[p]	A motor vehicle comprising:
8[a]	a frame having wheels;
8[b]	a motor connected to the frame;
8[c]	a steering control connected to the wheels to establish a steering angle;
8[d]	a brake control connected to the wheels;
8[e]	a controller operably connected to the steering control, to the motor, and to the brake control;
8[f]	the controller operable to selectably drive the wheels in a forward direction in a drive mode and in a rearward direction in a reverse mode; and

8[g]	the controller operable in response to a sequence of detected steering and brake inputs when in a first one of the drive mode and reverse mode to change to the other of the drive mode and reverse mode, without operator indication of a direction.
Claim 9	
9	The motor vehicle of claim 8 wherein the sequence of detected steering and brake inputs includes detecting a steering angle in one direction while driving the vehicle in the first one of the drive mode and reverse mode, and detecting a steering angle in a second direction opposite the first direction while driving the vehicle in the other of the drive mode and reverse mode.
Claim 10	
10	The motor vehicle of claim 9 wherein the sequence of detected steering and brake inputs includes detecting a brake application.
Claim 11	
11	The motor vehicle of claim 10 wherein the brake application is a brake tap.
Claim 12	
12	The motor vehicle of claim 8 wherein the sequence of detected steering and brake inputs includes: detecting driving in a first direction with the steering control turned in a first direction, detecting application of the brake control, and detecting turning the steering control in a direction opposite the first direction.
Claim 13	
13	The motor vehicle of claim 12 wherein the sequence of detected steering and brake inputs includes while the vehicle is in a stopped condition, detecting turning the steering control in a direction opposite the first direction.
Claim 14	
14	The motor vehicle of claim 12 wherein the sequence of detected steering and brake inputs includes detecting releasing an accelerator

	pedal when driving in the first direction to slow the vehicle to a stop without driver application of force to the brake control, and then applying force to the brake control.
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Tesla, Inc. (“Petitioner” or “Tesla”) petitions for *Inter Partes* Review (“IPR”) of claims 1-14 (“the Challenged Claims”) of U.S. Patent No. 12,233,871 (“the ’871 Patent”). Compelling evidence presented in this Petition demonstrates at least a reasonable likelihood that Tesla will prevail with respect to at least one of the Challenged Claims.

I. REQUIREMENTS FOR IPR

A. Grounds for Standing

Petitioner certifies that the ’871 Patent is available for IPR. This Petition is being filed within one year of service of a complaint against Tesla. *See* TESLA-1100. Tesla is not barred or estopped from requesting review of the Challenged Claims on the below-identified grounds.

B. Challenge and Relief Requested

Tesla requests IPR of the Challenged Claims on the grounds indicated below. Grounds 1-2C are supported and corroborated by evidence cited throughout this Petition, including by the expert declaration of Dr. Jason Janet. TESLA-1003, ¶52.

Ground	Claim(s)	35 U.S.C. § 103
1	1-6, 8-13	Joos
2A	1-6, 8-13	Joos in view of Bettger
2B	1-6, 8-13	Joos in view of Bettger and Kischkat

Ground	Claim(s)	35 U.S.C. § 103
2C	7, 14	Joos in view of Bettger, Kischkat, and Hoop

The earliest possible priority date of the '871 Patent is June 5, 2023 (“Critical Date”). Each of the references in Grounds 1-2C pre-dates the Critical Date.

Reference	Filed	Published	AIA Prior Art Basis
Joos	1/19/2017	8/1/2019	§102(a)(1)-(2)
Bettger	11/28/2018	5/30/2019	§102(a)(1)-(2)
Hoop	10/28/2019	4/29/2021	§102(a)(1)-(2)
Kischkat	---	8/29/2012	§102(a)(1)

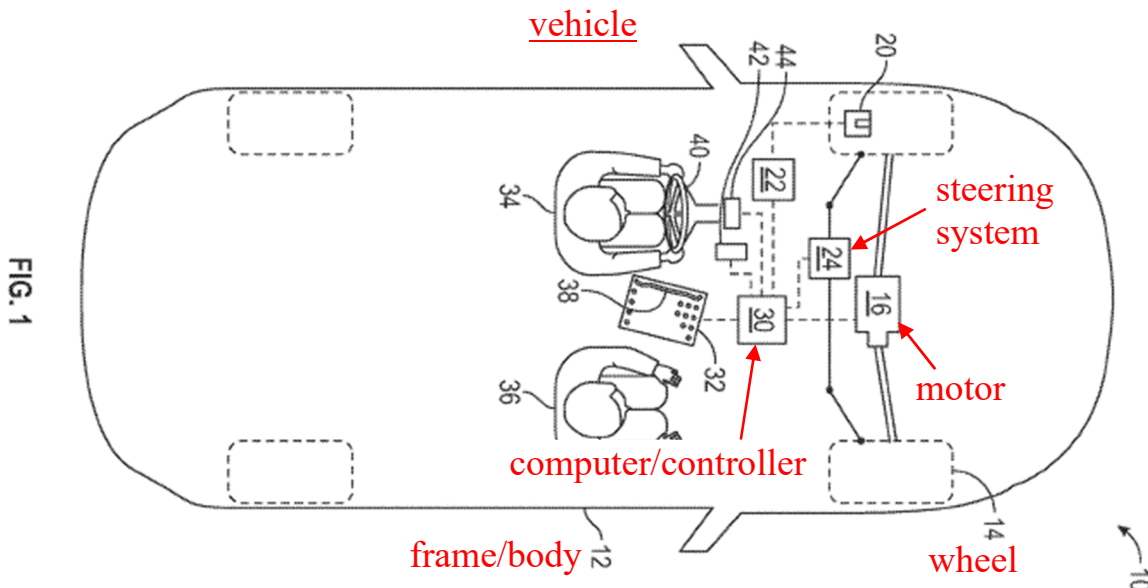
All references are analogous art as they are all directed to the same field of endeavor (*e.g.*, motor vehicle operational control systems), and they are also reasonably pertinent to at least one problem that the inventors of the '871 Patent sought to address (*e.g.*, distracting or non-intuitive gear shifters and vehicle controls). *See* TESLA-1001, 1:5-6 (“present invention relates to motor vehicles and operational control systems”), 1:37-49 (“these gear direction systems may have disadvantages, or have an opportunity for automation to provide convenience”), 1:53-59 (“may be a distraction, ... and may be [] non-intuitive”); TESLA-1004, [0001] (“driver assistance system for a motor vehicle”); TESLA-

1005, [0001] (“park-steer assist system”); TESLA-1006, [0008] (“a driver can be assisted when reversing”); TESLA-1023, [0002] (“vehicles may include one-pedal drive systems”); TESLA-1003, ¶¶45, 47, 49, 51.

II. THE '871 PATENT

A. Brief Description

The '871 Patent describes “motor vehicles and operational control systems.” TESLA-1001, 1:17-18; TESLA-1003, ¶¶35-38. According to the '871 Patent, “[t]raditional motor vehicles have gear selection controls” that “have a direction or element associated with each direction, and the driver indicates by the control operation which direction is desired.” TESLA-1001, 1:22-28. The '871 Patent notes that these prior systems “have an opportunity for automation,” for example, “during routine parking when backing out of a parking space, stopping, then selecting the forward drive direction.” TESLA-1001, 1:48-2:3, 2:32-36.



TESLA-1001, FIG. 1¹ (rotated)

The '871 Patent thus describes a “system... in the context of ‘unparking,’ when a driver backs out of a parking spot in reverse, steers to adjust direction while reversing, then shifts to drive, steers the other direction, then straightens out to proceed.” TESLA-1001, 2:61-3:6. The '871 Patent illustrates in FIG. 2 “the sequence of unparking.” TESLA-1001, 3:13-14. “The upper trace 110 indicates steering wheel angle on a time-based horizontal chart. The lower trace 120 indicates velocity. The lower images A-F depict the vehicle 130 in a parking space 132 and are located at their relative positions on the time axis.” TESLA-1001, 3:14-48.

¹ Annotations and color added to figures unless otherwise noted.

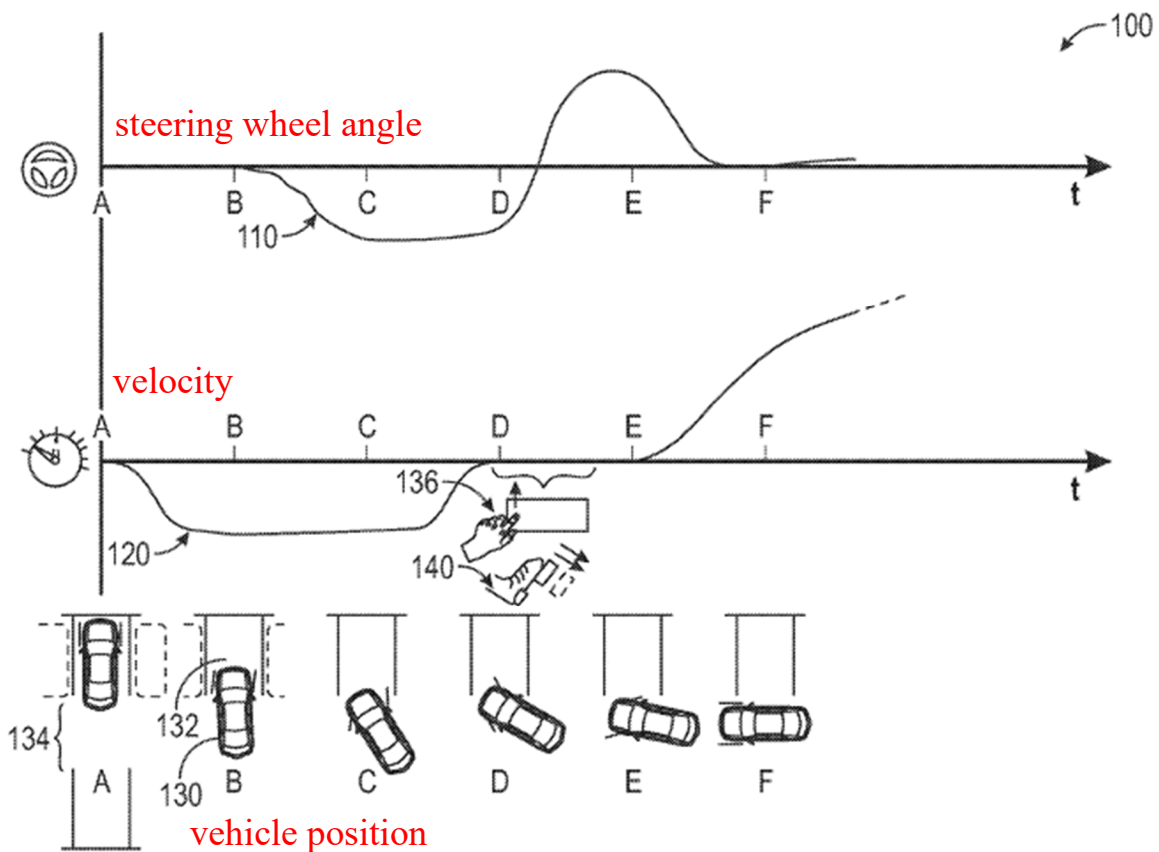


FIG. 2

TESLA-1001, FIG. 2

According to the specification, “[t]he controller may be programmed with specific functions or algorithms” indicating “when an auto-shift is clearly safe to offer or enact, and when if offered, acceptance by the driver is likely desired and not an unwanted distraction.” TESLA-1001, 3:54-57. The system may “determine actual patterns when auto-shifting might be safely offered,” for example, “based on wheel angle patterns, velocity patterns, with certain thresholds of their various amounts, derivatives, and integrals.” TESLA-1001, 3:57-4:1.

B. Prosecution History

Claims 1-14 were rejected as being anticipated by Shivaprasad (US2024/0051558). TESLA-1002, 133-138. The applicant argued that most of the cited sections of Shivaprasad are not prior art because they are absent in Shivaprasad's provisional application. TESLA-1002, 153-154. The application was subsequently allowed. TESLA-1002, 215-223. As reasons for allowance, the examiner stated that the prior art does not disclose claim elements 1[g] and 8[g]. As demonstrated below in Grounds 1-2C, however, the prior art and evidence cited in this Petition would have rendered obvious the claim elements that the examiner believed to be missing from the prior art. TESLA-1003, ¶39.

C. Level of Ordinary Skill in the Art

For purposes of this IPR, a person of ordinary skill in the art ("POSITA") would have had a Bachelor's degree in electrical engineering, computer engineering, computer science, physics, or a related field, and at least two years of experience in the research, design or development of autonomous systems for motor vehicles, or the equivalent, as of the Critical Date. TESLA-1003, ¶¶40-42. Increased educational experience can make up for less work experience, and vice versa. *Id.*

D. Claim Construction

All claim terms should be construed according to the *Phillips* standard. *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005); 37 C.F.R. § 42.100. No

formal claim constructions are presently necessary because “claim terms need only be construed to the extent necessary to resolve the controversy.” *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011). Petitioner reserves the right to respond to any constructions offered by Patent Owner or adopted by the Board. Petitioner is not conceding that each challenged claim satisfies all statutory requirements, nor is Petitioner waiving any arguments concerning claim scope or grounds that can only be raised in district court.

III. THE CHALLENGED CLAIMS ARE UNPATENTABLE

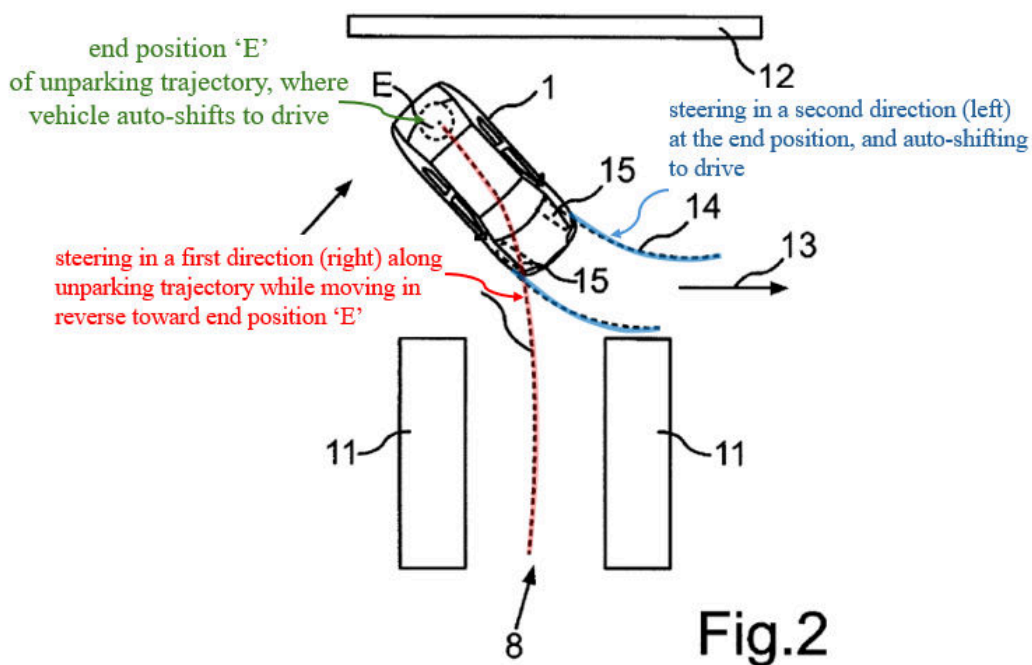
A. GROUND 1—Obvious based on Joos (Claims 1-6, 8-13)

1. Overview of Joos²

Joos describes “a method for unparking a motor vehicle from a cross-parking space, with which the motor vehicle is [maneuvered] along an unparking trajectory at least semi-autonomously from the cross-parking space onto a road bounding on the cross-parking space, wherein during said semi-autonomous [maneuvering] the motor vehicle carries out at least one reversing movement along

² General descriptions provided for the references (and combinations thereof) are incorporated into each subsection and mapping of the claims that includes citations to these references.

the unparking trajectory, an end position is determined and the semi-autonomous [maneuvering] of the motor vehicle along the unparking trajectory is ended at the end position.” TESLA-1004, [0001], [0008]; TESLA-1003, ¶¶43-44. “During [maneuvering] of the motor vehicle, the position of the motor vehicle can be defined continuously by means of odometry. In addition, objects, in particular objects bounding on the cross-parking space, can be detected with the sensors of the motor vehicle. This enables the position of the motor vehicle relative to the objects to be continuously determined.” TESLA-1004, [0009].



TESLA-1004, FIG. 2 (annotated)

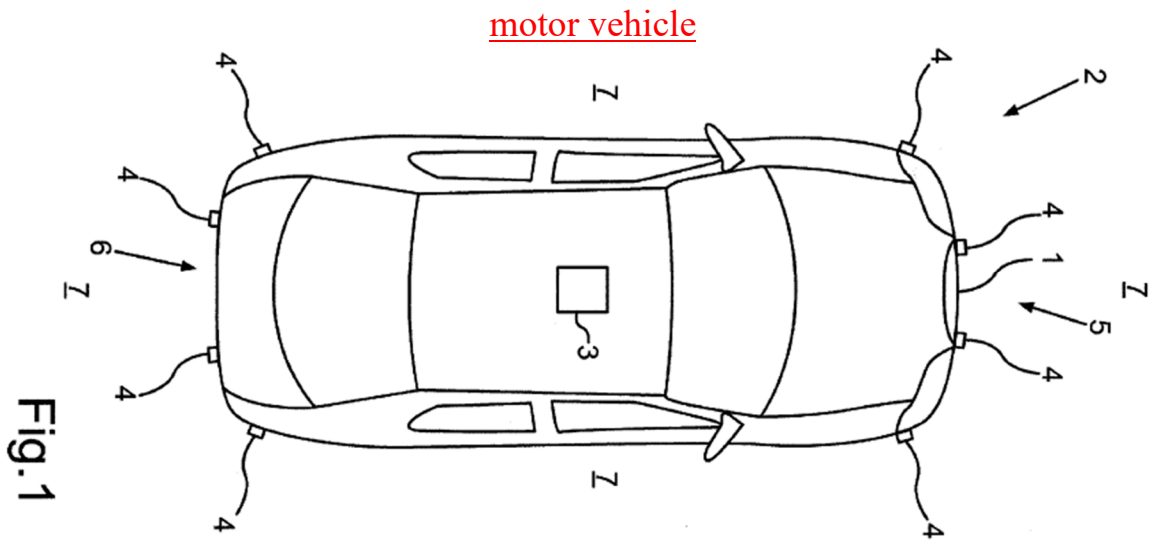
Joos describes that “the end position is determined under the assumption that a predefined steering angle, in particular a maximum steering angle, is set during

manual control of the motor vehicle,” and the “set steering angle is in particular selected so that the driver can carry out the collision-free forward movement without changing the adjusted steering angle.” TESLA-1004, [0015]-[0016], [0037]-[0038]. In Joos, “after reaching the end position a forward gear is engaged or an instruction to engage the forward gear is issued to the driver of the motor vehicle.” TESLA-1004, [0017], [0038]. Accordingly, Joos provides that “semi-autonomous [maneuvering] of the motor vehicle is ended, or the control of the motor vehicle is handed over to the driver, if the end position is reached, the specified steering angle has been set by the driver assistance system and the forward gear has been engaged.” TESLA-1004, [0018].

2. Claim Element Analysis

- (a) 1[p]: A motor vehicle comprising:
8[p]: A motor vehicle comprising:

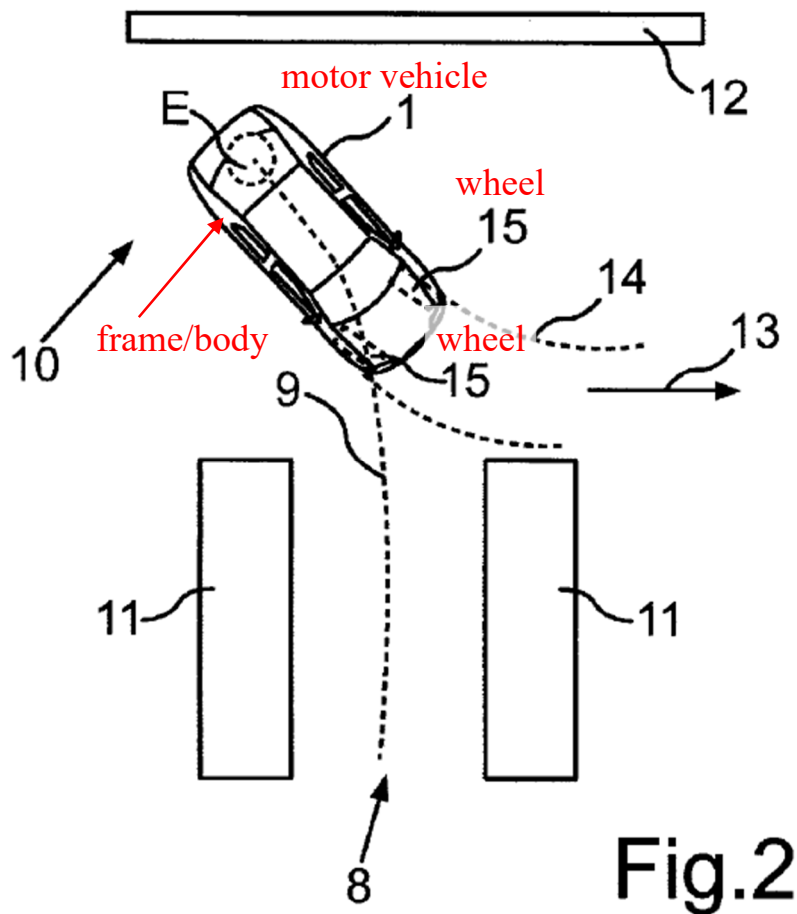
To the extent the preamble is a limitation, Joos discloses and renders it obvious. TESLA-1003, ¶¶53-54. For example, Joos discloses “a *motor vehicle*.” TESLA-1004, Abstract, [0001], [0005], FIG. 1. FIG. 1, reproduced below, depicts a top view of Joos’s *motor vehicle*. TESLA-1004, [0031]. Joos discloses that “manual driving of the motor vehicle can be carried out by a vehicle driver.” TESLA-1004, [0006], [0008], [0009], [0012], [0014], [0036]-[0037].



TESLA-1004, FIG. 1 (rotated)

- (b) 1[a]: a frame having wheels;
8[a]: a frame having wheels;

Joos renders obvious 1[a] and 8[a]. TESLA_1003, ¶¶55-56. Joos discloses that the motor vehicle has a “body” (*frame*) and “wheels.” TESLA-1004, [0014], [0016]. Joos also discloses “orient[ing] the steerable **wheels** of the motor vehicle in such a way that the steering has the predefined steering angle.” TESLA-1004, [0016]. FIG. 1 (above) and FIG. 2 (below) shows the motor vehicle 1 having a “body” and “wheels 15” (*a frame having wheels*). TESLA-1004, [0038].



TESLA-1004, FIG. 2

- (c) 1[b]: a motor connected to the frame;
8[b]: a motor connected to the frame;

Joos renders obvious 1[b] and 8[b]. TESLA_1003, ¶¶57-58. Joos discloses that the motor vehicle has “a drive *motor*.” TESLA-1004, [0002], [0008], [0021]. That the motor is *connected to the frame* of Joos’s vehicle is evident because Joos’s vehicle travels as an integrated unit including the motor and frame together. TESLA-1004, FIGs. 2-3; TESLA-1003, ¶58. A POSITA also would have found it obvious to connect the motor to the frame of Joos’s motor vehicle to ensure the

motor is adequately supported in the vehicle according to well-established vehicle assembly techniques. TESLA-1003, ¶58 (citing TESLA-1012, [0127]; TESLA-1014, [0076]).

- (d) **1[c]: a steering control connected to the wheels to establish a steering angle;**
 8[c]: a steering control connected to the wheels to establish a steering angle;

Joos renders obvious 1[c] and 8[c]. TESLA_1003, ¶¶59-60. Joos discloses that the motor vehicle has a “**steering wheel**” and a “**steering system**” that each individually or together provide a “*steering control*.” TESLA-1004, [0014]-[0015], [0033].

For example, Joos explains that “the driver assistance system can intervene in the **steering** of the motor vehicle once again and can orient the **steerable wheels** of the motor vehicle in such a way that the steering has the predefined **steering angle**.” TESLA-1004, [0016], [0033]. Additionally, “the driver of the vehicle can move on the lane of the road if he turns the steering wheel fully.” TESLA-1004, [0015]. Because the steering wheel and steering system (*steering control*) in Joos are operable by the driver to generate a steering input that causes the vehicle to turn its wheels to change its driving direction, the steering wheel and steering each individually or together provide *a steering control connected to the wheels to establish a steering angle*. TESLA-1003, ¶61.

- (e) **1[d]: a brake control connected to the wheels;**
8[d]: a brake control connected to the wheels;

Joos renders obvious 1[d] and 8[d]. TESLA_1003, ¶¶62-63. Specifically, Joos discloses that its vehicle includes “**brakes**” comprising a “*brake control*” connected to the wheels. *Id.*

For example, Joos discloses that the “driver of the motor vehicle... operate[s] the gas pedal and the **brakes**,” and further explains that “the driver assistance system also carries out the intervention into a brake system and a drive motor of the motor vehicle.” TESLA-1004, [0002], [0008]-[0009]. “The driver assistance system can for example comprise a controller or an electronic control unit, with which during the unparking [maneuver] control signals are output to the steering system of the motor vehicle and possibly to **the brake system** and/or the drive motor.” TESLA-1004, [0021]. A POSITA would have understood Joos’s brakes that allow the driver to slow the vehicle (*brake control*) and the brake system to be *connected to the wheels* because the *wheels* rotationally decelerate in response to brake input from the brake control. TESLA-1004, [0002], [0008]-[0009], [0021]; TESLA-1003, ¶64. Connecting Joos’s brakes to the wheels also would have been obvious to a POSITA to enable the driver and the driver assistance system to slow or stop the motor vehicle as desired while driving. *Id.*

- (f) **1[e]: a drive system operably connected to the steering control, to the motor, and to the brake**

control;
8[e]: a controller operably connected to the steering control, to the motor, and to the brake control;

Joos renders obvious 1[e] and 8[e]. TESLA_1003, ¶65. Specifically, Joos discloses that the motor vehicle includes a “*controller*” of a “driver assistance system” (*drive system*) connected to the steering control, to the motor, and to the brake control. TESLA-1004, [0021]; TESLA-1003, ¶66.

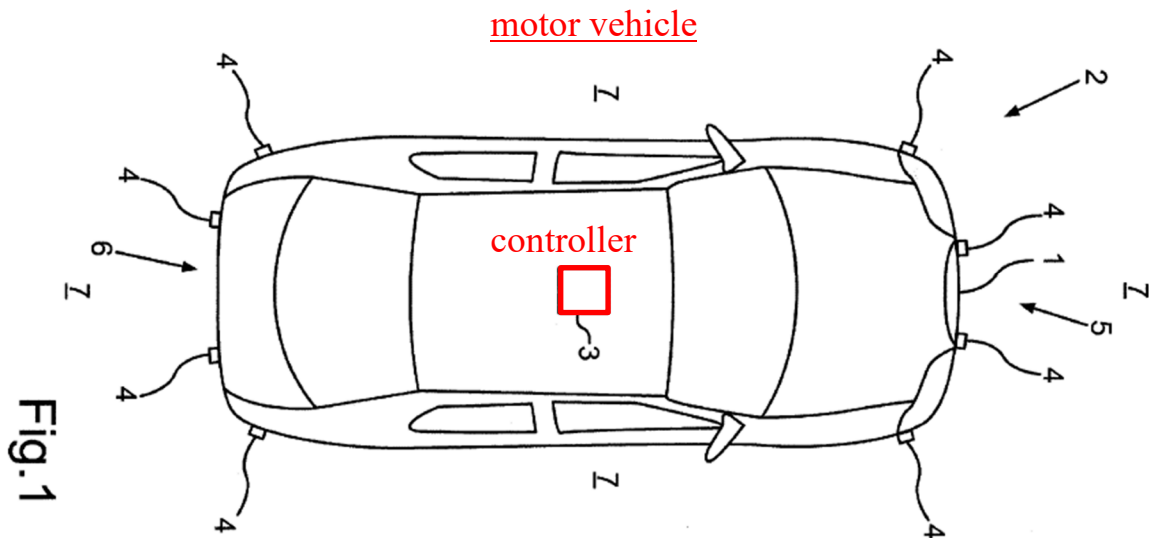
In more detail, Joos’s driver assistance system (*drive system*) includes “a *controller* or an electronic control unit, with which during the unparking [maneuver] control signals are output to the steering system of the motor vehicle and possibly to the brake system and/or the drive motor.” TESLA-1004, [0021], [0031]. “The driver assistance system 2 is [] embodied to continuously detect a movement of the motor vehicle 1 by means of odometry.” TESLA-1004, [0033], [0037]-[0038]. By continuously monitoring movement of the vehicle by odometry, the *controller* of the driver assistance system (*drive system*) monitors the *steering control*. TESLA-1004, [0016], [0021], [0031], [0033], [0037]-[0038], FIG. 2.

Estimating the location of a moving vehicle by odometry involves monitoring the steering angle and other factors (*e.g.*, velocity or distance traveled) over time.

TESLA-1008, 9; TESLA-1027, [0010], [0015]; TESLA-1003, ¶67. “The **controller 3 can thus also receive data from a speed sensor and/or a steering**

angle sensor, for example. Moreover, the **controller 3** is designed to output **corresponding control signals to the steering system** of the motor vehicle 1.”

TESLA-1004, [0033], [0037]-[0038].



TESLA-1004, FIG. 1 (rotated)

The controller of Joos’s driver assistance system (*drive system*) is *operably connected to the* steering system including the steering wheel (*steering control*) to detect steering inputs; indeed, Joos’s controller receives data from a steering angle sensor of the steering system and issues control signals to the steering system that are operable to cause the wheels to adjust their angle in accordance with the steering input from the steering system including the steering wheel. TESLA-1004, [0016], [0021], [0031], [0033], [0037]-[0038]; TESLA-1003, ¶68. The steering angle sensor is part of a steering system (*steering control*); indeed, the steering angle sensor provides a feedback signal relating to the steering angle that

allows the vehicle to be properly steered. TESLA-1004, [0033], [0037]-[0038]; TESLA-1003, ¶68 (citing TESLA-1008, 4-8, 1, 2; TESLA-1028, [0033]-[0036]).

A POSITA also would have recognized that Joos's drive system/controller monitors the steering control while autonomously or semi-autonomously driving in the reverse direction; indeed, the drive system/controller autonomously or semi-autonomously guides the vehicle along the unparking trajectory to the calculated end position E. TESLA-1004, [0008]. It was known and obvious to use closed-loop steering feedback in this context to minimize a difference between the steering angles needed to follow the unparking trajectory and the measured steering angles obtained through monitoring of the steering control. TESLA-1003, ¶69 (citing TESLA-1029, [0072]-[0073]); *cf.*, TESLA-1001, 2:32-36, 2:48-56 (substantially similar features disclosed in the '104 Patent's preferred embodiments).

Joos's controller of the driver assistance system also is operably connected to the drive motor of the motor vehicle that controls their operation. TESLA-1003, ¶70. The controller of the driver assistance system issues control signals to the motor that are operable to cause the wheels to accelerate in angular velocity. TESLA-1004, [0016], [0021], [0031], [0033], [0037]-[0038].

The controller of Joos's driver assistance system is also operably connected to the brakes (*brake control*) and the brake system. TESLA-1003, ¶71. Indeed, the controller of the driver assistance system, responsive to brake input from the

brake control, issues control signals to the brake system that are operable to cause the wheels to decelerate in angular velocity. TESLA-1004, [0002], [0008]-[0009], [0021]. Operably connecting Joos's controller to the steering control, motor, and brake control also would have been obvious to a POSITA to enable the driver assistance system to brake, accelerate, and steer the motor vehicle as needed to carry out autonomous or semi-autonomous tasks such as the disclosed unparking maneuver and in accordance with well-established vehicle assembly techniques. TESLA-1003, ¶71.

- (g) **1[f]: the drive system operable to selectably drive the wheels in a forward direction in a drive mode and in a rearward direction in a reverse mode; and**
8[f]: the controller operable to selectably drive the wheels in a forward direction in a drive mode and in a rearward direction in a reverse mode; and

Joos renders obvious 1[f] and 8[f]. TESLA_1003, ¶72. For example, Joos discloses that “the driver assistance system itself can change from the **reverse gear** into the **forward gear**. A gear change can thus be carried out by the driver assistance system.” TESLA-1004, [0017]. “It can thus be provided that the motor vehicle is moved back and forth until the end point can be reached.” TESLA-1004, [0020], [0039]-[0040]; *see also id.*, FIGs. 2-5. The controller of the driver assistance system (**drive system**) “can change from the reverse gear into the

forward gear” to move the vehicle “back and forth.” *Id.* Accordingly, Joos’s controller of the drive system is *operable to selectably drive the wheels in a forward direction in a drive mode and in a rearward direction in a reverse mode.* TESLA-1003, ¶73.

- (h) 1[g]: the drive system operable in response to a sequence of detected steering and brake inputs when in a first one of the drive mode and reverse mode to change to the other of the drive mode and reverse mode, without operator indication of a direction.
8[g]: the controller operable in response to a sequence of detected steering and brake inputs when in a first one of the drive mode and reverse mode to change to the other of the drive mode and reverse mode, without operator indication of a direction.

Joos renders obvious 1[g] and 8[g]. TESLA_1003, ¶74. Joos discloses *detecting steering and brake inputs.* TESLA-1003, ¶75. As discussed above in 1[d]-1[e], Joos discloses that the “driver of the motor vehicle... operate[s] the gas pedal and the **brakes**” and that “the driver assistance system also carries out the intervention into a **brake system** and a drive motor of the motor vehicle.” TESLA-1004, [0002], [0008]-[0009]. “The driver assistance system can for example comprise a controller or an electronic control unit, with which during the unparking [maneuver] control signals are output to **the steering system** of the motor vehicle and possibly to **the brake system** and/or the drive motor.” TESLA-

1004, [0021]. “The driver assistance system 2 is [] embodied to **continuously detect** a movement of the motor vehicle 1 by means of odometry. The **controller 3** can thus also receive data from a speed sensor and/or a steering angle sensor, for example. Moreover, the **controller 3 is designed to output corresponding control signals to the steering system** of the motor vehicle 1.” TESLA-1004, [0033], [0037]-[0038].

Joos’s *controller* of the driver assistance system (*drive system*) thus detects steering and brake inputs that allow it to continuously detect movement of the motor vehicle. TESLA-1003, ¶76. Joos’s steering inputs are detected from the steering angle sensor and from signals issued to and received from the steering system that allow the driver assistance system to intervene in steering. TESLA-1004, [0002], [0008]-[0009], [0021], [0033], [0037]-[0038]. Joos’s brake inputs are detected from the brake system, from the speed sensor that produces signals indicative of braking when the vehicle decelerates, and from signals issued to and received from the braking system that allow the driver assistance system to intervene in braking. *Id.* Accordingly, the detected steering inputs not only include real-time measurements of steering angles but also include steering control signals detected by the steering system that are applied to steer the vehicle during Joos’s unparking maneuver. *Id.* Likewise, the detected brake inputs not only include real-time braking measurements but also include brake control signals

output by the controller and detected by the braking system that are applied to brake the vehicle during the unparking maneuver. *Id.*

Joos discloses *when in a first one of the drive mode and reverse mode to change to the other of the drive mode and reverse mode*. TESLA-1003, ¶77. For example, Joos discloses that “the motor vehicle is **stopped at the end position**” of the unparking trajectory and “[a]fter the end position is reached, the driver assistance system itself can **change from the reverse gear into the forward gear**.” TESLA-1004, [0016]-[0018], [0036]-[0038], FIG. 2.

The controller of Joos’s driver assistance system changes from the reverse mode to the drive mode without “operator indication of a direction,” but rather *in response to a sequence of detected steering and brake inputs* made during an autonomous or semi-autonomous unparking procedure. TESLA-1003, ¶78. Joos’s *sequence of detected steering and brake inputs* includes (1) steering in a first direction while reversing to reach the end position of the unparking trajectory, (2) braking to stop at the end position, and (3) steering in the opposite direction at the end position of the unparking trajectory to attain “a predetermined or adjusted steering angle,” e.g., “a maximum steering angle,” for the anticipated forward

movement of the vehicle after unparking is complete.³ TESLA-1004, [0010], [0014], [0015], [0036]-[0038], FIG. 2; TESLA-1003, ¶78.

In more detail, Joos discloses that the controller of the driver assistance system sets the steering angle in a first direction while traveling “along the unparking trajectory” “in the reversing direction” “until it has reached an end position” where “the autonomous parking [maneuver] is ended” and “the motor vehicle is stopped.” TESLA-1004, [0008], [0016]-[0017]. The steering control

³ Joos’s *sequence of detected steering and brake inputs* can include either or both of steering inputs (1) and (3). Steering input (1) and followed by brake input (2) is sufficient even without steering input (3) to provide a *sequence of detected steering and brake inputs* as claimed. TESLA-1003, ¶78. Likewise, brake input (2) followed by steering input (3) is sufficient even without steering input (1) to provide a *sequence of detected steering and brake inputs*. *Id.* The sequence of detected steering inputs described in this example is the same pattern recited in dependent claim 5 (“detecting driving in a first direction with the steering control turned in a first direction... and detecting turning the steering control in a direction opposite the first direction.”). *Infra*, Claim 5. This pattern is also recited in claim 4 of related U.S. Patent No. 11,932,230 (TESLA-1026).

signals issued by the controller and detected by the steering system to steer the vehicle while reversing to the end position provides a first one or more “*steering input(s)*” of the “*sequence.*” TESLA-1003, ¶79. The braking control signals issued by the controller and detected by the braking system to stop at the end position provides one or more “*brake input(s)*” of the “*sequence.*” This brake input in Joos’s *sequence of detected steering and brake inputs* would be further apparent and/or obvious in light of Joos’s teaching that the vehicle must be stopped before shifting gears. TESLA-1004, [0016]-[0018]; TESLA-1003, ¶79.

While stopped at the end position, Joos discloses that the motor vehicle is steered in the opposite direction from the direction of steering while reversing to set a “a predefined steering angle, in particular a maximum steering angle” “so that the driver can carry out [a] collision-free forward movement without changing the adjusted steering angle.” TESLA-1004, [0010], [0015], [0016], [0037]. Joos explains that “it is advantageous if the specified steering angle at the end position is set by means of a driver assistance system of the motor vehicle. If the end position is reached, the driver assistance system can intervene in the steering of the motor vehicle once again and can orient the steerable wheels of the motor vehicle in such a way that the steering has the predefined steering angle.” TESLA-1004, [0016], [0038]. The steering control signals issued by the controller and detected by the steering system to set the pull-forward steering angle at the end position

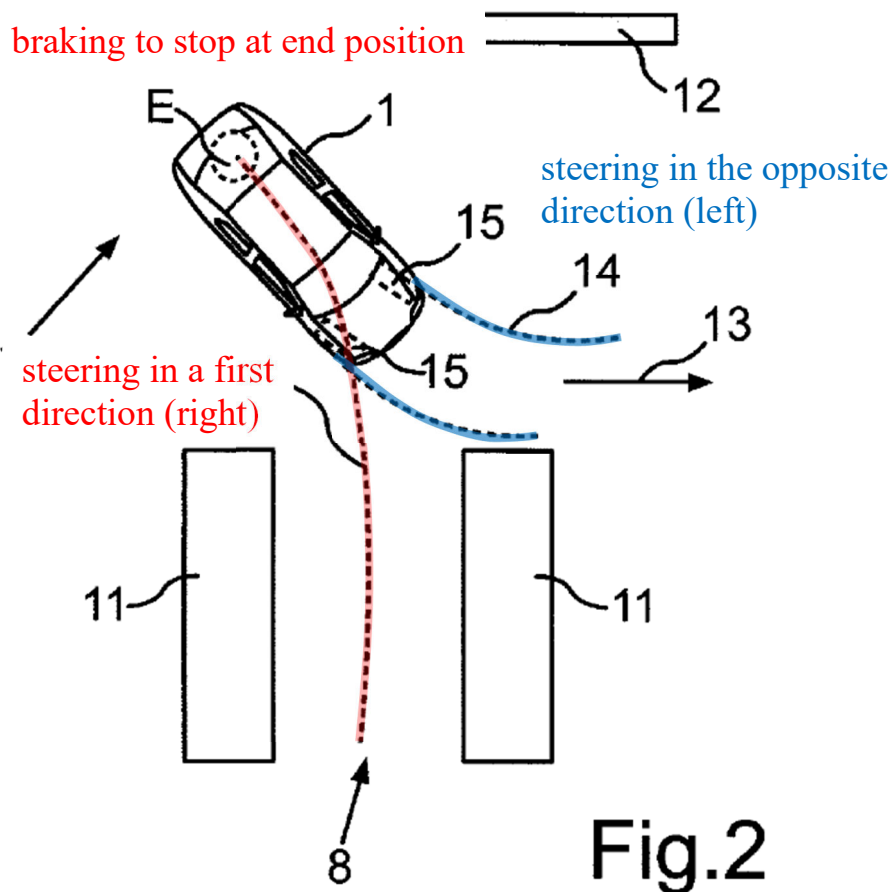
provides another one or more “*steering input(s)*” of the “*sequence*” that follows the steering input(s) for reversing and the brake input(s) for stopping at the end position TESLA-1003, ¶80. Further explanation as to how Joos discloses and renders obvious shifting gears from reverse to drive at the end position only after and in response to a sequence that includes detecting that the pull-through steering angle has been set is provided below in the analysis of Claims 6 and 13. *Infra*, III.A.2(k).

Joos describes that the controller of the driver assistance system (*drive system*) is operable *when in a reverse mode to change to the drive mode* after the reversing movement. TESLA-1003, ¶81. For example, Joos discloses that after “the end position is reached, the driver assistance system itself can change from the reverse gear into the forward gear.” TESLA-1004, [0017], [0038], [0018].

Moreover, in Joos, the vehicle is steered in a first direction while reversing to reach the end position of the unparking trajectory, is braked to stop at the end position, and is then steered in the opposite direction to achieve the specified steering angle that will allow the driver to safely pull the vehicle forward. This *sequence of steering and brake inputs*, indicated by control signals from the controller, is detected and used to trigger the requisite steering and braking to be performed for the vehicle to arrive at the end position and be placed in a state where the controller auto-shifts to drive. As such, the controller of Joos’s drive

system *is operable in response to a sequence of detected steering and brake inputs when in the reverse mode to change to the drive mode.* TESLA-1003, ¶82. For example, as shown in FIG. 2, the vehicle is reversed while applying a steering angle in the first direction (turned to the right) until it reaches the end position E where it is braked to a stop. Also shown in FIG. 2, the maximum steering angle set while the vehicle is stopped at the end position is a steering angle in the opposite direction (turned to the left) “so that the motor vehicle 1 can be oriented along the driving direction 13 in a single forward movement starting from the end position E.” TESLA-1004, [0036]; *see also id.*, [0008], [0015], [0028], [0037], [0009]-[0010], FIG. 2.

Thus, by shifting gears from reverse to drive as a result of detecting steering inputs that steer the wheels first in a rightward direction to reverse the vehicle to the end position E, detecting braking inputs that stop the vehicle at the end position E, and detecting further steering inputs that steer the wheels in a leftward direction to set the specified (*e.g.*, maximum) steering angle that ensures the driver will not collide with adjacent vehicles 11 during forward movement, the controller of Joos’s drive system changes the drive direction only in response to the sequence of detected steering and brake inputs as recited in 1[g]/8[g]. TESLA-1003, ¶83.

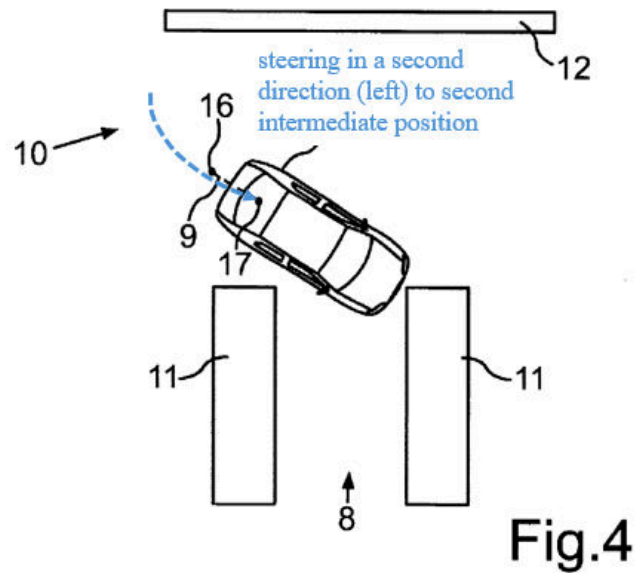
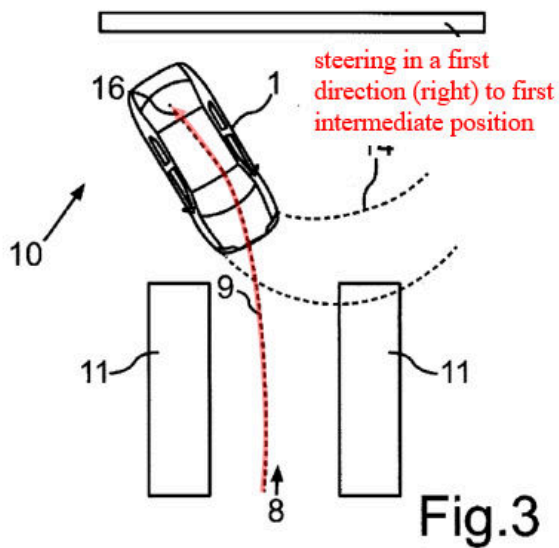


TESLA-1004, FIG. 2 (annotated)

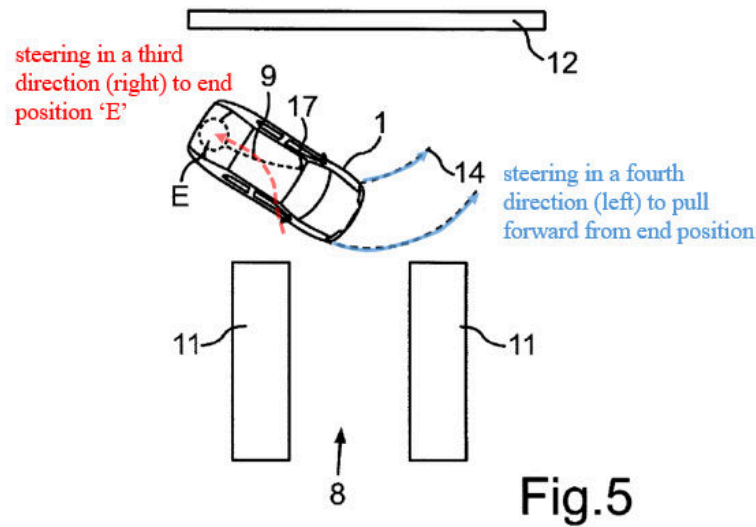
Further, in Joos, the controller's change to the drive mode is accomplished *without operator indication of a direction*. *Id.* Joos's controller *changes to the drive mode without operator indication of direction*; indeed, the driver never manipulates the vehicle's gear selector or any other control that specifies a particular direction at end position E. TESLA-1004, [0017]; *cf.*, TESLA-1001, 1:42-47, 3:49-53, 5:15-24 ('871 Patent disclosing similar inputs that do not involve operator indication of direction); TESLA-1003, ¶84.

Joos also discloses scenarios that require additional steering and brake inputs

to be provided in a sequence of alternating directions to travel back and forth between intermediate positions until the end position E is reached. TESLA-1004, [0039]-[0040], FIGs. 3-5. Joos's motor vehicle is also capable of adjusting the steering angle while in a reverse gear as evident from the curved trajectory taken by the vehicle when backing out of the parking space. *Id.*; TESLA-1004, FIGs. 2, 3-5. As illustrated below, the series of reversing and forward movements of the vehicle to reach the end position E while providing steering and brake inputs that include steering to the right while reversing to a first intermediate point, braking to a stop at the first intermediate point, steering to the left while driving forward to a second intermediate point, braking to a stop at the second intermediate point, steering to the right while reversing to end position E, and braking to a stop at the end position E further exemplifies how finally changing the drive direction in response to *a sequence of detected steering and brake inputs* would have been obvious to a POSITA based on Joos. TESLA-1003, ¶85.



TESLA-1004, FIGs. 3-4



TESLA-1004, FIG. 5

- (i) **Claim 2:** The motor vehicle of claim 1 wherein the sequence of detected steering and brake inputs includes detecting a steering angle in one direction while driving the vehicle in the first one of the drive mode and reverse mode, and detecting a steering angle in a second direction opposite the first direction while driving the vehicle in the other of the drive mode and

reverse mode.

Claim 3: The motor vehicle of claim 2 wherein the sequence of detected steering and brake inputs includes detecting a brake application.

Claim 4: The motor vehicle of claim 3 wherein the brake application is a brake tap.

Claim 9: The motor vehicle of claim 8 wherein the sequence of detected steering and brake inputs includes detecting a steering angle in one direction while driving the vehicle in the first one of the drive mode and reverse mode, and detecting a steering angle in a second direction opposite the first direction while driving the vehicle in the other of the drive mode and reverse mode.

Claim 10: The motor vehicle of claim 9 wherein the sequence of detected steering and brake inputs includes detecting a brake application.

Claim 11: The motor vehicle of claim 10 wherein the brake application is a brake tap.

Joos renders obvious Claims 2-4 and 9-11. TESLA-1003, ¶86. For the reasons discussed above with respect to Elements 1[g] and 8[g], Joos discloses and renders obvious *the sequence of detected steering and brake inputs includes detecting a steering angle in one direction while driving the vehicle in the reverse mode, detecting a steering angle in a second direction opposite the first direction while driving the vehicle in the drive mode, and detecting a brake application* that is *a brake tap*. TESLA-1003, ¶87. For example, the series of reversing and forward movements of the vehicle to reach the end position E as described with respect to FIGs. 3-5 in Joos provides *a sequence of detected steering and brake*

inputs that includes (1) steering to the right while reversing to the first intermediate point (*detecting a steering angle in one direction* (right) *while driving the vehicle in the first one of the drive mode and reverse mode* (reverse mode)), (2) braking to stop at the first intermediate point (*detecting a brake application*), (3) steering to the left while driving forward to the second intermediate point (*detecting a steering angle in a second direction opposite the first direction* (left) *while driving the vehicle in the other of the drive mode and reverse mode* (drive mode)), (4) braking to stop at the second intermediate point (*detecting a brake application*), (5) steering to the right while reversing to end position E (*detecting a steering angle in one direction* (right) *while driving the vehicle in the first one of the drive mode and reverse mode* (reverse mode)), and (6) braking to stop at the end position E (*detecting a brake application*). TESLA-1004, [0029]-[0039], FIGs. 3-5; *supra*, §III.A.2(h); TESLA-1003, ¶87. A POSITA would have understood or at least found it obvious that braking to stop in Joos's unparking maneuver, whether at an intermediate position or the end position, involves a "*brake tap*"; indeed, the brake is applied to stop the vehicle and then released to continue maneuvering the vehicle to the next position or otherwise to drive in the lane away from the parking space. TESLA-1003, ¶87.

- (j) **Claim 5: The motor vehicle of claim 1 wherein the sequence of detected steering and brake inputs includes: detecting driving in a first**

direction with the steering control turned in a first direction, detecting application of the brake control, and detecting turning the steering control in a direction opposite the first direction.

Claim 12: The motor vehicle of claim 8 wherein the sequence of detected steering and brake inputs includes: detecting driving in a first direction with the steering control turned in a first direction, detecting application of the brake control, and detecting turning the steering control in a direction opposite the first direction.

Joos renders obvious Claims 5 and 12. TESLA-1003, ¶88. For reasons discussed above with respect to Elements 1[g]/8[g] and 2-4/9-11, Joos discloses and renders obvious *the sequence of detected steering and brake inputs includes: detecting driving in a first direction with the steering control turned in a first direction, detecting application of the brake control, and detecting turning the steering control in a direction opposite the first direction.* TESLA-1003, ¶89.

For example, Joos's *sequence of detected steering and brake inputs* includes steering in a first direction (*e.g., right*) to reach the end position of the unparking trajectory (*detecting driving in a first direction (reverse) with the steering control turned in a first direction*), braking to stop at the end position (*detecting application of the brake control*), and steering in the opposite direction (*e.g., left*) to attain the "predetermined or adjusted steering angle," *e.g., "a maximum steering angle," (detecting turning the steering control in a direction*

opposite the first direction) for the anticipated forward movement of the vehicle after unparking is complete. TESLA-1004, [0014]-[0018], [0034]-[0038], FIG. 2; *supra*, III.A.2(h); TESLA-1003, ¶90.

As another example, the series of reversing and forward movements of the vehicle to reach the end position E provides *a sequence of steering and brake inputs* that includes (1) steering to the right while reversing to the first intermediate point (*detecting driving in a first direction* (reverse) *with the steering control turned in a first direction* (right)), (2) braking to stop at the first intermediate point (*detecting application of the brake control*), (3) steering to the left while driving forward to the second intermediate point (*detecting turning the steering control in a direction opposite the first direction* (left)), (4) braking to stop at the second intermediate point (*detecting application of the brake control*), (5) steering to the right while reversing to end position E (*detecting driving in a first direction* (reverse) *with the steering control turned in a first direction* (right)), and (6) braking to stop (*detecting application of the brake control*) at the end position E. TESLA-1004, [0029]-[0039], FIGs. 3-5; *supra*, §§III.A.2(h), III.A.2(i); TESLA-1003, ¶91.

- (k) **Claim 6: The motor vehicle of claim 5 wherein the sequence of detected steering and brake inputs includes while the vehicle is in a stopped condition, detecting turning the steering control in a direction opposite the first direction.**

Claim 13: The motor vehicle of claim 12 wherein the sequence of detected steering and brake inputs includes while the vehicle is in a stopped condition, detecting turning the steering control in a direction opposite the first direction.

Joos renders obvious Claims 6 and 13. TESLA-1003, ¶92. For the reasons discussed above with respect to Elements 1[g]/8[g] and Claims 5/12, Joos discloses and renders obvious *the sequence of detected steering and brake inputs includes while the vehicle is in a stopped condition, detecting turning the steering control in a direction opposite the first direction*. *Supra*, III.A.2(h); III.A.2(j); TESLA-1003, ¶93. For example, the *sequence of detected steering and brake inputs* includes (1) steering in a first direction (*e.g.*, right) to reach the end position of the unparking trajectory, (2) braking to stop at the end position E, and (3) steering in the opposite direction to attain the “predetermined or adjusted steering angle,” *e.g.*, “a maximum steering angle” while stopped at the end position E (*while the vehicle is in a stopped condition, detecting turning the steering control in a direction opposite the first direction*) for the anticipated forward movement of the vehicle after unparking is complete. TESLA-1004, [0014]-[0018], [0034]-[0038], FIG. 2; TESLA-1003, ¶93.

Joos’s disclosure also makes clear that the *controller* of the driver assistance system (*drive system*) auto-shifts to drive (*changing from reverse mode to drive*

mode) at the end position of the unparking maneuver only after and in response to the steering control being steered in the opposite direction to set the pull-forward steering angle (*based on the steering control*) while the vehicle is stopped at the end position. TESLA-1003, ¶94. For example, Joos explicitly states that the driver “take[s] over directly and rapidly” from the driver assistance system to manually operate the vehicle once the vehicle shifts to drive. TESLA-1004, [0017], [0038]. The pull-forward steering angle would need to be set before the drive system/controller auto-shifts to drive for the driver to “take over directly and rapidly” as disclosed. TESLA-1003, ¶94. Additionally, Joos explains that the last action to occur when “the automatic or autonomous unparking manoeuvre is [] ended” is to “engage the forward gear.” TESLA-1004, [0017]-[0018]; *see also id.*, [0009], [0011]-[0012], [0014]-[0015], [0037]-[0039]. This means that the pull-forward steering angle must be set before the forward gear is engaged; indeed, the pull-forward steering angle is set by the driver assistance system before the automatic or autonomous unparking maneuver is ended. *Id.*; TESLA-1003, ¶94.

A POSITA also would have found it obvious to condition Joos’s auto-shift to drive (*changing from reverse mode to drive mode*) at the end position E of the unparking trajectory on completion of the detected sequence of steering and brake inputs, including detecting that the pull-forward steering angle has been set while the vehicle is parked at the end position. TESLA-1003, ¶95. This would have

been obvious and beneficial to ensure full control of the vehicle could be handed back to the driver more quickly upon shifting to drive and to ensure the driver would not pull forward from the end position before the steering angle is set. TESLA-1004, [0017]; *Id.* Joos teaches that the steering angle is set to avoid collisions and to allow the vehicle to properly orient itself in the lane of travel when the driver pulls forward while maintaining the set steering angle. TESLA-1004, [0010], [0014]-[0016], [0036]-[0038]. Maintenance of the set steering angle also allows the vehicle to avoid collisions with other parked vehicles. *Id.* Allowing the driver to pull forward before the steering angle is set introduces risk of collisions with other vehicles and prevents the vehicle from being properly oriented such that it could move forward into the lane of travel, all of which may compromise safety. *Id.*; TESLA-1004, [0010], [0014]-[0016], [0036]-[0038]. Accordingly, a POSITA would have been motivated to configure Joos's drive system/controller to auto-shift to drive based on the pull-forward steering angle first being set to enhance safety and provide a more intuitive driving experience that would allow the driver to immediately assume full control of the vehicle once the vehicle shifts to drive. TESLA-1003, ¶95. Allowing the driver to more quickly assume control of the vehicle after the auto-shift to drive also furthers Joos's objective of "enabl[ing] the driver of the motor vehicle to take over directly and rapidly." TESLA-1004, [0017]. Further, it provides added convenience;

indeed, the set steering angle allows the driver to simply pull forward into the direction of the lane of travel while avoiding collisions with nearby vehicles or objects (*e.g.*, vehicle in adjacent parking spaces). *Id.*, [0014]; TESLA-1003, ¶95. Even basic driver's education instructional materials teach drivers to set the pull-forward steering angle before shifting to drive upon exiting a parking space. *See, e.g.*, TESLA-1003, ¶95; TESLA-1024, 1; TESLA-1025, 3.

Moreover, configuring the drive system/controller to auto-shift to drive only after setting the steering angle would have been obvious to try. TESLA-1003, ¶96. Joos discloses both setting of the steering angle and shifting to drive as two actions that must occur at the end of the unparking procedure before control is handed back to the user. *Id.*; TESLA-1004, [0018]. A finite number of options exist for sequencing these actions. TESLA-1003, ¶96. Namely, the steering angle could only be set before, during, or after the auto-shift to drive of the vehicle. *Id.* Considering these limited options and the known benefits of setting the steering angle before auto-shifting to drive as described above, it would have been obvious to implement Joos such that the auto-shift to drive would occur only if the steering angle had been successfully set beforehand. *Id.* A POSITA would have reasonably expected success because implementing the system in this manner would merely involve applying capabilities that the driver assistance system in Joos was already configured to perform (*e.g.*, setting the steering angle and auto-

shifting to drive). *Id.* Joos’s vehicle is also capable of adjusting the steering angle while in a reverse gear as evident from the curved trajectory taken by the vehicle when reversing from the parking space. *Id.*; TESLA-1004, FIG. 2.

As another example, the series of reversing and forward movements of the vehicle to reach the end position E provides *a sequence of steering and brake inputs* that includes steering to the right while reversing to the first intermediate point, braking to stop at the first intermediate point, steering to the left while driving forward to the second intermediate point, braking to stop at the second intermediate point, steering to the right while reversing to end position E, braking to stop at the end position E, and steering in the opposite direction to attain the “predetermined or adjusted steering angle,” e.g., “a maximum steering angle,” (*while the vehicle is in a stopped condition, detecting turning the steering control in a direction opposite the first direction*) for the anticipated forward movement of the vehicle after unparking is complete. TESLA-1003, ¶97.

B. GROUND 2A—Obvious based on Joos in view of Bettger (Claims 1-6, 8-13)

1. Overview of Bettger

Bettger describes “assisted performance of a reverse-turning maneuver of a vehicle.” TESLA-1006, [0002], [0036]; TESLA-1003, ¶50. In Bettger, if “the driver of the vehicle agrees with executing the reverse-turning maneuver, he

confirms the same by... carrying out a certain steering movement, for example, a steering movement of an angle which lies above a certain threshold value and which corresponds to the steering movement that is necessary for carrying out the reverse-turning maneuver.” TESLA-1006, [0044], [0021]. “Receipt by the processing unit 14 of the driver’s confirmation causes the processing unit to perform computerized determination and outputting of instructions for carrying out the reverse-turning maneuver. The instructions may comprise a route to be followed by the vehicle to perform the maneuver.” TESLA-1006, [0045], [0017]. “The processing unit 14 may further output to a vehicle dynamics controller 18 of vehicle steering angles, steering torques and/or engine or vehicle speeds necessary for traversing the determined route” such that the vehicle can “operate in a partially or fully autonomous manner... [in] perform[ing] the reverse-turning maneuver.” TESLA-1006, [0045]. When the vehicle’s orientation permits travelling in a forward direction, a vehicle dynamics controller 18 selects “the appropriate transmission gear range” and shifts gears from the REVERSE range “to the DRIVE range” so that the “vehicle can now continue travelling rapidly forwards.” TESLA-1006, [0047], [0045].

2. Combination of Joos and Bettger

It would have been obvious to integrate in Joos Bettger’s teachings for the driver to confirm initiation of an assisted reverse-turning maneuver based on the

driver's steering input to the vehicle. TESLA-1003, ¶98. Based on Bettger's teachings, the Joos-Bettger vehicle would initiate Joos's autonomous or semi-autonomous unparking maneuver—*i.e.*, a type of reverse-turning maneuver like those taught in Bettger—only following confirmation by the driver. TESLA-1006, [0021], [0043]-[0047], FIGs. 1-2. More specifically, the driver would provide confirmation by “carrying out a certain steering movement, for example, a steering movement of an angle which lies above a certain threshold value and which corresponds to the steering movement that is necessary for carrying out the reverse-turning maneuver.” TESLA-1006, [0044]. For example, in the combination, while the vehicle is parked, or even after the driver begins reversing from the parking space, “[i]f it is determined that the maneuver is permitted, an audible, haptic or visible signal may be output to the driver of the vehicle.” TESLA-1006, [0043]. The driver would then signal confirmation to initiate the maneuver (or at least initiate the assisted maneuver) by “carrying out a certain steering angle movement” that “corresponds to the steering movement” for carrying out the unparking maneuver (*e.g.*, steering angle movement for following Joos's “predetermined” “unparking trajectory”). *Id.*, [0044]. In response to this initiating steering movement, the driver assistance system would intervene in one or more aspects of the vehicle's operation (*e.g.*, steering, acceleration, braking) to carry out Joos's autonomous or semi-autonomous unparking maneuver. TESLA-

1004, [0008], [0017]; TESLA-1006, [0044]-[0047]; TESLA-1003, ¶99.

Once the vehicle arrives and stops at the end position of Joos's unparking trajectory, and the pull-forward steering angle is set as taught in Joos, the controller of the driver assistance system in the Joos-Bettger vehicle changes from the reverse mode to drive mode by auto-shifting from a reverse gear to a drive gear as taught in each of Joos and Bettger. TESLA-1004, [0017], [0038]; TESLA-1006, [0045], [0047]. The driver's steering input that sets a steering angle greater than a threshold as taught in Bettger triggers initiation of the assisted unparking maneuver that culminates in auto-shifting from reverse to drive at the end position E as taught in Joos, and the controller/driver assistance system in the Joos-Bettger vehicle initiates the assisted unparking maneuver and shifts from reverse to drive at the end position E in response to a sequence that includes the initiating steering input. TESLA-1003, ¶100. Multiple reasons would have prompted a POSITA to implement Joos in accordance with Bettger's teachings in this manner. TESLA-1003, ¶¶100-104.

First, Bettger's approach would promote safety and improve the user experience by allowing the driver to confirm that an assisted reverse-turning unparking maneuver should be initiated by adjusting the steering angle by at least a threshold value. TESLA-1003, ¶101. As Bettger explains, by requiring driver confirmation, "unintentional performance of a reverse-turning maneuver can

advantageously be prevented.” TESLA-1006, [0021]. Thus, Bettger’s driver confirmation allows the driver to retain control in accepting/rejecting a proposed reverse-turning unparking maneuver before the driver assistance system initiates the maneuver (or intervenes to assist in the maneuver), rather than leaving the determination entirely up to the vehicle. TESLA-1006, [0043]-[0044]; TESLA-1003, ¶101.

Second, a POSITA would have applied Bettger’s suggestion to require driver confirmation for initiating an assisted reverse-turning unparking maneuver to ensure valets, new drivers, or others who are unfamiliar with the driver assistance system are better capable of operating the vehicle and are not surprised by unexpected reverse- turning of the vehicle. TESLA-1003, ¶102.

Third, a POSITA would have combined Joos-Kischkat and Bettger as described above because Bettger’s suggestion for allowing the driver to confirm initiation of a reverse-turning maneuver via a steering input while reversing that “corresponds to the steering input that is necessary for carrying out the reverse-turning maneuver” provides a convenient and natural confirmation mechanism that avoids burdening the driver with offering confirmation via other controls that are not normally used when reversing the vehicle. TESLA-1003, ¶103.

Fourth, a POSITA would have integrated Bettger’s techniques in the combination because it merely involves the application of known techniques (*e.g.*,

Bettger's confirmatory response to initiate a reverse-turning unparking maneuver) to improve a conventional system (*e.g.*, Joos's autonomous or semi-autonomous unparking assistant) to achieve predictable results. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007) ("a person of ordinary skill has good reason to pursue the known options within his or her technical grasp."); *Intel Corp. v. PACT XPP Schweiz AG*, 61 F.4th 1373, 1380-81 (Fed. Cir. 2023) ("It's enough... to show that there was a known problem... in the art, that [another known teaching]... helped address that issue, and that combining the teachings... wasn't beyond the skill of an ordinary artisan. Nothing more is required to show a motivation to combine under *KSR*."). A POSITA would have reasonably expected success implementing the combination, because Joos and Bettger each describes driver assistance systems designed for use in similar contexts (*e.g.*, reverse-turning unparking maneuvers). TESLA-1003, ¶104. As Joos's motor vehicle already includes a driver assistance system and associated steering controls, it would be well suited to implement Bettger's techniques. *Id.*

3. Claim Element Analysis

Ground 2A incorporates the analysis of Ground 1. Where Ground 1 relies on the teachings of Joos, Ground 2A relies on the combined teachings of Joos and Bettger. Integration of Bettger in Joos does not disturb the aspects of Joos mapped to each of the claim elements in claims 1-6 and 8-13 addressed in Ground 1 but not

addressed below. To avoid repetition, and because the analysis of all other claim elements is substantively the same, only claim elements whose mappings are materially affected by the integration of Bettger in the combination are addressed below. TESLA-1003, ¶105. Ground 2A relies on the mappings from Ground 1 for all other elements of claims 1-6 and 8-13 not addressed below. *Id.*

- (a) **1[g]: the drive system operable in response to a sequence of detected steering and brake inputs when in a first one of the drive mode and reverse mode to change to the other of the drive mode and reverse mode, without operator indication of a direction.**
8[g]: the controller operable in response to a sequence of detected steering and brake inputs when in a first one of the drive mode and reverse mode to change to the other of the drive mode and reverse mode, without operator indication of a direction.

Joos-Bettger renders obvious 1[g] and 8[g]. TESLA-1003, ¶106. In the Joos-Bettger combination, Joos's *controller* of the driver assistance system (*drive system*) is *operable in response to a sequence of detected steering and brake inputs when in a reverse mode to change to the drive mode*. TESLA-1003, ¶107.

As discussed above in §III.B.2, *when in a reverse mode*, the Joos-Bettger controller would initiate the assisted unparking maneuver disclosed in Joos only following confirmation by the driver. TESLA-1006, [0021]. As disclosed in Bettger, the driver provides confirmation by “carrying out a certain steering

movement, for example, a steering movement of an angle which lies above a certain threshold value and which corresponds to the steering movement that is necessary for carrying out the reverse-turning maneuver.” TESLA-1006, [0044].

The Joos-Bettger controller would detect this steering movement (*detected steering input*) to determine that the driver provided the confirmation to initiate the assisted reverse-turning unparking maneuver. *Id.*; TESLA-1003, ¶107. Upon detecting the steering input to initiate the assisted reverse-turning unparking maneuver, the Joos-Bettger controller would begin autonomously or semi-autonomously controlling aspects of the vehicle’s operations (*e.g.*, driving, steering, and/or braking) as needed to carry out the assisted reverse-turning unparking maneuver. TESLA-1006, [0043]-[0047], [0017]; TESLA-1004, [0008].

The Joos-Bettger combination’s *sequence of detected steering and brake inputs* include additional detected steering and brake inputs disclosed in Joos as part of Joos’s assisted unparking maneuver for the reasons discussed above in Ground 1. *Supra*, §§III.A.2(h)-III.A.2(k); TESLA-1003, ¶108. These additional steering and brake inputs include the steering and brake inputs applied by the vehicle to reach then stop at the end position E of the unparking trajectory, and the steering input set by the driver assistance system to establish the desired pull-forward steering angle at the end position E before the vehicle shifts to drive, thereby ending the assisted unparking maneuver. *Id.*

This change from the reverse mode to the drive mode is also made *without operator indication of a direction*; indeed, the driver never selects a direction for shifting gears during the entire unparking maneuver. TESLA-1003, ¶109. This is evident or at least obvious as the confirmatory steering input that initiates the maneuver (as taught in Bettger) and all other inputs from the driver (*operator*) in connection with the maneuver are made to control the vehicle or signal confirmation of particular actions, but do not involve the use of a gear selector or any other indicator of direction. *Id.*; *cf.* TESLA-1001, 1:42-47, 3:49-53, 5:15-24 ('871 Patent disclosing similar inputs that do not involve operator indication of direction); TESLA-1003, ¶109.

(b) Claim 2: The motor vehicle of claim 1 wherein the sequence of detected steering and brake inputs includes detecting a steering angle in one direction while driving the vehicle in the first one of the drive mode and reverse mode, and detecting a steering angle in a second direction opposite the first direction while driving the vehicle in the other of the drive mode and reverse mode.

Claim 9: The motor vehicle of claim 8 wherein the sequence of detected steering and brake inputs includes detecting a steering angle in one direction while driving the vehicle in the first one of the drive mode and reverse mode, and detecting a steering angle in a second direction opposite the first direction while driving the

vehicle in the other of the drive mode and reverse mode.

Joos-Bettger renders obvious Claims 2 and 9. TESLA-1003, ¶110.

Specifically, Joos-Bettger provides the sequence of detected steering and brake inputs that includes *detecting a steering angle in one direction while driving the vehicle in the first one of the drive mode and reverse mode*. TESLA-1003, ¶111.

For example, *while driving the vehicle in the reverse mode*, the Joos-Bettger controller would detect a steering movement (*detecting a steering angle in one direction*) as taught in Bettger that indicates driver confirmation to initiate the reverse-turning unparking maneuver (or initiate assistance for the maneuver).

TESLA-1006, [0021], [0044]; *supra*, §§III.B.1-2; TESLA-1003, ¶111. The driver would turn the steering control to the right (*first direction*) when beginning to reverse along the trajectory shown in FIG. 2 of Joos, where the detected steering movement “corresponds to the steering movement that is necessary for carrying out the reverse-turning maneuver” and therefore confirms that the driver assistance system should intervene in the maneuver. *Id.*; TESLA-1004, FIG. 2; TESLA-1006, [0044].

Joos-Bettger also renders obvious “the sequence of detected steering and brake inputs includes *detecting a steering angle in a second direction opposite the first direction while driving the vehicle in the other of the drive mode and reverse*

mode.” TESLA-1003, ¶112. As discussed above in §III.A.2(h), Joos renders obvious the controller of the driver assistance system detecting additional steering inputs during a sequence of alternating reversing and forward movements of the vehicle that are sometimes required to reach various intermediate positions until the vehicle ultimately arrives at the end position E where the driver can re-assume manual control of the vehicle. TESLA-1004, [0033], [0037]-[0040], FIGs. 3-5. In the combination, if the end position E cannot be reached during the first reversing movement of Joos’s unparking maneuver, the vehicle would be steered to the left while driving forward to a second intermediate position. *Id.*; TESLA-1003, ¶112. Because the vehicle only reaches the end position E as a result of completing each of the specific steering angle movements disclosed in Joos and Bettger, that final shift from reverse to drive, performed at end position E, is carried out in response to a sequence of detected inputs that includes both (i) a first steering input as taught in Bettger that angles the wheels to the right while reversing to indicate driver confirmation for initiating the reverse-turning unparking maneuver (***detecting a steering angle in one direction while driving the vehicle in reverse mode***) and (ii) a steering input angling the wheels to the left as taught in Joos while pulling forward to an intermediate position (***detecting a steering angle in a second direction opposite the first direction while driving the vehicle in the drive mode***). *Id.*

(c) **Claim 5: The motor vehicle of claim 1 wherein the sequence of detected steering and brake inputs includes: detecting driving in a first direction with the steering control turned in a first direction, detecting application of the brake control, and detecting turning the steering control in a direction opposite the first direction.**

Claim 12: The motor vehicle of claim 8 wherein the sequence of detected steering and brake inputs includes: detecting driving in a first direction with the steering control turned in a first direction, detecting application of the brake control, and detecting turning the steering control in a direction opposite the first direction.

Joos-Bettger renders obvious Claims 5 and 12. TESLA-1003, ¶113.

Specifically, Joos-Bettger renders obvious the sequence of detected steering and brake inputs includes *detecting driving in a first direction with the steering control turned in a first direction*. TESLA-1003, ¶114. For example, while driving the vehicle in the reverse mode (*detecting driving in a first direction*), the Joos-Bettger controller detects the steering movement (*the steering control turned in a first direction*) indicating driver confirmation to initiate the reverse-turning unparking maneuver. TESLA-1006, [0021], [0044]; TESLA-1003, ¶114. The steering control would be turned to the right (*turned in a first direction*) while reversing along the trajectory shown in FIG. 2 of Joos and when the detected steering movement “corresponds to the steering movement that is necessary for

carrying out the reverse-turning maneuver” and therefore confirms that the driver assistance system should intervene in the maneuver. TESLA-1004, FIG. 2; TESLA-1006, [0044].

Joos-Bettger also renders obvious the sequence of detected steering and brake inputs includes *detecting application of the brake control*. TESLA-1003, ¶115. For example, as the vehicle approaches the end position E while reversing with the steering control turned to the right, the Joos-Bettger controller *detects application of the brake control* to slow the vehicle to a stop at the end position E. TESLA-1004, [0008], [0012], [0021], FIG. 2.

Joos-Bettger also renders obvious the sequence of detected steering and brake inputs includes *detecting turning the steering control in a direction opposite the first direction*. TESLA-1003, ¶116. For example, for the reasons addressed above in Ground 1, Joos teaches or at least renders obvious that the *sequence of detected steering and brake inputs* can further include detecting steering in the opposite direction to attain the “predetermined or adjusted steering angle,” e.g., “a maximum steering angle,” (*detecting turning the steering control in a direction opposite the first direction*) for the anticipated forward movement of the vehicle after unparking is complete. TESLA-1004, [0010], [0014]-[0016], [0018], [0037]-[0039]; *supra*, §§III.A.2(h), III.A.2(k); TESLA-1003, ¶116. As another example, if the end position E cannot be reached during the first reversing

movement of Joos's unparking maneuver, the vehicle would detect steering to the left while driving forward to a second intermediate position (*detecting turning the steering control in a direction (left) opposite the first direction*). TESLA-1004, [0033], [0037]-[0040], FIGs. 3-5; *supra*, §§III.A.2(i), III.A.2(j), III.B.3(b); TESLA-1003, ¶116.

C. GROUND 2B—Obvious based on Joos in view of Bettger and Kischkat (Claims 1-6, 8-13)

1. Overview of Kischkat

Kischkat describes “a motor vehicle comprising an electronically shiftable automatic transmission and a park-steer assist system for supporting a parking process.” TESLA-1005, [0001], [0009]; TESLA-1003, ¶46. Kischkat discloses that “during a parking process supported by the assistance system, the signal for shifting the automatic transmission from a forward driving mode to a reverse driving mode or vice versa after automatic braking to a standstill can be given via the accelerator or brake pedal[,] via a voice input into a voice control system[,] or by actuating a control element on the steering wheel, dashboard, or key side.” TESLA-1005, [0009]; *generally id.*, [0001]-[0025], [0036], FIGs. 1-2. Kischkat also describes the driver giving “a confirmation response to change direction – if necessary, after asking via the voice control system or the vehicle's loudspeaker whether a change of direction is desired. For example, if the voice control system

or assistance system asks ‘Change direction?’, the driver simply has to answer ‘yes’.” TESLA-1005, [0016].

2. Combination of Joos, Bettger, and Kischkat

A POSITA further would have found it obvious to further modify the Joos-Bettger vehicle from Ground 2A to implement the gear shift that occurs at the end of the assisted unparking maneuver in accordance with Kischkat’s technique for offering an automated gear shift that would be made only upon confirmation from the driver. TESLA-1003, ¶117; *supra*, §III.C.1. After the Joos-Bettger-Kischkat vehicle reaches and stops at the end position of the predetermined unparking trajectory during an assisted unparking maneuver, and after the pull-forward steering angle is set as taught in Joos, the driver assistance system would offer an auto-shift to drive as taught in Kischkat. TESLA-1004, [0015]-[0018], [0037]-[0038]; TESLA-1005, [0009], [0016], [0019]. The driver can then tap/depress the brake pedal to provide a brake input confirming acceptance of the offer to auto-shift to drive as taught in Kischkat. TESLA-1005, [0010]-[0013], [0016]-[0019]. Upon receiving the driver’s confirmation, the controller of the driver assistance system would change from the reverse mode to the drive mode by shifting from a reverse gear to a drive gear. *Id.*, TESLA-1004, [0017], [0038]; TESLA-1006, [0047], [0045]. Because the auto-shift from reverse mode to drive mode occurs only upon driver confirmation via actuation of the brake pedal, the controller of the

driver assistance system changes from the reverse mode to the drive mode further in response to the brake input, and thus based on a sequence of steering and brake inputs that includes at least the steering input confirming initiation of the assisted unparking maneuver as taught in Bettger and the brake input confirming approval of the offer to auto-shift from reverse to drive as taught in Kischkat. TESLA-1003, ¶117.

In more detail, Joos describes two options for engaging the forward gear after reversing during an unparking maneuver. TESLA-1004, [0017], [0038]. In the first option, “the driver assistance system itself can change from the reverse gear into the forward gear.” *Id.*, [0017]. In the second option, “an instruction to engage the forward gear is issued to the driver of the motor vehicle” and “[t]he driver of the vehicle ... engage[s] the forward gear.” *Id.*, [0017], [0038]. The first option relieves the driver of the burden of manually shifting to the forward gear, but the driver may alternatively prefer to confirm agreement with the gear change before the driver assistance system effects the change automatically. *Id.* The second option provides the driver with more control but still the driver will need to manually manipulate the vehicle’s gear shifter to indicate the forward direction and engage the forward gear. TESLA-1003, ¶118.

Because each of Joos’s options for shifting gears during the unparking procedure carry distinct tradeoffs, a POSITA would have turned to references like

Kischkat that describe techniques for shifting gears that require a different level of driver involvement. TESLA-1003, ¶119. As discussed above, Kischkat describes the option of automatically shifting gears using a driver assistance system—but only after the driver assistance system offers to shift gears and the driver is able to accept or reject the offer via a control input other than the vehicle’s manual gear selector. TESLA-1005, [0003], [0016], [0010]-[0012], [0019]; *supra*, §III.C.1. Multiple reasons would have prompted a POSITA to pursue a Joos-Bettger-Kischkat combination that expands Joos’s options for shifting gears according to the techniques described in Kischkat. TESLA-1003, ¶¶119-129.

First, a POSITA would have integrated Kischkat’s techniques in the combination to provide drivers with another option for shifting from reverse to drive during the unparking procedure to achieve distinct benefits from those attained by Joos’s original solution. TESLA-1003, ¶120. Considering these distinct benefits, a POSITA would have expected Kischkat’s option to be preferred by a significant subset of drivers. *Id.* For example, Kischkat’s offer/acceptance technique allows the driver to retain control in accepting/rejecting a proposed gear shift before the driver assistance system makes the change. *Id.* At the same time, Kischkat’s solution relieves the driver of the burden of manually manipulating the gear selector. *Id.*; TESLA-1005, [0012].

Kischkat’s approach would also beneficially afford an opportunity for the

driver to independently assess whether a collision-free forward movement can successfully be carried out from the end position E or whether a further reverse movement may be necessary. TESLA-1003, ¶121; TESLA-1004, [0015]-[0016], [0037]-[0038]. The driver confirmation to change gears thus would have provided a valuable precaution, further reducing the risk of costly collisions and enhancing safety by mitigating the possibility that the vehicle changes a critical operating parameter such as the transmission gear/vehicle direction before control of the vehicle is returned to the driver without the driver's awareness. TESLA-1003, ¶121. Integration of Kischkat's technique in the combination thus would have provided an additional safety check and benefits beyond the driver's steering input confirmation to initiate the assisted reverse-turning unparking maneuver as taught in Bettger. *Id.*

Second, a POSITA would have applied Kischkat's suggestion for offering an automated gear shift that could be confirmed by the driver before the gear shift is made in Joos-Bettger's system to ensure valets, new drivers, or others who are unfamiliar with the driver assistance system are able to operate the vehicle in a more predictable manner where they would not be surprised by an unexpected change in direction of the vehicle. TESLA-1003, ¶122.

Third, a POSITA would have applied Kischkat's suggestion for offering an automated gear shift in Joos-Bettger's system to achieve known benefits like those

expressly described in Kischkat. TESLA-1003, ¶123. For example, Kischkat explains that “the use of the accelerator or brake pedal is advantageous in that the driver does not have to turn his attention away from what he is doing at all, since it is easy for him to press one or the other pedal to signal. ... It is also very easy for him to operate a control element, as he does not have to be careful to use a certain predetermined position” to select a specific gear. TESLA-1005, [0013]; *see also id.*, [0009], [0012]-[0013], [0016], [0019]; TESLA-1003, ¶123.

Fourth, a POSITA would have integrated Kischkat’s techniques in the combination because it merely involves the application of known techniques (*e.g.*, Kischkat’s automated gear shift conditioned on a confirmatory response) to improve a conventional system (*e.g.*, Joos-Bettger’s semi-autonomous unparking system) to achieve predictable results. *KSR*, 550 at 421; *Intel*, 61 F.4th at 1380-81. Here, a POSITA would have recognized the tradeoffs associated with the gear shifting options provided in Joos and would have appreciated that some drivers would prefer a third option like that described in Kischkat. TESLA-1003, ¶124. Kischkat’s techniques would have benefitted these drivers for each of the reasons described above. *Id.*

A POSITA would have reasonably expected success applying Kischkat’s techniques to the combination. TESLA-1003, ¶129. Like Joos and Bettger, Kischkat similarly describes a driver assistance system that introduces automation

in shifting gears during reverse-turning maneuvers such as a parking or unparking process. *Id.* Adding driver confirmation of an automated gear change as taught in Kischkat would have been a straightforward modification to a similar system as provided in the Joos-Bettger vehicle, and would have been well within the capabilities of a POSITA. *Id.*; TESLA-1005, [0010]; TESLA-1003, ¶129.

3. Claim Element Analysis

Ground 2B incorporates the analysis of Grounds 1 and 2A. Where Ground 1 relies on the teachings of Joos and Ground 2A relies on the teachings of Joos-Bettger, Ground 2B relies on the combined teachings of Joos, Bettger, and Kischkat. Integration of Kischkat in Joos-Bettger does not disturb the aspects of Joos and Bettger mapped to each of the claim elements in claims 1-6 and 8-13 addressed in Grounds 1 and 2A but not addressed below. To avoid repetition, and because the analysis of all other claim elements is substantively the same, only claim elements whose mappings are materially affected by the integration of Kischkat in the Joos-Bettger-Kischkat combination are addressed below. TESLA-1003, ¶130. Ground 2B relies on the mappings from Ground 2A (including those referenced from Ground 1) for all other elements of claims 1-6 and 8-13 not addressed below. *Id.*

- (a) 1[g]: the drive system operable in response to a sequence of detected steering and brake inputs when in a first one of the drive mode and**

reverse mode to change to the other of the drive mode and reverse mode, without operator indication of a direction.

8[g]: the controller operable in response to a sequence of detected steering and brake inputs when in a first one of the drive mode and reverse mode to change to the other of the drive mode and reverse mode, without operator indication of a direction.

Joos-Bettger-Kischkat renders obvious 1[g] and 8[g]. TESLA-1003, ¶131.

In the Joos-Bettger-Kischkat combination, Joos's *controller* of the driver assistance system (*drive system*) is *operable in response to a sequence of detected steering and brake inputs when in a reverse mode to change to the drive mode*.

TESLA-1003, ¶132. As discussed above in §§ III.B.2 and III.B.3(a), *when in a reverse mode*, the Joos-Bettger-Kischkat controller would initiate the assisted unparking maneuver disclosed in Joos upon detecting the steering input to initiate the assisted reverse-turning unparking maneuver. TESLA-1006, [0021], [0043]-[0047], [0017]; TESLA-1004, [0008]; TESLA-1003, ¶132.

As discussed above in §III.C.1-III.C.2, after the vehicle reaches the end position of the reverse-turning unparking maneuver, the driver assistance system would offer an auto-shift to drive as taught in Kischkat. TESLA-1003, ¶133; TESLA-1004, [0015]-[0018], [0037]-[0038]; TESLA-1005, [0009], [0016], [0019]. The driver can then tap/depress the brake pedal to confirm acceptance of the offer to auto-shift to drive as taught in Kischkat. TESLA-1005, [0010]-[0013],

[0016]-[0019]. The Joos-Bettger-Kischkat controller would detect this brake actuation (*detected brake input*) to determine that the driver accepted the offer to auto-shift to drive. *Id.*; TESLA-1003, ¶133. Kischkat's brake actuation can include one or more *detected brake inputs* such as an initial detection of the brake pedal being depressed, a second detection that the brake pedal has remained held out of a neutral position for a predetermined period of time, and a third detection of the brake pedal being released. TESLA-1005, [0015]. Upon detecting the brake input(s) signaling driver confirmation, the controller of the drive system changes from the reverse mode to the drive mode. TESLA-1005, [0010]-[0013], [0016]-[0019]; TESLA-1004, [0017], [0038]; TESLA-1006, [0047], [0045].

Because the auto-shift from reverse mode to drive mode only occurs (1) at the end of the assisted reverse-turning unparking maneuver that is initiated via a confirmatory *steering input* as taught in Bettger and (2) only upon driver confirmation via *a brake input* approving an offer to auto-shift to drive as taught in Kischkat, *the controller of the drive system changes from the reverse mode to the drive mode in response to a sequence of detected steering and brake inputs* that includes the steering input to initiate the assisted reverse-turning unparking maneuver and the brake input to accept the auto-shift from reverse mode to drive mode (at the end of the reverse-turning unparking maneuver). TESLA-1003, ¶134. This change from the reverse mode to the drive mode is also made *without*

operator indication of a direction; indeed, the driver never selects a direction for shifting gears during the entire unparking maneuver. *Id.* This is evident or at least obvious as the steering input initiated the maneuver, the brake input confirmed approval of the offer to auto-shift, and all other inputs from the driver (*operator*) in connection with the maneuver are made to control the vehicle or signal confirmation of particular actions, but do not involve the use of a gear selector or any other indicator of direction. *Id.*; *cf.* TESLA-1001, 1:42-47, 3:49-53, 5:15-24 ('871 Patent disclosing similar inputs that do not involve operator indication of direction); TESLA-1003, ¶134.

Optionally, the Joos-Bettger-Kischkat combination's *sequence of detected steering and brake inputs* can further be defined to encompass the additional detected steering and brake inputs disclosed in Joos that are part of Joos's assisted unparking maneuver for the reasons discussed above in Grounds 1 and 2A. *Supra*, §§III.A.2(h)-III.A.2(k), III.B.3(a)-III.B.3(c); TESLA-1003, ¶135.

- (b) **Claim 3: The motor vehicle of claim 2 wherein the sequence of detected steering and brake inputs includes detecting a brake application.**
Claim 4: The motor vehicle of claim 3 wherein the brake application is a brake tap.
Claim 10: The motor vehicle of claim 9 wherein the sequence of detected steering and brake inputs includes detecting a brake application.

**Claim 11: The motor vehicle of claim 10
wherein the brake application is a brake tap.**

Joos-Bettger-Kischkat renders obvious Claims 3-4 and 10-11. TESLA-1003, ¶136. As discussed above in §III.C.2 and §III.C.3(a), after the vehicle reaches the end position of the assisted reverse-turning unparking maneuver, the driver assistance system offers an auto-shift to drive as taught in Kischkat. TESLA-1003, ¶137; TESLA-1004, [0015]-[0018], [0037]-[0038]; TESLA-1005, [0009], [0016], [0019]. The driver can then tap/depress the brake pedal to confirm acceptance of the offer to auto-shift to drive as taught in Kischkat. TESLA-1005, [0010]-[0013], [0016]-[0019]. The Joos-Bettger-Kischkat controller detects this brake actuation (*detecting a brake application*) to determine that the driver accepted the offer to auto-shift to drive. *Id.*; TESLA-1003, ¶137. Kischkat explains that the brake actuation can be a *brake tap* that, for example, involves a short, shallow depression of the brake pedal. TESLA-1005, [0015]. Upon detecting the brake input signaling driver confirmation, the controller of the drive system changes from the reverse mode to the drive mode. TESLA-1005, [0010]-[0013], [0016]-[0019]; TESLA-1004, [0017], [0038]; TESLA-1006, [0047], [0045]; TESLA-1003, ¶137.

- (c) **Claim 5: The motor vehicle of claim 1 wherein the sequence of detected steering and brake inputs includes: detecting driving in a first direction with the steering control turned in a**

first direction, detecting application of the brake control, and detecting turning the steering control in a direction opposite the first direction.

Claim 12: The motor vehicle of claim 8 wherein the sequence of detected steering and brake inputs includes: detecting driving in a first direction with the steering control turned in a first direction, detecting application of the brake control, and detecting turning the steering control in a direction opposite the first direction.

Joos-Bettger-Kischkat renders obvious Claims 5 and 12. TESLA-1003, ¶138. Specifically, Joos-Bettger-Kischkat renders obvious the sequence of detected steering and brake inputs including *detecting driving in a first direction with the steering control turned in a first direction*. TESLA-1003, ¶139. As explained above in §III.B.3(c), while driving the vehicle in the reverse mode (*detecting driving in a first direction*), the Joos-Bettger-Kischkat controller detects the steering movement (*the steering control turned in a first direction*) indicating driver confirmation to initiate the assisted reverse-turning unparking maneuver. TESLA-1006, [0021], [0044]; TESLA-1003, ¶139; TESLA-1004, FIG. 2.

Joos-Bettger-Kischkat also renders obvious the sequence of detected steering and brake inputs includes *detecting application of the brake control*. TESLA-1003, ¶140. As discussed above in §§III.C.2, III.C.3(a), and III.C.3(b), after the vehicle reaches the end position of the reverse-turning unparking

maneuver, the driver assistance system would offer an auto-shift to drive as taught in Kischkat. TESLA-1003, ¶140; TESLA-1004, [0015]-[0018], [0037]-[0038]; TESLA-1005, [0009], [0016], [0019]. The driver can then tap/depress the brake pedal to confirm acceptance of the offer to auto-shift to drive as taught in Kischkat. TESLA-1005, [0010]-[0013], [0016]-[0019]. The Joos-Bettger-Kischkat controller would detect this brake actuation (*detecting application of the brake control*) to determine that the driver accepted the offer to auto-shift to drive. *Id.*; TESLA-1003, ¶140.

Joos-Bettger-Kischkat also renders obvious the sequence of detected steering and brake inputs includes *detecting turning the steering control in a direction opposite the first direction*. TESLA-1003, ¶141. For example, for the reasons addressed above in Ground 1, Joos teaches or at least renders obvious that the *sequence of detected steering and brake inputs* can further include detecting steering in the opposite direction to attain the “predetermined or adjusted steering angle,” e.g., “a maximum steering angle,” (*detecting turning the steering control in a direction opposite the first direction*) for the anticipated forward movement of the vehicle after unparking is complete. TESLA-1004, [0010], [0014]-[0016], [0018], [0037]-[0039]; *supra*, §§III.A.2(h), III.A.2(k); TESLA-1003, ¶141. As another example, if the end position E cannot be reached during the first reversing movement of Joos’s unparking maneuver, the vehicle would detect steering to the

left while driving forward to a second intermediate position (*detecting turning the steering control in a direction* (left) *opposite the first direction*). TESLA-1004, [0033], [0037]-[0040], FIGs. 3-5; *supra*, §§III.A.2(i), III.A.2(j), III.B.3(b); TESLA-1003, ¶141. The vehicle's ultimate shift to drive at end position E would thus follow and result from a sequence that includes steering to the right to initiate the unparking maneuver as taught in Bettger, detecting brake inputs approving offers to shift gears as taught in Kischkat at the intermediate positions shown in Joos's FIGs. 3-5 before the vehicle reaches the end position, and steering to the left to set the pull-forward steering angle at the end position E. *Id.*

D. GROUND 2C—Obvious based on Joos in view of Bettger, Kischkat, and Hoop (Claims 7, 14)

1. Overview of Hoop

Hoop generally describes “one-pedal drive systems that are configured to brake the vehicle through regenerative braking in response to releasing the accelerator pedal and without application of the brake pedal.” TESLA-1023, [0002]; TESLA-1003, ¶48. Hoop explains that in “one-pedal drive mode, the speed of the vehicle may be increased in response to increasing a depressed position of the accelerator pedal 34 while releasing the accelerator pedal 34 results in breaking the vehicle 10 via regenerative braking through the [motor/generator] M/G 14. More specifically, the vehicle 10 may be slowed or braked via releasing

the accelerator pedal 34 alone without an application or depression of the brake pedal 36.” TESLA-1023, [0022]. Even with one-pedal driving, however, the brake pedal 36 can still be depressed to apply the friction brakes 38 and further slow the vehicle. TESLA-1023, [0017], FIGs. 1-2. The brake pedal 36 can also be “depressed and then released... while the accelerator pedal 34 is released” and the vehicle has stopped, so that “the wheel torque is increased to allow vehicle creep.” TESLA-1023, [0029].

2. Combination of Joos, Bettger, Kischkat, and Hoop

A POSITA would have found it obvious to further modify the Joos-Bettger-Kischkat vehicle from Ground 2B to implement a “one-pedal” driving capability in which the vehicle is actively slowed in response to release of the accelerator pedal as taught in Hoop. *Supra*, §III.D.1; TESLA-1023, [0002], [0022]; TESLA-1003, ¶142. Based on Joos’s teachings, the driver would control at least acceleration/braking to follow a prescribed unparking trajectory to an end position E. TESLA-1004, [0002], [0008], FIG. 2. Further, based on Hoop’s suggestion for one-pedal driving, the driver would release the accelerator pedal to slow the vehicle to a stop at the end position E. TESLA-1003, ¶142; *supra*, §III.D.1.

Multiple reasons would have motivated a POSITA to apply Hoop’s one-pedal driving capability to the Joos-Bettger-Kischkat vehicle. TESLA-1003, ¶¶143-149.

First, a POSITA would have applied Hoop's suggested use of one-pedal driving to the Joos-Bettger-Kischkat vehicle to achieve a convenient method of activating regenerative braking in a hybrid- or fully-electric vehicle. TESLA-1003, ¶144. Regenerative braking is especially beneficial in hybrid- and fully-electric vehicles, indeed, it allows the vehicle's battery to be re-charged while the vehicle decelerates, thereby increasing the electric range of the vehicle and increasing the effective charge capacity of the battery. *Id.*; TESLA-1023, [0002], [0018]-[0020].

Second, a POSITA would have applied Hoop's suggested use of one-pedal driving to the Joos-Bettger-Kischkat vehicle to reduce the need for and frequency of use of the vehicle's friction brakes (*e.g.*, since regenerative braking can be used instead in many cases). TESLA-1003, ¶145. The reduced use of the friction brakes would beneficially increase the life of the vehicle's friction brake parts (*e.g.*, rotors, pads) and reduce costs of maintaining or replacing the friction brake parts. *Id.*

Third, a POSITA would have applied Hoop's suggested use of one-pedal driving to the Joos-Bettger-Kischkat vehicle because regenerative braking often provides a smoother, and therefore more pleasant, deceleration than friction braking. TESLA-1003, ¶146.

Fourth, a POSITA would have applied Hoop's suggested use of one-pedal

driving to the Joos-Bettger-Kischkat vehicle to enhance the driving experience for the driver of the vehicle. TESLA-1003, ¶147. One-pedal driving is preferred by many drivers of electric vehicles; indeed, these drivers find one-pedal driving to be simpler, more intuitive, and less burdensome than constantly shifting the foot between the accelerator and brake pedals whenever acceleration or deceleration is needed. *Id.*

Fifth, applying Hoop's techniques in combination with Joos and Joos-Bettger-Kischkat would have been obvious as a matter of law because the combination merely involves combining prior art elements according to known methods to yield predictable results. *KSR*, 550 U.S. at 415-421; *Intel*, 61 F.4th at 1380-81; TESLA-1003, ¶148.

A POSITA likewise would have reasonably expected success implementing the combination. TESLA-1003, ¶149. Indeed, Joos, Bettger, Kischkat, and Hoop all similarly describe motor vehicle systems and established technologies. Electric vehicles utilizing one-pedal driving with regenerative braking were common before the Critical Date. *Id.* Moreover, Joos's techniques are fully compatible with electric and hybrid-electric vehicles of the type that would use Hoop's one-pedal driving techniques. *Id.* Adding a capability for braking in response to releasing the accelerator pedal to a similar system as proposed in the combination would have been well within the capabilities of a POSITA. *Id.*

3. Claim Element Analysis

- (a) **Claim 7: The motor vehicle of claim 5 wherein the sequence of detected steering and brake inputs includes detecting releasing an accelerator pedal when driving in the first direction to slow the vehicle to a stop without driver application of force to the brake control, and then applying force to the brake control.**
Claim 14: The motor vehicle of claim 12 wherein the sequence of detected steering and brake inputs includes detecting releasing an accelerator pedal when driving in the first direction to slow the vehicle to a stop without driver application of force to the brake control, and then applying force to the brake control.

The Joos-Bettger-Kischkat-Hoop combination renders obvious claims 7 and 14.⁴ TESLA-1003, ¶150. For example, Joos discloses that the “driver of the motor

⁴ Claims 7 and 14 also would have been obvious for the same reasons discussed in this section based on combinations of Joos-Hoop, Joos-Bettger-Hoop, and Joos-Kischkat-Hoop. For brevity, this Petition illustrates how Joos’s and Hoop’s teachings would have provided the additional features recited in claims 7 and 14 in the context of the Joos-Bettger-Kischkat-Hoop combination, but it would have been obvious to modify Joos in view of Hoop, Joos-Kischkat in view of Hoop, and

vehicle... operate[s] the **gas pedal** and the brakes” (*an accelerator pedal* and *brake control*) and that “the driver assistance system also carries out the intervention into a brake system and a drive motor of the motor vehicle.” TESLA-1004, [0002], [0008]-[0009]. “The **driver assistance system** can for example comprise a **controller** or an electronic control unit, with which during the unparking [maneuver] **control signals are output** to the steering system of the motor vehicle and possibly to **the brake system and/or the drive motor.**” TESLA-1004, [0021]; TESLA-1003, ¶151.

As discussed in §III.D.2, *supra*, a POSITA would have implemented the vehicle in the Joos-Bettger-Kischkat-Hoop combination to include one-pedal driving as taught in Hoop such that the driver would release the accelerator pedal after following the unparking trajectory to slow the vehicle to a stop at the end position E (*releasing an accelerator pedal when driving in the first direction to slow the vehicle to a stop without driver application of force to the brake control*). TESLA-1003, ¶152. Upon reaching the end position of the unparking trajectory and setting the maximum or other pre-defined steering angle for the

Joos-Kischkat in view of Hoop in a manner that would have provided the features recited in claims 7 and 14.

anticipate pull-forward movement, the driver assistance system offers an auto-shift to drive as taught in Kischkat. *Id.*; TESLA-1004, [0015]-[0018], [0037]-[0038]; TESLA-1005, [0009], [0016], [0019]. The driver would then shift her foot from the accelerator pedal and tap/depress the brake pedal (*then applying force to the brake control*) to confirm approval of the offer to auto-shift to drive as taught in Kischkat. TESLA-1005, [0010]-[0013], [0016]-[0019]; TESLA-1003, ¶152.

Allowing the driver to release the accelerator pedal to brake the vehicle is also consistent with Joos's teaching that the vehicle should be stopped before shifting gears. TESLA-1004, [0016]-[0018]; TESLA-1003, ¶152. Accordingly, the Joos-Bettger-Kischkat-Hoop combination renders obvious that *the sequence of detected steering and brake inputs includes detecting releasing an accelerator pedal when driving in the first direction to slow the vehicle to a stop without driver application of force to the brake control, and then applying force to the brake control. Id.*

IV. CONCLUSION AND FEES

The Challenged Claims are unpatentable. Petitioner authorizes charge of fees to Deposit Account 06-1050.

V. MANDATORY NOTICES UNDER 37 C.F.R § 42.8(a)(1)

A. Real Party-In-Interest Under 37 C.F.R. § 42.8(b)(1)

Tesla, Inc. is the real party-in-interest.

B. Related Matters Under 37 C.F.R. § 42.8(b)(2)

The '871 Patent is the subject of civil action *Bulletproof Property Management, LLC v. Tesla, Inc. et al.*, Case No. 1:25-cv-00665 (W.D. Tex.) filed May 5, 2025. Petitioner is not aware of any disclaimers, reexamination certificates, or IPR petitions addressing the '871 Patent.

The '871 Patent is one of seven related patents that Bulletproof asserts in the Texas Litigation. Petitioner is concurrently filing IPR petitions on related patents in the following proceedings:

Patent No.	IPR Proceeding No.
12,221,104	IPR2026-00219
12,227,184	IPR2026-00204
12,233,871	IPR2026-00222
12,240,457	IPR2026-00205

C. Lead And Back-Up Counsel Under 37 C.F.R. § 42.8(b)(3)

Petitioner provides the following designation of counsel.

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D. Service Information

Please address all correspondence and service to the address listed above.

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Respectfully submitted,

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CERTIFICATION UNDER 37 CFR § 42.24

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petition for *Inter Partes* Review totals 13,949 words, which is less than the 14,000 allowed under 37 CFR § 42.24.

Dated: January 20, 2026

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CERTIFICATE OF SERVICE

Pursuant to 37 CFR §§ 42.6(e)(4)(i) et seq. and 42.105(b), the undersigned certifies that on January 21, 2026, a complete and entire copy of this Petition for *Inter Partes* Review and all supporting exhibits were provided by USPS Priority Express, to the Patent Owner, by serving the correspondence address of record as follows:

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