

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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WIRTGEN AMERICA, INC.,  
Petitioner,

v.

CATERPILLAR INC.,  
Patent Owner.

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Case No. IPR2022-01397  
Patent No. 9,975,538

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**PATENT OWNER'S RESPONSE**

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## **I. INTRODUCTION**

Wirtgen America, Inc. (“Wirtgen” or “Petitioner”) challenges claims 1-13 of U.S. Patent No. 9,975,538 (“the ’538 patent,” EX1001) based on two grounds: (1) claims 1-13 as obvious over Willis (EX1005) and Xing (EX1006); and (2) claims 8 and 13 as obvious over Willis, Xing, and Laux (EX1012). Pet., 3. Caterpillar Inc. (“Caterpillar” or “Patent Owner”) respectfully requests that the Board issue a final written decision rejecting Petitioner’s grounds of challenge and affirming the patentability of the challenged claims.

Petitioner’s grounds of challenge propose a combination of the milling machine disclosed in Willis with the continuously variable transmission and fuel-efficiency method disclosed in Xing. In alleging that Xing discloses each of the limitations recited in the challenged claims for adjusting an engine speed using certain fuel-efficiency considerations, Petitioner’s analysis fundamentally rests on a superficial, high-level comparison between the fuel-efficiency method claimed by the ’538 patent and the method described in Xing. However, despite using similar terminology and aiming generally for fuel efficiency, the process described in Xing differs from the challenged claims in several ways.

First, the claimed method is directed to a process that determines an “engine load,” then refers to one or more “predefined efficiency points,” which each identifies an optimum engine speed, to adjust the engine’s speed for the given

engine load. In contrast, Xing bases its efficiency determination on the load power requirement ( $P_{\text{load}}$ ), which defines the target engine parameters from which Xing selects to achieve a more fuel-efficient state. Petitioner's expert confirmed during cross-examination that Xing's load power requirement is not the claimed engine load. Any "engine load" that may be said to be measured in Xing, such as the engine torque or engine power ( $P_{\text{engine}}$ ) cited by Petitioner's expert during that same testimony, is not the basis for the ultimate engine speed adjustment.

Furthermore, after determining its load power requirement, Xing then seeks to identify candidate engine speeds that govern the calculation of candidate engine torques at which to potentially operate its engine. In this regard, Xing's method does not use "predefined efficiency points" that "provid[e] optimum engine speeds for different engine loads" as a basis for adjusting its engine speed because Xing analyzes candidate engine speed-torque pairings that themselves do not provide optimum speeds for a given load. Petitioner's cursory analysis of Xing as applied to the claimed method falls apart when Xing's process is considered in its entirety and compared against the full language of the challenged claims.

Finally, Petitioner's failure to address express limitations of the claims is further illustrated in its analysis of dependent claim 13, which requires a clutch that is controlled by the controller to selectively disengage the rotor from the engine. Petitioner presents two theories, one that rests on certain components of Xing and a

second, alternative position that proposes modification of Willis and Xing with Laux. In both cases, the components that Petitioner relies upon as allegedly teaching the claimed clutch fail to actually “disengage the rotor from the engine” as any rotor would still be connected to the engine via other components.

For these reasons, and as discussed in more detail below, the Board should find that Petitioner has not met its burden to prove that the challenged claims of the ’538 patent are unpatentable.

## **II. THE ’538 PATENT**

The ’538 patent is directed to road milling machines and “to methods and systems for controlling the rotor speeds of cold planers and rotary mixers with optimized performance and fuel efficiency.” *See* EX1001, 1:6-9; EX2001, ¶21. The ’538 patent acknowledges that, “[t]ypically, it may be desirable to maintain substantially constant rotor speed at the speed specified by the operator for at least the duration of a given milling task and/or until the operator chooses otherwise,” but that “changes in engine speed and engine load throughout the operation can cause unwanted variations in the rotor speed.” EX1001, 1:28-34; EX2001, ¶22. As the ’538 patent explains, some milling machines “provide variable transmissions which allow for variations in the engine speed without affecting rotor speed,” but “these conventional systems do not further address fuel efficiency, which is another concern that can be adversely affected by variations in

engine speed and engine load.” EX1001, 1:34-40. Thus, the ’538 patent describes and claims specific fuel-efficient control methods and systems for controlling a rotor coupled to an engine through a variable transmission. *See, e.g., id.*, 1:41-44, 1:52-2:18, 4:48-63. In particular, the claimed control methods and systems take into account an engine load on the engine during operation and use that engine load, along with predetermined efficiency points, as a reference to determine optimum engine speeds at which the engine may operate at the load to achieve enhanced fuel efficiency. EX2001, ¶23.

For instance, the ’538 patent describes an example embodiment of a milling machine 100, which includes a rotor 118 for cutting and/or removing material from the surface of roadways. EX1001, 2:38-46, 2:57-60, FIG. 1; EX2001, ¶24. The milling machine 100 also includes an engine 122 as a power source that “drive[s] the rotor 118 via a hydrostatic, mechanical, or hydromechanical drive arrangement, such as a continuously variable transmission (CVT) 124, or the like.” EX1001, 2:63-3:4.

The milling machine 100 also has a control system 128 for controlling the rotor 118 to achieve a desired rotor speed, while, at the same time, adjusting the gear ratio between the engine output 136 and the CVT output 138 to maintain the desired rotor speed irrespective of changes in the engine speed, including changes

that are made to achieve a more fuel-efficient state based on the current load on the engine. *See id.*, 3:8-12, 3:51-62, 4:4-8, 4:31-37, FIG. 2; EX2001, ¶25.

During operation, the '538 patent teaches that the system, via a controller 130, is configured to receive a desired speed at which to operate the rotor 118. EX1001, 4:64-5:3; EX2001, ¶26. The controller 130 “monitor[s] or determine[s] the current engine speed and current engine load of the milling machine 100, such as via a sensor 134 located at the engine output 136.” EX1001, 5:3-7. As Petitioner’s expert, Dr. Stein, acknowledges, the term “engine load” of the '538 patent is used in a conventional manner and represents the total load on the engine, including “loads due to the rotor 118, the hydrostatic arrangement 144, and other parasitic loads.” *Id.*, 4:9-14; EX2003, 24:18-25:14, 29:16-30:20; EX2001, ¶26.

Once the current engine load on the engine is determined, the controller 130 then “retrieve[s], recall[s] and/or refer[s] to predefined fuel efficiency points 162 . . . to determine an optimum engine speed *for the given engine load.*” EX1001, 5:7-12 (emphasis added); EX2001, ¶27. This reference step to identify optimum engine speeds for the determined engine load as recited in the challenged claims is best illustrated in the table shown in FIG. 4, which is reproduced below. EX2001, ¶27. As shown below, to identify a speed at which to operate the engine in a fuel-efficient manner, the controller 130 refers to the table at the determined engine load to identify predefined efficiency points 162 (blue downward arrow in the

annotated figure below). *Id.*, ¶28. The predefined efficiency points 162 (yellow annotations), in turn, provide optimum engine speeds (green leftward arrow below) at which the engine can operate at the determined engine load for higher fuel efficiency. *Id.* Thus, in this manner, by “using the efficiency points 162 as reference, the controller 130 may be able to control the engine 122 to output *an engine speed that is not only appropriate for the determined engine load, but also [is] fuel efficient.*” EX1001, 4:23-27 (emphasis added); *see also id.*, 5:7-12; EX2001, ¶28. In other words, unlike Xing (as detailed more below), the fuel-efficiency method of the claimed invention relies on the determination of the total load on the engine, which serves as a basis and reference point for determining the appropriate engine speed at which the engine should operate at the given load for optimum fuel efficiency. EX2001, ¶29.

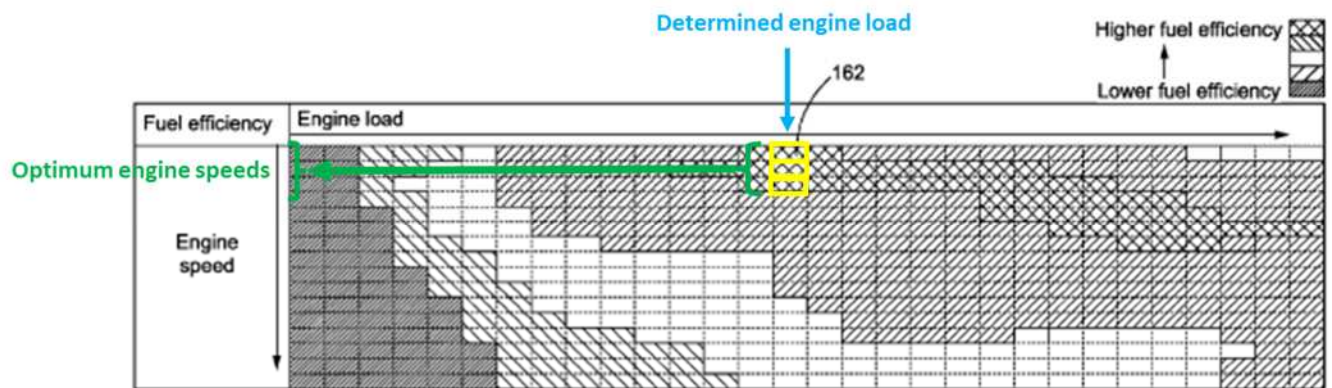


FIG.4

EX1001, FIG. 4 (annotated); EX2001, ¶27.



“Once the optimum engine speed, or the engine speed expected to provide the optimum fuel efficiency, has been determined for the given engine load,” the controller 130 then adjusts the actual engine speed to achieve the optimum engine speed, if needed. EX1001, 5:12-22; EX2001, ¶30. Similarly, if needed, the controller 130 then adjusts the speed of the rotor 118 to achieve the desired rotor speed by making any necessary adjustments to the gear ratio of the transmission in order to achieve the desired rotor speed. EX1001, 5:22-56; EX2001, ¶¶30-33.

### **III. PERSON OF ORDINARY SKILL IN THE ART**

For the purposes of this proceeding, Patent Owner applies the level of ordinary skill in the art provided in the petition. Pet., 8. Submitted with this response is the declaration of Dr. Amid Kemal, Ph.D., who is qualified to opine on the person of ordinary skill in the art (“POSA”) as of May 18, 2015. EX2001, ¶¶1-7, 34-35.

### **IV. CLAIM CONSTRUCTION**

A claim subject to *inter partes* review receives its plain and ordinary meaning, interpreted in light of the specification of the patent in which it appears. *See* 37 C.F.R. § 42.100(b). Petitioner does not propose any claim construction in its petition. No constructions are required to reach a decision rejecting the merits of Petitioner’s grounds. EX2001, ¶¶36-37.

Pursuant to the Consolidated Trial Practice Guide, Caterpillar submits the March 10, 2023, claim construction order (EX2008) and memorandum (EX2009) from the related district court litigation with this response. Consolidated Trial Practice Guide, 47 (Nov. 2019) (claim construction determination should be submitted as soon as possible, “[p]referably ... with the petition, preliminary response, or response”).

**V. GROUND 1: CLAIMS 1-13 ARE NOT OBVIOUS OVER WILLIS AND XING**

Petitioner’s Ground 1 is premised on modification of the milling machine disclosed in Willis to incorporate the continuously variable transmission and fuel-efficiency control method disclosed in Xing for driving Willis’s milling drum (or rotor) at a desired speed. *See* Pet., 33-35. Petitioner’s reliance on Xing, however, is premised on an oversimplification of the claimed invention—that it “consists of no more than using a controller to operate prior-art milling machines ‘in a manner that provides optimum fuel efficiency or in a manner constrained based on predetermined fuel consumption rates.’” *Id.*, 32. By reducing the claims to this general idea of operating a milling machine “based on ‘fuel consumption rates’” (*id.*), Petitioner presents an obviousness case that rests on a false equivalency: merely because Xing uses similar terminology (*e.g.*, “fuel consumption”) and illustrates facially similar figures, Petitioner concludes Xing must disclose the fuel-efficient method specifically recited in the challenged claims. However,

Petitioner’s superficial approach to mapping Xing’s disclosure to the claimed invention overlooks key distinctions between Xing’s approach to fuel efficiency and the particular approach claimed by the ’538 patent.

For the reasons detailed below, Petitioner fails to meet its burden in establishing the unpatentability of claims 1-13 based on Willis and Xing. EX2001, ¶38.

**A. Independent Claims 1 and 6 Are Not Obvious over Willis and Xing**

Independent claims 1 and 6 of the ’538 patent claim a controller-implemented method for operating a machine that drives a rotor in a fuel-efficient manner. The method requires an initial determination of “an engine load” of the engine of the machine. An “engine speed” is then adjusted based on (1) the determined engine load and (2) one or more predefined efficiency points, which are themselves based on predetermined fuel consumption rates and provide optimum engine speeds for different engine loads. EX2001, ¶39.

Petitioner contends that Xing’s fuel-efficiency method discloses an identical process, but, as detailed more below, Xing’s method relies on a starting point—the determination of a “load power requirement”—that is distinct from the engine load recited in the claims. Because Xing uses a different starting point in its fuel-efficiency method, any existing load on the engine (whether determined by the system or not) is ultimately irrelevant to Xing’s selection of engine parameters at

which the engine will operate, including selection of engine speed. Instead, Xing actually seeks to identify not only a target operating speed for the engine, but also a target **load** on the engine for fuel-efficiency purposes. As a result of this distinction, Xing's method fails to "adjust an engine speed based on the engine load" nor does it "adjust an engine speed" based on "predefined efficiency points" that "provid[e] optimum engine speeds for different engine loads." EX2001, ¶40.

**1. Petitioner fails to show Xing adjusts an engine speed based on the determined engine load**

Each of claims 1 and 6 require a controller to "determine an engine load" and "adjust an engine speed based on the engine load." EX2001, ¶41. While the petition fails to expressly identify what in Xing constitutes the claimed determination of an engine load by which engine speed is adjusted, Petitioner's expert, Dr. Stein, confirmed that it is not the load power requirement ( $P_{load}$ ) of Xing. Examining the aspects of Xing that Dr. Stein hypothesized could constitute the claimed engine load (*i.e.*, current engine torque or current engine power ( $P_{engine}$ )), reveals Xing does not adjust an engine speed based on those measured parameters.

- a) Xing's determination of a "load power requirement" is not a determination of an "engine load"

As explained in Patent Owner's Preliminary Response, the petition cites to the method shown in FIG. 4 of Xing as allegedly disclosing the determination of an

“engine load” as recited in the challenged claims. *See* POPR, 4-7. However, the figure, at step 202, only illustrates the calculation of a “load power requirement ( $P_{load}$ ),” which the petition appears to concede is not equivalent to the claimed “engine load.” *See id.*, 6 (citing Pet., 47). Nevertheless, in its decision granting institution, the Board found Petitioner’s citation to Xing’s load power requirement sufficient and pointed to the load power requirement as corresponding to the claimed “engine load.” *See* Paper 7 (“DI”), 30 (“[W]e agree with Petitioner that Xing teaches that its controller 116 **determines an engine load or current load power requirement ( $P_{load}$ )** based on the relationship of Equation 1:  $P_{engine} = P_{load} + P_{loss}$ .” (emphasis added) (internal quotations omitted)).

During deposition, however, Petitioner’s expert, Dr. Stein, confirmed that Xing’s load power requirement is “**not** the engine load,” as it only represents “the power that’s going to ... do useful work.” EX2003, 52:3-11 (emphasis added); *see also* EX1006, 9:18-21 (stating the load power requirement “generally corresponds to the amount of power required for the vehicle 10 to finish useful work”), FIG. 4 (step 202); Pet., 45-46. Instead, Dr. Stein contended that “[t]he engine load is higher than” the load power requirement and represents the **total** load on the engine, including loads due to system inefficiencies or losses. EX2003, 52:3-11; *see also id.*, 24:18-25:14 (agreeing “engine load” has its plain and ordinary meaning), 29:24-30:20; EX2001, ¶¶41-42 (noting the plain and ordinary meaning

for the term “engine load” is the amount of torque required from the engine to operate the machine at a given time). That the term “engine load” represents the total load on the engine is consistent with the ’538 patent, which explains that the engine load encompasses not only loads for operating the work component of the machine (*e.g.*, the rotor), but also loads caused by other elements of the machine, such as the hydrostatic arrangement and other parasitic loads. EX1001, 4:9-14; EX2001, ¶42. While engine load is typically expressed in terms of the amount of torque produced at the output of the engine (*see* EX2001, ¶¶42-43), Dr. Stein contended that it can also be expressed in terms of power (*i.e.*, engine torque times engine speed) produced at the output of the engine. EX2003, 26:18-27:7; *see also* EX1003, ¶78.

As such, although not clearly advanced in the petition, Petitioner’s expert clarified his understanding that the claimed “engine load” represents the ***total*** load on the engine, which encompasses both the load required to do useful work and loads caused by system inefficiencies or losses. EX2003, 24:18-25:14, 29:16-30:20, 52:3-11; *see also* EX2001, ¶¶41-42. Further, the petition cites Xing’s engine torque and speed sensors as used to determine the engine load, showing that Petitioner’s challenge is based on interpreting the current, measured output of Xing’s machine as the engine load. *E.g.*, Pet., 45 (describing torque sensor 122 as used to determine engine load), 46 (controller in Xing “measured engine load”),

46-47 (Xing’s processor “measured current engine power ( $P_{\text{engine}}$ ) ... to determine the current load power requirement ( $P_{\text{load}}$ )”). Petitioner therefore relies on Xing’s disclosure where the load power requirement ( $P_{\text{load}}$ ) is calculated indirectly (rather than measured directly). Pet., 46; EX1003, ¶78; *see also* EX2003, 47:18-49:6, 49:20-50:23. Xing teaches this is accomplished through the measurement of a current engine speed and a current engine torque at the engine’s output to calculate the current “engine power ( $P_{\text{engine}}$ ),” which is the product of the measured engine speed and the measured engine torque. EX1006, 9:37-44; *see also* Pet., 46; EX1003, ¶78. This, in turn, is used to calculate the load power requirement ( $P_{\text{load}}$ ) by subtracting the estimated current power loss ( $P_{\text{loss}}$ ) from the current engine power ( $P_{\text{engine}}$ ). *See* EX1006, 9:37-56. Thus, according to the testimony of Petitioner’s expert and Xing’s disclosure, to the extent Xing describes determining an engine load, it is in service of calculating the load power requirement. Pet., 46; EX1003, ¶78; *see also* EX2001, ¶¶43-44.

However, as described further below, while Xing may disclose that one means for indirectly determining the load power requirement ( $P_{\text{load}}$ ) is through the measurement of a current engine torque or engine power, Xing nevertheless uses ***the load power requirement***—and not any measured engine torque or engine power (and, thereby, any ***engine load*** according to Dr. Stein’s testimony)—as a

basis for defining the set of engine operating parameters from which to choose for fuel-efficiency purposes. EX2001, ¶45.

b) Xing fails to adjust an engine speed “based on” a determined engine load

The undisputed fact that Xing’s load power requirement is not an engine load leads to a key distinction between that reference and the challenged claims. As explained below, Xing’s efficiency method centers on determining a target engine speed to achieve the load power requirement, not an engine load. As evidence of this, to the extent that Xing may measure what Dr. Stein identified as an engine load as one way to calculate the load power requirement, Xing also describes starting its method by directly measuring the load power requirement. That is, Xing’s speed adjustment cannot be based on the engine load, where the method need not even involve a determination of such a load. Further, the engine load (*i.e.*, in Dr. Stein’s view, the total torque or power at the engine output) will vary for each of the candidate speed/torque combinations in Xing. As such, Xing’s speed adjustment is independent of, and not based on, a determined engine load. EX2001, ¶45.

Examining Xing’s process quickly reveals that its efficiency assessments and resulting engine speed adjustments are based on the load power requirement, not a determined engine load. As noted above, the method described and claimed by the ’538 patent starts with a determination of the engine load as a reference



point from which predefined efficiency points are retrieved for that given load, which then provide optimum engine speeds at which to operate the engine at the determined engine load to achieve fuel efficiency. *See* EX1001, 5:7-12; EX2001, ¶46 (explaining the '538 patent's process of moving from engine load to efficiency points to optimal engine speed). In contrast, Xing describes a different process for selecting target engine parameters, such as target engine speed: it begins with an identification of a set of candidate (or possible) engine speeds for achieving the load power requirement, from which a set of corresponding candidate (or possible) engine torques is calculated, which are then compared to efficiency values to find the candidate speed-torque pair associated with the lowest value. EX2001, ¶47 (noting Xing's process of moving from candidate engine speed to candidate engine torque to efficiency value).

More specifically, as Xing discloses, after determining the load power requirement, "a plurality of candidate engine speeds may be determined based on the load power requirement." EX1006, 10:16-18, FIG. 5 (step 206). These speeds are potential engine speeds that "may be utilized to achieve the vehicle's load requirement." *Id.*, 10:18-22; EX2001, ¶48. For each candidate engine speed, "a power loss value ( $P_{\text{loss}}$ )" is determined based on "suitable efficiency data for one or more of the components of the work vehicle 10." EX1006, 10:43-46; *see also id.*, 10:46-67 (identifying power loss due to components such as the transmission,

power take-off (PTO), drive axle, fan, or other), FIGS. 6-10; EX2003, 61:1-66:7 (Dr. Stein confirming Xing's process).

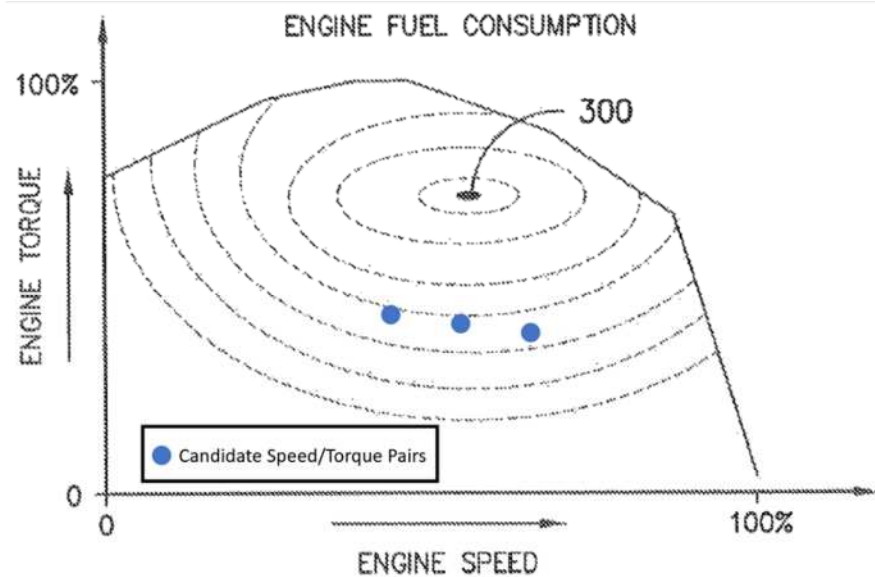
Then, for each of the candidate engine speeds, candidate engine powers are determined by adding the calculated power loss values ( $P_{\text{loss}}$ ) to the specific load power requirement of interest (*e.g.*, 150 kW as shown in FIG. 5):

CANDIDATE ENGINE SPEEDS (RPM)	FORECASTED LOAD POWER REQUIREMENT (Kw)	ASSOCIATED SYSTEM POWER LOSS (Kw)	CANDIDATE ENGINE POWER (Kw)	CANDIDATE ENGINE TORQUE (Nm)	ENGINE BSFC EFFICIENCY (g/Km-h)	FUEL CONSUMPTION (g/h)
1500	150	15	165	1050	212	34980
1600	150	24	174	1038	200	34800
1700	150	33	183	1028	205	37515
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.

*FIG. -5-*

EX1006, FIG. 5, 11:65-12:6; EX2001, ¶49. Thereafter, “for each pair of candidate engine powers and speeds,” a candidate engine torque (*i.e.*, candidate engine loads, expressed in terms of torque) is determined by dividing each candidate engine power by its associated engine speed. EX1006, 12:28-33. Each set of engine torques and engine speeds is then “utilized to determine the most fuel efficient engine settings for achieving the desired load power requirement.” *Id.*, 12:33-35. An example of this is shown in Xing's FIG. 11, which is reproduced below. EX2001, ¶50. As annotated below, the candidate engine torque and candidate

engine speed pairs are plotted (annotated in blue) to determine which pair of candidate engine torque and candidate engine speed intersect closest to “an optimal efficiency point 300 at which the fuel efficiency of the engine is maximized (i.e. at the minimum bsfc value).” EX1006, 12:36-47; EX2001, ¶50.



Thus, in Xing’s process, the ultimate speed adjustments are based on the load power requirement, which is the only constant in Xing’s Figure 5. EX2001, ¶51. All other “candidate” variables and associated efficiency values are potential values that will vary depending on which candidate engine speed is chosen. *Id.* And, as Xing explains, the speed adjustments are not based on any measured load at the engine (whether in terms of torque or power) because while engine power has a loss component that varies with engine speed, the ultimate value of concern is the load power requirement (*i.e.*, “the amount of power required for the vehicle 10 to finish useful work”). EX1006, 9:18-36. Therefore, Xing’s engine speed

adjustments are based on its determined load power requirement rather than engine load. EX2001, ¶51.

That Xing's load power requirement, and not the current engine load, serves as the basis for determining the most fuel-efficient engine operating parameters is made further apparent by Xing's disclosure of other methods for calculating the load power requirement, which do not involve determining an engine load.

EX2001, ¶52. For instance, while Petitioner relies on Xing's "indirect[]" calculation of  $P_{load}$ , Xing also teaches that, "[a]lternatively, the power load requirement may be determined directly by monitoring the output torque and the output speed of the work vehicle 10." EX1006, 9:57-64. In other words, any measurement of the load at the engine can be bypassed entirely by directly measuring the variable of interest,  $P_{load}$ , at the source—*i.e.*, where the useful work is occurring. EX2001, ¶52. Further, Xing also teaches that a "future load power requirement" may be used as the starting point to its method by forecasting the load power requirement based on previously calculated load power requirements. EX1006, 10:2-15. Thus, Xing shows that determining a current engine load is ultimately irrelevant to Xing's fuel-efficiency method because the load power requirement forming the basis for the method can be calculated *without* making a determination as to the current engine load. EX2001, ¶53.

As yet another distinction, Xing's target engine speed (that is, the adjusted speed of the engine) does not maintain an initially measured engine torque or power, providing an additional illustration of why the speed adjustment is not based on a determined engine load. EX2001, ¶54. As demonstrated in Xing's FIG. 5, in addition to engine speed, engine torque is also treated as a variable parameter that is optimized in Xing's calculations, such that the pair of candidate engine speeds and candidate engine torques that will benefit fuel efficiency is identified. See EX1006, 12:16-21 (the controller is configured "to consider every possible combination of engine speeds and torques ... to create a large pool of candidate settings for achieving the best fuel efficiency"); EX2003, 87:13-88:9 (acknowledging Xing "look[s] for an engine torque and engine speed that gives you the best fuel consumption"); EX2001, ¶54. Thus, any candidate speed that Xing identifies as its target engine speed is not a speed that can achieve a given *measured* engine load (e.g., *measured* engine torque or engine power ( $P_{\text{engine}}$ )). Instead, Xing seeks to vary *both* engine speed and engine torque to identify the target candidate speed (which itself is paired with a candidate engine torque), which further evidences that the selection of target engine speed is made *independent* of any existing and measured engine load. EX2001, ¶55.

Accordingly, Xing's adjustment of an engine speed for fuel-efficiency purposes is not "based on the [determined] engine load."

**2. Petitioner fails to show Xing adjusts an engine speed based on predetermined fuel efficiency points that provide optimum engine speeds for different engine loads**

Furthermore, because of Xing's different approach to efficiency assessment, Xing also does not adjust an engine speed based on predetermined fuel efficiency points that provide optimum engine speeds for different engine loads. EX2001, ¶56.

As an initial matter, Petitioner (and its expert) fail to expressly identify specifically what in Xing allegedly discloses the claimed "predetermined fuel efficiency points." *See* Pet., 47-49. Indeed, when asked to identify which aspect of Xing's method mapped to the claimed "predetermined fuel efficiency points," Dr. Stein admitted to not having fully considered the claim language, instead relying on a visual comparison of FIG. 4 of the '538 patent with Xing's Figure 11 and corresponding disclosure. *See* EX2003, 90:7-91:20. Petitioner cannot be said to have met its burden in showing that the prior art teaches each and every element of the claims when its own expert was unable to identify what in Xing constituted a "predetermined fuel efficiency point."

Moreover, Petitioner's superficial analysis is insufficient because it fails to take into account that, despite any superficial similarities between the information conveyed by FIG. 4 of the '538 patent and FIG. 11 of Xing, those respective fuel efficiency tables are used in very different ways. EX2001, ¶57. As noted above,

with respect to FIG. 4 of the '538 patent, the determined engine load serves as a reference point from which predetermined efficiency points are identified that provide optimum engine speeds for the determined engine load, which then becomes the adjusted speed for the given load. *Id.* In contrast, as described above with respect to Xing, Xing seeks to identify pairs of speed and torque combinations that can achieve a given load power requirement, and then determine which of these pairs is the most efficient. *Id.* Dr. Stein, however, ignores these differences and instead relies on superficial similarities between figures of the '538 patent and Xing to conclude that the claimed limitations are taught.<sup>1</sup>

Moreover, by considering the distinctions between the method claimed by the '538 patent and the method described in Xing, a POSA would appreciate that

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<sup>1</sup> Indeed, further illustrating how Petitioner and its expert overlook key differences between the claimed method of the '538 patent and that of Xing, Dr. Stein, during his deposition, seemed to misinterpret FIG. 4 of the '538 patent, reading the figure in the same manner as Xing's FIG. 11 in that both engine load and engine speed are varied to find a fuel-efficient speed-load pairing. *See* EX2003, 81:10-82:10, 83:14-25. Such a reading of FIG. 4 is incorrect and further demonstrates the deficiencies underlying Petitioner's application of Xing to the challenged claims. EX2001, ¶57 n.1.

Xing's method does not adjust an engine speed based on any predefined efficiency points that provide optimum engine speeds for different loads. EX2001, ¶58. This is because Xing's method relies on the identification of a number of candidate engine speed-torque pairings that will achieve a given load power requirement. *Id.* Xing does not indicate that the candidate speeds associated with each of these pairings represent the *optimum* speed for the paired candidate engine torque; instead, Xing seeks to identify the most efficient combination of candidate engine speed-torque by comparing each of the pairings to an associated efficiency value. *Id.* This distinct process leads to two ways in which Xing fails to teach the claimed "predefined efficiency points": (1) any "predefined efficiency points" that may be said to "provide optimum engine speeds for different engine loads" do not serve as a basis for adjusting the engine speed in Xing; and (2) conversely, any "predefined efficiency points" serving as a basis for adjusting the engine speed in Xing do not "provide optimum engine speeds for different engine loads."

First, to the extent Xing's FIG. 11 (or any similar fuel efficiency table) includes efficiency points identifying the optimum speed for a given torque value, those points are not used for Xing's speed adjustments. EX2001, ¶59. This, again, turns on the fact that despite any similarities in the information conveyed in FIG. 4 of the '538 patent and Xing's FIG. 11, they are used in very different ways. As noted above, Xing's process first identifies candidate engine speeds for a given



load power requirement and then calculates a candidate engine torque for each candidate engine speed. EX1006, 10:16-18, 12:28-33; EX2001, ¶59. To the extent that, for any particular candidate engine torque, an “efficiency point” designating an “optimum engine speed” theoretically could be identified (e.g., the speed at which that torque can be most efficiently achieved), that speed is not necessarily the candidate engine speed that is paired with the given candidate engine torque. EX2001, ¶59. Indeed, the candidate engine speed *determines* the candidate engine torque by establishing the power loss associated with that candidate speed, by which the candidate torque is calculated. EX1006, 10:16-18, 12:18-33. In this respect, Xing does not “adjust an engine speed” based on such an optimal point because Xing instead adjusts the engine speed by selecting one of the engine speed-torque pairings based on its efficiency relative to the other pairs. EX2001, ¶59.

Indeed, Xing illustrates this point in stating that its method “tak[es] into consideration component efficiencies *other than the engine’s efficiency*,” and as a result, “the most fuel efficient settings for the engine 22 may not result in the lowest fuel consumption for the vehicle 10 given the current load power requirement and/or other operating parameters.” EX1006, 13:36-50. In other words, Xing’s method does not aim to provide an “optimum engine speed for

different engine loads,” and thus it does not adjust an engine speed on this basis. EX2001, ¶60.

Second, for similar reasons, to the extent each of Xing’s candidate engine speed-torque pairings could be said to correspond to a “predetermined efficiency point” (*e.g.*, on Xing’s FIG. 11 graph) that serves as the basis of an efficiency assessment and subsequent speed adjustment, those points do not constitute *optimum* engine speeds for different engine loads. EX2001, ¶61. This is due to Xing’s process, which first must identify candidate engine speeds *before* candidate engine torques are calculated. Thus, each candidate speed-torque pairing cannot be said to provide *optimum* engine speeds for the candidate engine torques because the candidate speeds are already determined before any candidate load is identified. *Id.*

Accordingly, for the reasons above, Petitioner has failed to meet its burden in showing that the combination of Willis and Xing teach each and every limitation of independent claims 1 and 6.

**B. Dependent Claims 2-5 and 7-13 Are Not Obvious over Willis and Xing**

Petitioner’s Ground 1 also challenges dependent claims 2-5 and 7-13 as allegedly obvious over Willis and Xing. Pet., 3. Claims 2-5 depend from independent claim 1 and claims 7-13 depend from independent claim 6. These claims are not obvious over Willis and Xing for the same reasons identified above

with respect to claims 1 and 6. EX2001, ¶62. Below, additional discussion for dependent claim 13 provides further reasons why Petitioner fails to meet its burden in showing the unpatentability of the challenged claims.

Claim 13, which depends from claim 6, recites that the machine further comprises “a clutch disposed between the engine and the rotor, the controller being configured to selectively disengage the rotor from the engine through control of the clutch.” EX2001, ¶63. Petitioner alleges that the combination of Willis and Xing renders the limitations of claim 13 obvious based on three different components disclosed in Xing that each allegedly constitutes “a clutch” that is controlled by the controller “to selectively disengage” the load (*i.e.*, Willis’s milling drum) “from the engine.” Pet., 73-76. As described more below, however, Petitioner fails to show that any of the components relied upon in the petition constitute a “clutch” that is controlled to “selectively disengage the rotor from the engine.” EX2001, ¶64.

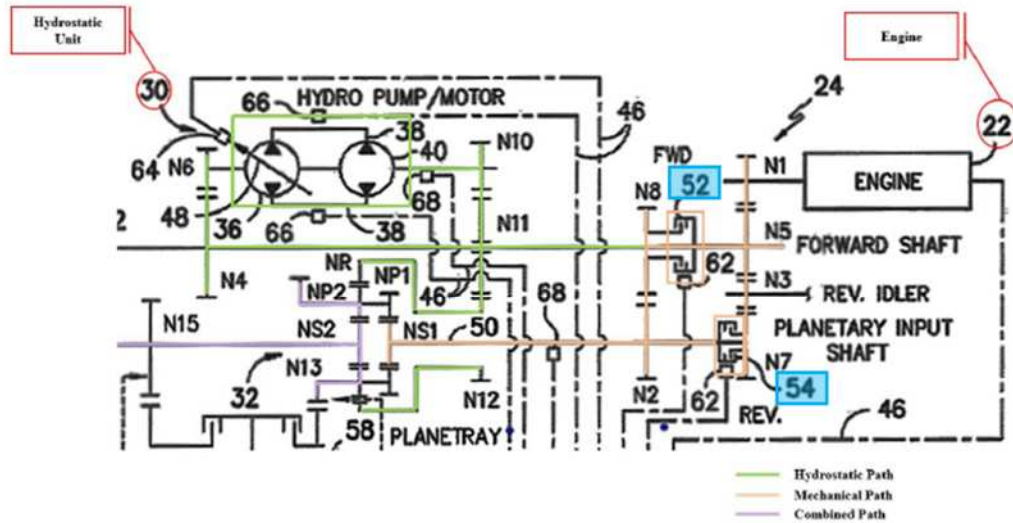
**1. Xing’s directional clutches 52, 54 do not “disengage the rotor from the engine”**

First, Petitioner alleges that Xing’s forward and reverse directional clutches 52, 54 constitute the claimed clutch of claim 13. Pet., 73-74. In particular, Petitioner argues that “Xing taught that forward directional clutch 52 and reverse directional clutch 54 selectively couple the engine to its planetary gear” and “[c]ontroller 116 could disengage both directional clutches 52, 54 from planetary

unit 32.” *Id.*, 74 (citing EX1006, 5:11-17, 6:3-6); EX2001, ¶65. Petitioner, however, fails to show that by disengaging directional clutches 52, 54 “from planetary unit 32,” the **load** (*i.e.*, the milling drum in Petitioner’s combination) also would be disengaged from the engine. Indeed, Xing discloses the opposite—the load connected to the engine is still engaged with the engine even when directional clutches 52, 54 are disengaged because the directional clutches merely serve to direct engine power output through the hydrostatic branch of the transmission alone or both the hydrostatic and mechanical branches to drive the connected load. EX2001, ¶66.

Xing teaches a machine having a transmission 24 that incorporates a hydromechanical arrangement for driving a coupled load (*e.g.*, a milling drum in Petitioner’s combination). EX1006, 4:38-46, 5:65-6:6, FIG. 2; EX1003, ¶55; EX2001, ¶67. As Petitioner’s expert explains, “[p]ower from the engine flows in parallel through both a hydrostatic branch and a mechanical branch and combines through a planetary unit or gear set 32.” EX1003, ¶55 (citing EX1006, 4:42-53, 5:14-17, 5:65-6:3). “In the mechanical branch, the sun gear NS1 of the planetary unit 32 receives power from the engine 22 via planetary input shaft 50, which is connected to engine 22, when either the forward or reverse directional clutch 52, 54 is engaged.” *Id.* (citing EX1006, 5:9-14, 5:65-6:3). Dr. Stein annotates this

mechanical branch in Xing's FIG. 2 below. *Id.* Forward and reverse directional clutches 52, 54 are further highlighted in blue. EX2001, ¶67.



Xing, Fig. 2 (excerpt annotated)

EX2001, ¶67 (reproducing and further annotating FIG. 2 from EX1003, ¶55); *see also* Pet., 23.

In the hydrostatic branch, also partially annotated above by Dr. Stein, “the ring gear NR of the planetary unit 32 receives power from the output gear N10 of hydrostatic unit 30 through gears N11, N12.” EX1003, ¶55 (citing EX1006, 4:54-63). Power flow from the engine is directed through both branches and then combined at the planetary unit 32, which is then applied to the load (*i.e.*, milling drum) via an output shaft 56. EX1003, ¶56 (“Xing Fig. 2 depicts a conventional, power split, summation-type hydromechanical transmission.”) (citing EX1006,

1:25-38, 6:34-45); *see also* EX2001, ¶68; Pet., 24 (depicting “a simplified version of Xing Fig. 2”).

Xing further discloses that the directional clutches 52, 54 direct whether the mechanical branch receives power output from the engine, while having no effect on the hydrostatic branch. EX2001, ¶69. For instance, Xing explains that, “[d]uring operation, the transmission 24 may be operated to have a combined hydrostatic and mechanical power flow by engaging the reverse directional clutch 54 to the power planetary unit 32 via gears N1, N3, N5, and N7 or by engaging the forward directional clutch 52 to power the planetary unit 32 via gears N1, N8, and N2.” EX1006, 5:65-6:3. “Alternatively, the transmission 44 may be operated to have a pure hydrostatic power flow by disengaging both of the directional clutches 52, 54.” *Id.*, 6:3-6.

Xing therefore discloses two possible arrangements when directional clutches 52, 54 are controlled: (1) when either clutch is engaged, the transmission operates to provide “combined hydrostatic and mechanical power flow” from the engine to the transmission’s output; or (2) when both clutches are disengaged, the transmission operates to provide “pure hydrostatic power flow” from the engine to the transmission’s output. EX2001, ¶70; *see also* EX1006, 4:54-63; EX1003, ¶55 (power from the engine flows through the hydrostatic branch to the planetary unit 32). In either case, whether the clutches are engaged or disengaged, power from

the engine can still flow to the planetary unit 32 and to the load (*i.e.*, milling drum) via the output shaft 56. EX2001, ¶71. Thus, directional clutches 52, 54 would not selectively ***disengage*** Willis' milling drum from the engine because power from the engine can still flow to the milling drum to drive it even if both clutches are disengaged.<sup>2</sup> EX2001, ¶71.

Accordingly, for these reasons, Petitioner fails to show that directional clutches 52, 54 are controlled to “selectively disengage the rotor from the engine.”

**2. Xing's parking brake 70 is not a clutch controlled to disengage the rotor from the engine**

As a second argument, Petitioner also contends that Xing's parking brake 70 constitutes the claimed clutch, alleging that “[b]y actuating parking brake 70, output shaft 56 and its connected load remained mechanically isolated and disengaged from the engine.” Pet., 74-75 (citing EX1006, 6:14-34). Petitioner,

---

<sup>2</sup> To the extent Petitioner contends that disengagement of a particular flow path (*e.g.*, the mechanical branch) results in the rotor being “disengage[d]” from the engine, this is unsupported by the plain language of the claim and the specification. EX2001, ¶71 n.2. For example, FIG. 2 of the '538 patent illustrates clutch 140 as being connected to both the mechanical and hydrostatic arrangements of the transmission, and thus can selectively disengage the rotor from the engine as claimed. *Id.*

however, fails to show how Xing's parking brake constitutes a clutch that can selectively disengage the rotor from the engine. EX2001, ¶72.

First, Petitioner (and its expert) fails to explain how a parking **brake** would have been understood to be a **clutch** as conventionally understood by those in the art. As Dr. Kemal details, a brake, such as a parking brake, was typically understood to be a device to inhibit or prevent motion of a moving load, while a clutch was typically understood to be a device that provides for energy transfer from a power input (*e.g.*, engine) to an output (*e.g.*, rotor). EX2001, ¶73. Indeed, in addition to referencing the component using different terminology (*i.e.*, a brake versus a clutch), Xing explicitly distinguishes the very element they rely on (*i.e.*, parking brake 70) from a “clutch.” EX1006, 6:29-34 (“Thus, contrary to the various **clutches** of the transmission 24, the parking **brake** 70 may be designed such that it is engaged when the pressure within the brake 70 is reduced and when the pressure within the brake 70 is increased.”); EX2001, ¶73. Petitioner provides no evidence why those skilled in the art would have viewed a parking brake to be a clutch as conventionally understood by those in the art.

Moreover, apart from stating that the parking brake 70 would “mechanically isolate[]” the rotor from the engine, neither Petitioner nor its expert explain how this would be understood to be a configuration that would **disengage** the rotor from the engine. EX2001, ¶74. Xing merely states that the parking brake 70 is



“operably positioned on the load shaft 56” and “may be configured to proportionally or gradually engage the parking brake 70 as well as gradually release or disengage the parking brake 70.” EX1006, 6:15-23. Nothing in Xing discloses that the parking brake 70 selectively disengages the connection between the load (*i.e.*, rotor) and the engine. EX2001, ¶74. As Dr. Kemal notes, those skilled in the art would have understood that the load would still be connected to the engine and that the parking brake 70, when engaged, would merely exert a torque on the output shaft 56 to prevent unwanted movement when the vehicle is parked. *Id.* In fact, such a configuration would not even have been understood to “mechanically isolate[]” the rotor from the engine because, given a high enough torque outputted from the engine to the output shaft 56, the parking brake 70 could be overcome and the engine’s output would be transferred to the rotor. *Id.* Thus, Petitioner fails to establish that Xing’s parking brake 70 is a **clutch** that is controlled to selectively **disengage** the rotor from the engine.

**3. Petitioner’s reliance on Xing’s power take-off (PTO) component is insufficient**

Finally, in a footnote, Petitioner identifies a third component of Xing in its analysis of claim 13. Pet., 75 n.4. There, Petitioner alleges that “Xing’s transmission would be configured so that the transmission output shaft 56 is connected indirectly (through PTO 110) to a load, such as a milling drum, via PTO shaft 112 and a third clutch set, PTO clutch 114, under control of controller 116.”

*Id.* “In this arrangement, PTO clutch 114 would have connected PTO shaft 112—and Willis’s milling drum—to transmission output shaft 56 and the engine.” *Id.*; EX2001, ¶75.

Petitioner, however, does not explain (or even allege) that the third clutch set, PTO clutch 114, is a clutch controlled to selectively disengage the rotor from the engine as claimed. *Id.* Instead, Petitioner’s proposed configuration requires additional, unaddressed modifications, and no motivation is provided as to why a POSA would pursue such a configuration. *See id.* It also raises inconsistencies with regard to Petitioner’s mapping of Xing to the challenged claims, as Xing treats the power associated with the PTO as a loss component, which is separate from the load power requirement Xing bases its method on. *See* EX1006, 9:27-36, 10:53-67 (Equation 2), FIG. 8 (showing linear relationship between power consumption and engine speed).

Moreover, Petitioner’s own expert alleges that, “[a]s additional support for this combination, Laux teaches connecting a transmission in this manner.” EX1003, ¶151 (citing EX1012, 6:45-7:3); EX2001, ¶76. As described below with respect to Ground 2, Laux’s connection, via clutch 15, also fails to “selectively disengage” a load (*i.e.*, a milling drum) from the engine. *Infra*, section VI. Thus, to the extent Xing suggests connecting a load, such as Willis’s milling drum, to the transmission 24 via PTO 110 in the manner described in Laux, Petitioner’s

footnote argument fails to establish that Xing discloses a clutch controlled to “selectively disengage the rotor from the engine.” EX2001, ¶76.

Accordingly, Petitioner has not shown dependent claim 13 to be unpatentable for these additional reasons.

## **VI. GROUND 2: CLAIMS 8 AND 13 ARE NOT OBVIOUS OVER WILLIS, XING, AND LAUX**

For its Ground 2, Petitioner relies on Laux as allegedly teaching the limitations of dependent claims 8 and 13. Pet., 76-80. Because Petitioner does not rely on Laux for its analysis related to independent claims 1 and 6, Petitioner has failed to show that claims 8 and 13 are unpatentable for the same reasons explained above with respect to Ground 1. EX2001, ¶77.

Moreover, with respect to Petitioner’s application of Laux to claim 13, Petitioner has failed to show that claim 13 is unpatentable over Willis, Xing, and Laux for the additional reasons described below. In particular, Petitioner fails to show that Laux discloses a clutch that is controlled “to selectively disengage the rotor from the engine.” Indeed, Petitioner relies on Laux in much the same manner as it relies on Xing—as with Xing, whether the clutch component Petitioner identifies in Laux is engaged or disengaged, the rotor is still connected to the engine. Thus, Petitioner’s reliance on Laux fails to remedy the disclosure that is missing from Xing. EX2001, ¶78. Additionally, Petitioner fails to establish that a

POSA would have been motivated to incorporate Laux's clutch into Willis's milling machine for "safety" purposes as alleged in the petition. *Id.*

**A. Petitioner fails to show Laux discloses a clutch that "selectively disengage[s]" a rotor from an engine**

Petitioner alleges that, "to the extent a POSITA would have found Xing's teachings insufficient to permit disengagement of the rotor from the engine through the control of a clutch, Laux taught a milling machine powertrain in which clutch 15 was disposed between the engine and the rotor to selectively disengage the rotor from the engine." Pet., 78. In particular, Petitioner asserts that "[c]lutch 15 could disengage engine 4 from belt drive 16, drive transmission 17, and rotor 7." *Id.*, 79 (citing EX1012, 9:3-10). Laux, however, fails to disclose that clutch 15 "disengage[s]" rotor 7 from engine 4 because, even when clutch 15 is disengaged, rotor 7 would still be connected to engine 4 via a secondary drive 20 and hydraulic pumps 19. EX2001, ¶79.

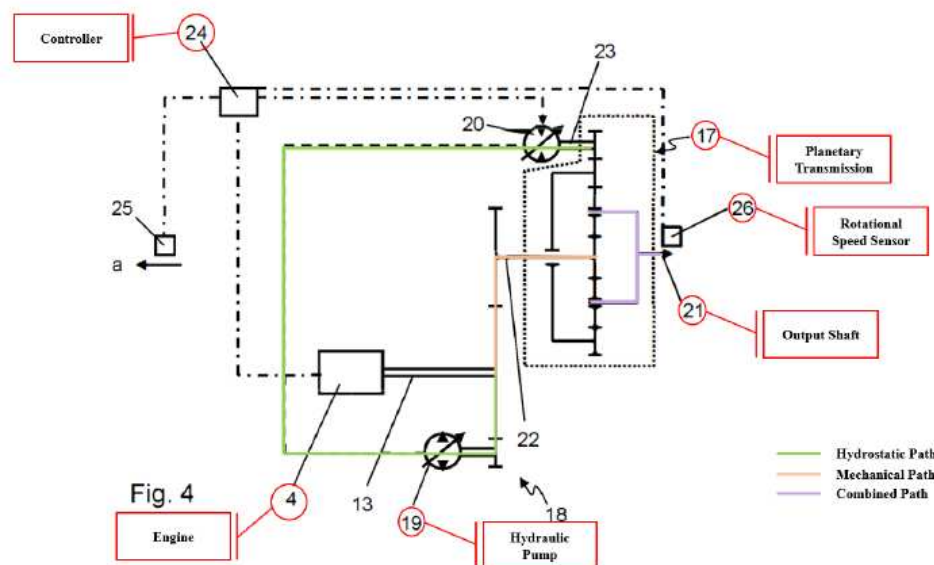
Laux describes a ground milling machine 1 having a drive train 5, as shown in FIG. 3, which is reproduced below. EX1012, 9:3-4; EX2001, ¶80. "The drive train 5 transmits drive energy from the main drive unit 4, which is implemented as an internal combustion engine, to the milling drum 7." EX1012, 9:4-7. The drive train 5 includes "an elastic clutch 14, a shift clutch 15, a belt drive 16, and a drive transmission 17" that "are connected to the output shaft 13 of the internal combustion engine 4." *Id.*, 9:7-10.

A schematic diagram of a mechanical assembly, likely a pump or motor, shown in a cross-sectional view. The diagram includes the following numbered components:

- 4**: A horizontal housing or casing with four circular openings.
- 5**: A lightning bolt symbol indicating electrical connection or grounding.
- 6**: A vertical shaft or rod passing through the center of the assembly.
- 7**: A base or support structure with a serrated edge.
- 8**: A vertical component, possibly a valve or seal, located near the center.
- 9**: A horizontal component, possibly a piston or plunger, located in the center.
- 10**: A vertical component, possibly a valve or seal, located near the center.
- 11**: A base or support structure with a serrated edge.
- 12**: A horizontal component, possibly a piston or plunger, located in the center.
- 13**: A vertical component, possibly a valve or seal, located near the center.
- 14**: A horizontal component, possibly a piston or plunger, located in the center.
- 15**: A vertical component, possibly a valve or seal, located near the center.
- 16**: A horizontal component, possibly a piston or plunger, located in the center.
- 17**: A vertical component, possibly a valve or seal, located near the center.
- 18**: A horizontal component, possibly a piston or plunger, located in the center.
- 19**: A horizontal component, possibly a piston or plunger, located in the center.
- 20**: A base or support structure with a serrated edge.
- 21**: A horizontal component, possibly a piston or plunger, located in the center.

Thus, Laux describes two paths in which drive energy from the engine 4 is transmitted to the transmission 17 and thus to its output shaft 21 for rotating the milling drum. EX2001, ¶82. The first is a mechanical path, in which power from the engine 4 is outputted via shaft 13 to the belt drive 16 and inputted into the transmission 17 via shaft 22. *Id.* The second is a hydrostatic path, in which power

from the engine 4 is outputted to hydraulic motors 19, which drive hydraulic motor 20, the output of which is inputted into the transmission via shaft 23. *Id.* This is confirmed by FIG. 4 of Laux, as annotated by Petitioner (reproduced below), which shows the hydrostatic path (green) extending from the engine 4, to the hydraulic pump 19, to the auxiliary drive 20, and into the transmission 17 via input shaft 23, and the mechanical path (tan) extending from the engine 4 and into the transmission 17 via input shaft 22. EX2001, ¶82.



Laux, Fig. 4 (annotated).

Pet., 15.

As Dr. Kemal notes, because Laux discloses that the hydraulic pumps 19 are connected to the engine 4 before (or upstream) from the clutch 15 (as shown by transfer case 18 shown in Laux FIG. 3 above), a POSA would have understood that even with clutch 15 disengaged, the transmission 17 (and thus the milling drum 7)

would still be connected to the engine 4 via the hydrostatic path (*i.e.*, auxiliary drive 20 and hydraulic pumps 19). EX2001, ¶83. Due this connection, a POSA would have understood that control of clutch 15 would not “*disengage* the rotor from the engine” because the milling drum would still be engaged with the engine through the hydrostatic path. *Id.*

Accordingly, Petitioner fails to show that Laux discloses a clutch that is controlled “to selectively disengage the rotor from the engine.”

**B. Petitioner fails to establish that a POSA would have been motivated to combine Willis, Xing, and Laux**

While Petitioner’s failure to show that Laux teaches a clutch that disengages a rotor and an engine is reason enough to reject this challenge, Petitioner also fails to establish a reason to combine the cited references. Specifically, Petitioner also argues that a POSA “would have been motivated to incorporate Laux’s clutch into Willis’s milling machine” because a POSA “would have understood that, for safety reasons, the milling drum needed to be disengaged from the engine to avoid unexpected startup and possible injury.” Pet., 79. Based upon a citation to an unrelated reference, Petitioner alleges that “this was conventionally achieved using a clutch between the rotor and the engine” and “[b]ecause a POSITA would have wanted to retain this safety feature from conventional milling machine[s], a POSITA would have been motivated to incorporate Laux’s clutch.” *Id.*, 79-80; *see also* EX2001, ¶84. Petitioner’s analysis is insufficient to establish obviousness

because it relies on a hindsight-based motivation that is unsupported by the references.

First, Petitioner's contention that a POSA would have viewed Laux's clutch as a "safety feature" for disengaging the milling drum from the engine during replacement of milling drum tools is unsupported by Laux. EX2001, ¶85. For instance, as described above, Laux's shift clutch 15 is not configured to disengage the milling drum from the engine as it is only intended to connect the mechanical path of the drive train to the transmission 17. *Id.* Thus, Petitioner's assertion that a POSA would have understood Laux's clutch as a conventional safety feature used to disengage milling drum from the engine during tool replacement is unsupported by the reference itself. *Id.*

Second, Petitioner ignores that the claim requires that the ***controller*** control the clutch to selectively disengage the rotor from the engine. EX2001, ¶86. As Dr. Kemal explains, a POSA would not have been motivated to use a controller to control the clutch for disengagement of the rotor from the engine based on Petitioner's purported "safety" rationale. *Id.* In particular, Petitioner alleges that a POSA would have been motivated to disengage the milling drum from the engine "to avoid unexpected startup and possible injury." Pet., 79. The same rationale, however, applies to why a POSA would ***avoid*** using a controller to control the clutch to disengage the drum from the engine. EX2001, ¶87. By relying on a



controller to control the clutch to disengage the drum from the engine, the POSA would have understood that controller error may lead to inadvertent engagement of the clutch (and thus engagement of the drum to the engine). *Id.* This would thus run into the same issues—unexpected startup and possible injury—that underlies Petitioner’s rationale for proposed modification. *Id.* Thus, to the extent a POSA would even been motivated to use a clutch between the rotor and the engine as a safety feature during tool replacement, the POSA would have sought to control the clutch for this purpose using *manual* means, as doing so would “avoid unexpected startup and possible injury.” *Id.*

Thus, Petitioner’s stated rationale for combining Laux with Willis and Xing is premised on hindsight—Laux is in no way related to using a clutch for the purpose of tool replacement, nor does its clutch disengage the engine from the rotor. Moreover, the reference Petitioner relies on for its alleged motivation to provide for disengagement does not support Petitioner’s conclusions. As such, Petitioner’s motivation for combining Laux with Willis and Xing is legally insufficient.

## **VII. CONCLUSION**

Accordingly, for at least the reasons set forth above, the petition fails to meet its burden of establishing the unpatentability of claims 1-13 of the ’538 patent.

Patent Owner respectfully submits that the challenged claims should be found to be not unpatentable over the grounds raised in the petition.

Respectfully submitted,

Dated: June 20, 2023

/Matthew A. Argenti/  
Matthew A. Argenti, Lead Counsel  
Reg. No. 61,836

## **CERTIFICATE OF COMPLIANCE**

Pursuant to §42.24(d), the undersigned certifies that this paper contains no more than 14,000 words, not including the portions of the paper exempted by §42.24(b). According to the word-processing system used to prepare this paper, the paper contains 8,629 words.

Respectfully submitted,

Dated: June 20, 2023

/Matthew A. Argenti/  
Matthew A. Argenti, Lead Counsel  
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## VIII. APPENDIX

EXHIBIT NO.	DESCRIPTION
2001	Declaration of Abid Kemal, Ph.D.
2002	<i>Curriculum vitae</i> of Abid Kemal, Ph.D.
2003	Transcript of the Deposition of Jeffrey L. Stein, Ph.D., P.E., held on May 23, 2023
2004	Reserved
2005	Reserved
2006	Reserved
2007	Reserved
2008	Claim Construction Order, <i>Wirtgen America Inc. v. Caterpillar, Inc.</i> , Case No. 1:17-cv-00770 (D. Del. Mar. 10, 2023)
2009	Claim Construction Memorandum, <i>Wirtgen America Inc. v. Caterpillar, Inc.</i> , Case No. 1:17-cv-00770 (D. Del. Mar. 10, 2023)

## **CERTIFICATE OF SERVICE**

I certify that the foregoing Patent Owner's Response Pursuant to 37 C.F.R. § 42.107 and accompanying Exhibits 2001-2003 and 2008-2009 were served on this 20th day of June 2023, on the Petitioner at the following electronic service addresses:

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