

Filed on behalf of: CMS Cepcor Ltd., and
CMS Cepcor Americas LLC

By: Terry M. Sanks (tsanks@firstiniplaw.com; litigation@firstiniplaw.com)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CMS CEPCOR LTD., and
CMS CEPCOR AMERICAS LLC,
Petitioners,

v.

SANDVIK INTELLECTUAL PROPERTY AB,
Patent Owner.

Case No. IPR2024-01380
Patent No. 9,827,568

**PETITIONERS' RESPONSE IN OPPOSITION TO PATENT
OWNER'S NON-CONTINGENT MOTION TO AMEND AND
REQUEST FOR PRELIMINARY GUIDANCE**

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TABLE OF AUTHORITIES

CASES:

In re Paulsen, 30 F.3d 1475 (Fed. Cir. 1994).

In re Van Geuns, 988 F.2d 1181 (Fed. Cir. 1993)

Phillips v. AWH Corp., 415 F.3d 1303 (Fed. Cir. 2004).

Toyota Motor Corp. v. American Vehicular Sciences LLC, IPR2013-00419, Paper 32 at 4-5 (PTAB 2014).

STATUTES:

37 C.F.R. § 42.121

37 C.F.R. § 42.20(c)

PETITIONER’S EXHIBIT LIST

Exhibit	Description
Ex. 1015	U.S. Pat No. 4,410,143 (Polinski))
Ex. 1016	U.S. Pat. No. 6,270,026 (Piepho))
Ex. 1017	U.S. Pat No. 4,060,205 (Pollack)
Ex. 1034	U.S. Pat No. 2,764,437 (A.E. Bratt)
Ex. 1039	U.S. Pat. No. 4,037,0800 (Coxhill)
Ex. 1043	Smith 2 nd Declaration
Ex. 1044	Kytömaa Declaration
Ex. 1045	Shigley Reference
Ex. 1046	Munsun Reference

I. INTRODUCTION

Petitioners, CMS Cepcor Limited and CMS Cepcor America LLC (“CMS Cepcor”), oppose Patent Owner, Sandvik Mining and Construction USA LLC’s Non-Contingent Motion to Amend and Request for Preliminary Guidance (“Motion to Amend”) the claims of U.S. Patent No. 9,827,568 (the ‘568 Patent) under 37 C.F.R. § 42.121. As discussed below, the substitute claims are substantively defective. The amendments embodied therein fail to distinguish these new claims over the prior art. Petitioner therefore requests that the Board deny the Motion to Amend.

II. LEGAL STANDARD

Patent Owner needs to establish that it is entitled to make the amendment by distinguishing the claims over the prior art. 37 C.F.R. § 42.20(c). A patent owner is required to come, "forward with technical facts and reasoning about those [added] feature(s), including construction of new claim terms, sufficient to persuade the Board that the proposed substitute claim is patentable over the prior art of record, and over the prior art not of record but known to the patent owner." *Toyota Motor Corp. v. American Vehicular Sciences LLC*, IPR2013-00419, Paper 32 at 4-5 (PTAB 2014) (emphasis added).

Furthermore, to meet this burden, a patent owner should address the general level of ordinary skill in the art outside of the references of record and the references cited, with respect to the features [patent owner] added to the claims to render the

claimed subject matter as a whole allegedly patentably distinct from the prior art. Though the Patent Owner may provide a contrary definition of a term in the specification, it must be done with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). At the same time, the Patent Owner may not read a particular embodiment appearing in the written description into the claim if the claim language is broader than the embodiment. *In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993).

III. THE SUBSTITUTE CLAIMS ARE UNPATENTABLE OVER THE PRIOR ART.

A. Patent Owner RELIES ON A BIASED Expert OPINION.

No terms need construction because the claims read on the prior art identified below. Under any construction, claim terms should be given their ordinary and customary meaning as understood by one of ordinary skill in the art at the time of the invention. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2004). However, Patent Owner’s expert provides inconsistencies that appear to be presented not to clarify a reasonable understanding of a POSITA but instead to be litigation based simply to justify why the substitute claims should be accepted. Ex. 1043 at ¶ 27.

For example, even after admitting that “claims are to be given their broadest reasonable construction consistent with the specification (Ex. 1044 at ¶ 5), Dr. Kytömaa attempts to argue for a very narrow meaning of the term “end” based solely

on extrinsic evidence. Ex. 1044 at ¶ 5. More specifically, as disclosed herein, Dr. Kytömaa ignores the intrinsic evidence in rendering his opinion. Ex. 1043 at ¶ 23.

Most interesting is Dr. Kytömaa's limited use of Shigley. Ex. 1045. First, Dr. Kytömaa opines that a POSITA would be aware of the teachings of Shigley but then opines that a POSITA would not be aware of certain subject matter in Shigley. Ex. 1043 at ¶¶ 25-27. It is evident that, instead of representing what is truly taught in the prior art, Dr. Kytömaa is attempting to use apposing arguments to support a biased opinion whenever one or the other supports the substitute claims. *Id.* at 26. It is further evident that Dr. Kytömaa's arguments are not only biased to support the substitute claims but are also not supported by the intrinsic evidence. Without explaining further, Dr. Kytömaa purports that a POSITA would be dissuaded from combining the prior art references, yet his opinion is contradicted by the very references he cites in support, such as his deliberate attempt to limit the use of Shigley to only a single chapter. Ex. 1043 at ¶ 27.

To further illustrate the biasness of Dr. Kytömaa, he argues that a POSITA would be aware of Shigley (Ex. 1044 ¶ 78), but then claims that "tribology," "fracture mechanics," and "fluid mechanics" would not be obvious to a POSITA even though Shigley and Munsun (Ex. 2046 teaches Fluids in Motion, Kinematics of Fluid Motion, Flow Analysis Using Control Volumes, and Flow Analysis Using Differential Methods) teach these required subjects for mechanical engineering

students. Ex. 1043 at ¶ 26 (chart pp. 17-18). This biased misrepresentation continues beyond ignoring teachings provided in Shigley (Ex. 1045) by further making incorrect assumptions. For example, Dr. Kytömaa claims that the eccentric design of the shaft introduces complexity beyond the scope of a POSITA. Yet again, though Dr. Kytömaa recognizes that a POSITA would be knowledgeable of Shigley, Dr. Kytömaa ignores that Shigley teaches a shaft with an eccentric design. Ex. 1043 at ¶ 26.

Dr. Kytömaa goes as far as to state incorrect opinions regarding the cited prior art. Dr. Kytömaa claims that it would not have been obvious to modify Polinski (Ex. 1015) to reduce the thickness of the threaded shoulder 28 because this would significantly increase the likelihood that the connection between the sleeve and mantle would fail. Ex. 1044; Ex. 73. Dr. Kytömaa further opines to the effect that adding an oil groove to the bearing journal would have a similar effect to the threads described by Polinski, which would have been evident to a person of ordinary skill in the art. Ex. 1044 ¶ 78. These opinions are incorrect as a POSITA would be educated to solve these types of stress concerns. Ex. 1043 ¶ 26. The many sections in Shigley dedicated to calculating fatigue failure both enables a POSITA to analyze the stress as well as educate them on the many methods to reduce high stress regions and concentrations in order to optimize a design for the intended use. No experienced mechanical engineer would immediately know the fatigue life of a component, or

the fatigue life due to a change to that component, without some analysis. *Id.*

Dr. Kytömaa further claims that Polinski (Ex. 1015) provides that any discontinuities “should be removed.” Yet, Polinski actually teaches that these high stress regions are “satisfactory for most crusher installations” and “normal”. Ex. 1015 1:21; 3:9-14. Specifically, Polinski teaches that:

“[t]o secure the mantle to the shaft, a threaded section has generally been provided on the shaft immediately above the tapered portion supporting the mantle for receiving a head nut which forces the mantle against the tapered portion of the shaft. While **this type of arrangement has proven to be satisfactory for most crusher installations**, experience has indicated that the relatively abrupt changes in the cross-sectional area of the shaft above and below the threaded section have resulted in high local stress concentrations in these regions of the shaft.”

See Ex. 1015 1:15-25 (emphasis added). Polinski further teaches that:

“[t]he sleeve arrangement, which is releasably **secured to the bearing journal at the low stressed, outermost end of the shaft, includes a head nut** which abuts the mantle to secure it to the tapered portion of the shaft. From the foregoing, it can be seen that the invention contemplates an arrangement wherein abrupt structural discontinuities **in the normally high-stressed regions of the main shaft** have been essentially eliminated to minimize the development of fatigue fractures in the shaft while at the same time providing an arrangement which can be easily maintained and repaired in the field.”

See Ex. 1015 1:56-67 (emphasis added). Thus, it is clear that Polinski teaches what a POSITA would understand, namely that stress must be calculated and then the stress must be managed to meet the requirements of the machine operation. This is a typical and normal task for any machine design or redesign. Ex. 1043 at ¶ 26 and Table p. 20.

Dr. Kytömaa claims that “a POSITA would not be motivated to incorporate a groove into the shaft of Polinski as modified by the proposed combination with Piepho at least for the additional reason that incorporating such a groove would increase the likelihood of fretting wear and fretting induced fatigue failure.” 1044 ¶ 82; *see also* Ex. 1043 ¶ 26 (table p. 20). Fretting is an issue that a POSITA would be aware of from textbooks used in obtaining their degree and prior art, such as Shigley Section 6-9 Endurance Limit Modifying Factors and Piepho (Ex. 1016). Piepho teaches that fretting issues occur in rock crushers, as well as how these high stress interactions have been mitigated and often do not produce stress concentrations. Ex. 1043 ¶ 26 and Table p. 21.

Polinsky (Ex. 1015) teaches “[a]dditionally, **to abate fretting corrosion** of the main shaft in the normally high stressed portion of the shaft at the base of the bearing journal 11, the sleeve is counterbored as indicated at 28' to prevent engagement between the sleeve and the main shaft in the proximity of the threaded annular shoulder 28.” Ex. 1015 3:9-15. Piepho teaches that the coating should resist cracking or Separation at Surface Strains up to approximately ± 65 micro inches/inch (corresponding to $+20,000$ psi stress) **for essentially unlimited number of cycles**. Ex. 1015 3:55-59, emphasis added. Piepho teaches that “[s]ome of the advantages of the present invention include the following. **The existing shaft and yoke geometries need not be changed**. The application of an intervening layer of coated

material allows the use of Surface treatments like shot peening which can mutilate the Surface, but the final Surface is refined with the coating material while leaving the treated Surface undisturbed. The intervening layer is of high hardness for maximum resistance to fretting and wear. **Minor fretting does not produce Stress concentrations in the Shaft material.** The coating provides protection from mechanical and corrosion damage in the area outside the fitted joint. An additional advantage with the present invention is the ability to use lubricants Such as tungsten disulfide on the bushing and the coated tapered end. Ex. 1015 4:23-36.

Thus, despite Dr. Kytömaa's opinion, it is without question that a POSITA would not be dissuaded from the combination of Polinski with Piepho due to fretting concerns since fretting is a well-known mechanism that a POSITA would be aware of and be able to solve. For these reasons, Dr. Kytömaa's biased report should be given little to no weight in evaluating the substitute claims.

B. THERE IS SUFFICIENT INTRINSIC EVIDENCE SUPPORTED BY EXTRINSIC EVIDENCE TO DETERMINE THE TERM "END"

Patent Owner, by way of Dr. Kytömaa's Declaration, contends that the term "end" needs construction as this term would not be understood by a POSITA. Petitioner respectfully disagrees with this assessment. First, there is sufficient intrinsic evidence from which a POSITA can determine the meaning of "end." Next, if extrinsic evidence is required, there is sufficient extrinsic evidence that further supports the intrinsic evidence. Therefore, the Board does not need to construe the

term “end.”

The term “end” is used several different ways in the ‘568 patent, often in conjunction with other words to form compound terms. Ex. 1043 ¶ 11-12. Such terms “conical end portion” and “end region” are used to denote when the term “means a portion or region. *Id.* at 12. When denoting “an extremity of a shaft body of sleeve,” an example of compound terms used include “end surface,” “lowermost end,” or “uppermost end.”

The following are example citations from the ‘568 patent where the term is used to denote a region and not “an extremity of a shaft body or sleeve.”

- “The present sleeve arrangement is configured for secure mounting in position via an interference or friction fit arrangement in direct contact with a **tapered end region** of the main shaft.” Ex. 1001 (9,827,568) 2:6-9, emphasis added.
- “An **upper end region** of a shaft 113 comprises an axial taper to define an upper conical section.” Ex. 1001 (9,827,568) 3:64-65, emphasis added.

Ex. 1043 ¶ 13. As is evident, these citations use such words “region” and “tapered . . . region” to clarify the term “end.” It is evident that these terms denote more than “an extremity of a shaft body or sleeve.” Ex. 1043 ¶ 14. Figure 2 of the ‘568 patent includes the label 113 in the center of the “end region” of the shaft. As provided in the ‘568 patent, “[b]oss 207 and pin 206 are positioned coaxially with **shaft end 113** and sleeve 114.” Ex. 1001 4:47-48 (emphasis added). Thus, it is evident that element

113 is the “shaft end” and is not pointing to the distal surface.

The following citations are examples of the term “end” used without modifiers, but still clearly refer to the same end region 113 when taken in context:

- “The gyratory pendulum movement of the crushing head is supported by a lower bearing assembly positioned below the crushing head and a top bearing into which an upper end of the main shaft is journalled.” Ex. 1001 (9,827,568) 1:38-41.
- “Typically, the main shaft upper end is protected against wear by a sleeve.” Ex. 1001 (9,827,568) 1:41-42.
- “In particular, if the time taken to friction fit the heated sleeve onto the main shaft end is too great it is not uncommon for the sleeve to cool and shrink before it is forced onto the shaft to the correct and final position.” Ex. 1001 (9,827,568) 1:52-55.
- “FIG. 1 is a cross - sectional side view of a gyratory crusher having a main shaft supported at its upper end by a top bearing set and having a protective sleeve mounted about the upper end of the main shaft” Ex. 1001 (9,827,568) 3:27-30.
- “10 . The gyratory crusher as claimed in claim 1 , wherein at a curved region of the first end...” Ex. 1001 (9,827,568) 6:22-23.

Ex. 1043 ¶ 15.

Similar to the above, the following citation also does not refer to an extreme surface but to a specific region – “Similarly, a bottom end 118 of shaft 107 is supported by a bottom bearing assembly 119.” Ex. 1001 (9,827,568) 4:2-3.

As shown in Figure 1 of the ‘568 patent, 118 is not pointing to an extreme surface

of the shaft, but to a region of the shaft. Ex. 1043 ¶ 16-17.

A POSITA is believed to be aware of terms used and may look to prior art in the field of art for further confirmation of proper construction or to such authoritative references as dictionaries. Ex. 1043 ¶ 18, 21.

Regarding the term “end,” Piepho (Ex. 1016) utilizes the word ‘end,’ including in several compound terms, such as “yoke end (20), “top end (20),” tapered end (25),” shaft end (25),” and “cylindrical end (25).” Piepho (Ex. 1016) also uses the term “end” to denote a region. Ex. 1043 ¶ 18.

Polinski (Ex. 1016) also uses the term “end” to denote a region. For example:

- “a bearing sleeve fitted about the **end** of the shaft” (Ex. 1016 Abstract, emphasis added).
- “The **end** of the shaft is provided with a bearing journal fitted with a replaceable sleeve arrangement...” (Ex. 1016 1:51-53 emphasis added).
- “...annular lip 36 on the **upper end** of the sleeve 12.” (Ex 1016 3:26-27 emphasis added).

As with the '090 patent (*see* IPR 2024-01381), Polinski uses specific language to indicate when the term “end” refers to “an extremity of a shaft body or sleeve” and not a region. For example, “a retaining ring 51 sized to axially overlies the **outermost ends** of the journal 11 and the sleeve 50.” (Ex. 1015 3:64-66 emphasis

added).

There are multiple dictionary definitions for “end.” Ex. 1043 ¶ 21. Yet, it is easy to find many colloquial uses of “end” that agree with the particular meaning utilized in the ‘568 patent. *Id.* at 22. A POSITA would reply on the intrinsic evidence, discussed above, to inform the POSITA which extrinsic definition is most appropriate for a given term. *Id.* With respect to the ‘568 patent, since the claim language includes no modifier, such as “end region” or “end surface,” the patent writers intentionally left the modifiers off within the claims to denote the broadest possible meaning of “end.” *Id.* Thus, a POSITA would interpret “end” in the claims to mean “a part or place at or adjacent to an extremity” and/or “an extremity of a shaft body or sleeve.” *Id.*

The term end should be given its broadest meaning which would be a region or section of the shaft or sleeve and not merely an extreme surface. Ex. 1043 ¶ 11.

C. THE ‘568 SUBSTITUTE CLAIMS ARE OBVIOUS

The following is a chart illustrating the claims showing both the original challenged claims and the substitute challenged claims:

Challenged Claims (Original)	Challenged Claims (Substitute)
1P. A gyratory crusher comprising:	11P. A gyratory crusher comprising:
1a1. a main shaft including a shaft body having a first end for positioning at a lower region of the crusher and a second end for positioning at an upper	11a1. a main shaft including a shaft body having a first end for positioning at a lower region of the crusher and a second end for positioning at an upper region of

region of the crusher relative to the first end,	the crusher relative to the first end,
1a2. a thickness of the shaft body being tapered in an axial direction of the main shaft at a region of the second end so as to decrease in cross-sectional area; and	11a2. a thickness of the shaft body being tapered in an axial direction of the main shaft at a <u>tapered</u> region of the second end so as to <u>taper and</u> decrease in cross-sectional area; and
1b1. a sleeve fitted over the tapered region at the second end of the main shaft,	11b1. a sleeve fitted over the tapered region at the second end of the main shaft,
1b2. the sleeve including an elongate axial wall extending around a longitudinal axis of the sleeve,	11b2. the sleeve including an elongate axial wall extending around a longitudinal axis of the sleeve,
1b3. the axial wall having an internal facing surface for positioning in contact with an outward facing surface of the main shaft, and	11b3. the axial wall having an internal facing surface for positioning in contact with an outward facing surface of the main shaft, and
1b4. an external facing surface relative to the longitudinal axis,	11b4. an external facing surface relative to the longitudinal axis,
1b5. the axial wall extending between the internal and external facing surfaces,	11b5. The axial wall extending between the internal and external facing surfaces,
1b6. the axial wall having a first end for positioning at a lower region of the main shaft and a second end for positioning at an upper region of the main shaft relative to the lower region,	11b6. the axial wall having a first <u>sleeve</u> end for positioning at a lower region of the main shaft and a second <u>sleeve</u> end for positioning at an upper region of the main shaft relative to the lower region,
1b7. wherein a thickness of the axial wall at a region between the first and second ends decreases in a direction from the second end to the first end,	11b7. wherein a thickness of the axial wall at a region between the first and second <u>sleeve</u> ends <u>tapers and</u> decreases in a direction from the second <u>sleeve</u> end to the first <u>sleeve</u> end,
1b8. in the axial direction the internal	11b8. in the axial direction the internal

facing surface at said region between the first and second ends extending transverse to the longitudinal axis so as to taper inwardly towards the longitudinal axis in the direction from the first to the second end.	facing surface at said region between the first and second <u>sleeve</u> ends extending transverse to the longitudinal axis so as to taper inwardly towards the longitudinal axis <u>of the sleeve</u> in the direction from the first <u>sleeve</u> end to the second <u>sleeve</u> end, and
	11b9. <u>wherein the external facing surface from the first sleeve end to the second sleeve end is parallel to the longitudinal axis of the sleeve such that the external facing surface of the sleeve when viewed externally has a cylindrical geometry.</u>
2P. The gyratory crusher as claimed in claim 1,	12P. The gyratory crusher as claimed in claim <u>11</u>,
2a. wherein the region over which the thickness of the axial wall decreases extends substantially the full axial length of the sleeve.	12a. wherein the region over which the thickness of the axial wall <u>tapers and</u> decreases extends ~~substantially~~ the full axial length of the sleeve.
3P. The gyratory crusher as claimed in claim 1,	13P. The gyratory crusher as claimed in claim <u>11</u>,
3a1. further comprising a radial wall extending perpendicular or transverse to the axial wall,	13a1. further comprising a radial wall extending perpendicular or transverse to the axial wall,
3a2. the radial wall being positioned at or towards the second end and extending inwardly towards the longitudinal axis.	13a2. the radial wall being positioned at or towards the second end and extending inwardly towards the longitudinal axis.
4P. The gyratory crusher as claimed in claim 3,	(no corresponding claim)
4a. wherein the radial wall includes a through bore positioned at the longitudinal axis of the sleeve.	

5P. The gyratory crusher as claimed in claim 1,	14P. The gyratory crusher as claimed in claim 11,
5a. wherein a cross-sectional shape profile of the external facing surface is substantially circular.	14a. wherein a cross-sectional shape profile of the external facing surface is substantially circular.
6P. The gyratory crusher as claimed in claim 1,	15P. The gyratory crusher as claimed in claim 11,
6a. wherein a cross-sectional shape profile of the internal facing surface is substantially circular.	wherein a cross-sectional shape profile of the internal facing surface is substantially circular.
7P. The gyratory crusher as claimed in claim 1,	(no corresponding claim)
7a. wherein a shape profile of the external facing surface defines a section of a cylinder in the axial direction.	
8P. The gyratory crusher as claimed in claim 1,	16P. The gyratory crusher as claimed in claim 11,
8a. wherein a shape profile of the internal facing surface defines a section of a cone in the axial direction.	16a. Wherein a shape profile of the internal facing surface defines a section of a cone in the axial direction.
9P. The gyratory crusher as claimed in claim 1,	17P. The gyratory crusher as claimed in claim 11,
9a. further comprising at least one bore provided through the axial wall to allow the passage of a fluid to the internal facing surface.	17a. Further comprising at least one bore provided through the axial wall to allow the passage of a fluid to the internal facing surface.
10P. The gyratory crusher as claimed in claim 1,	18P. The gyratory crusher as claimed in claim 11,
10a. wherein at a curved region of the first end, the internal facing surface is	18a. wherein at a ~~curved~~ region [[of]] <u>proximal to the first sleeve end, the</u>

curved radially outward relative to the longitudinal axis in a direction towards the external facing surface such that the axial wall thickness decreases to zero at the curved region.	<u>thickness of the axial wall reduces at an increased rate relative to a region of the axial wall proximal to the second sleeve end</u> ~~the internal facing surface is curved radially outward relative to the longitudinal axis in a direction towards the external facing surface such that the axial wall thickness decreases to zero at the curved region.~~
(no corresponding claim; substitute for claim 4)	19P. The gyratory crusher as claimed in claim 18,
	19a. wherein the thickness of the axial wall reduces at a uniform rate along an entire axial length of the sleeve other than the region proximal to the first sleeve end.

Ex. 1043 ¶ 4.

Though such terms as “tapered,” “taper,” “sleeve,” and “tapers” have been added to independent claim 11, when compared to original claim 1, the most significant change from claim 1 to claim 11 is requiring that the external facing surface of the sleeve must be cylindrical. Ex. 1043 ¶ 5. This limitation new was part of canceled claim 7. *Id.*

The most significant change from claim 2 to claim 12 is that the tapered region now extends the full length of the sleeve instead of substantially the full length of the sleeve. *Id.* Claims 3, 5-6, and 8-9 were duplicated without changes. *Id.* Claims 4 and 7 were eliminated. *Id.* The most significant change from claim 10 to claim 18 was replacing the curved surface on the inside of the sleeve with a tapered surface

that tapers faster than the first tapered surface. *Id.* Claim 19 is new and describes the first tapered surface having a constant taper angle. *Id.*

Though fully addressed in Ex. 1043 and extensively cited herein, instead of addressing each claim elements in detail, Ex. 1043 should be referenced for details regarding why each substitute claim is obvious.

1. Polinski in View of Piepho Render Claims 11-16 Obvious

Challenged Claim (Substitute)	Does Prior Art Disclose This?
11P. A gyratory crusher comprising:	YES: Although the preamble is generally not considered limiting, Polinski discloses a gyratory crusher. In particular Polinski states: <i>“The present invention relates to <u>gyratory crushers</u> and, in particular, to the main shaft supporting the crusher head or mantle within the crusher.”¹</i>
11a1. a main shaft including a shaft body having a first end for positioning at a lower region of the crusher and a second end for positioning at an upper region of the crusher relative to the first end,	Both Polinski and Piepho disclose a main shaft including a shaft body having a first end for positioning at a lower region of the crusher and a second end for positioning at an upper region of the crusher relative to the first end.
11a2. a thickness of the shaft body being tapered in an axial direction of the main shaft at a <u>tapered</u> region of the second end so as to <u>taper and</u> decrease in cross-sectional area; and	YES: Polinski in view of Piepho discloses a thickness of the shaft body being tapered in an axial direction of the main shaft at a tapered region of the second end so as to taper and

¹ Ex. 1015 1:6-8, emphasis added.

	decrease in cross-sectional area. Hence the inclusions of “tapered” does not make this claim patentable.
11b1. a sleeve fitted over the tapered region at the second end of the main shaft,	YES: Polinski in view of Piepho discloses a sleeve fitted over the tapered region at the second end of the main shaft.
11b2. the sleeve including an elongate axial wall extending around a longitudinal axis of the sleeve,	YES: Polinski in view of Piepho discloses a sleeve including an elongate axial wall extending around a longitudinal axis of the sleeve.
11b3. the axial wall having an internal facing surface for positioning in contact with an outward facing surface of the main shaft, and	YES: Both Polinski and Piepho disclose a sleeve with an axial wall having an internal facing surface for positioning in contact with an outward facing surface of the main shaft.
11b4. an external facing surface relative to the longitudinal axis,	YES: Both Polinski and Piepho disclose a sleeve with an external facing surface relative to the longitudinal axis.
11b5. The axial wall extending between the internal and external facing surfaces,	YES: Both Polinski and Piepho disclose a sleeve with an axial wall extends between the internal and external facing surfaces.
11b6. the axial wall having a first <u>sleeve</u> end for positioning at a lower region of the main shaft and a second <u>sleeve</u> end for positioning at an upper region of the main shaft relative to the lower region,	YES: Both Polinski and Piepho discloses an axial wall having a first sleeve end for positioning at a lower region of the main shaft and a second sleeve end for positioning at an upper region of the main shaft relative to the lower region.
11b7. wherein a thickness of the axial wall at a region between the first and second <u>sleeve</u> ends <u>tapers and</u> decreases	YES: Piepho discloses that the thickness of the axial wall at a region between the first and second sleeve

in a direction from the second <u>sleeve</u> end to the first <u>sleeve</u> end,	ends tapers and decreases in a direction from the second sleeve end to the first sleeve end.
11b8. in the axial direction the internal facing surface at said region between the first and second <u>sleeve</u> ends extending transverse to the longitudinal axis so as to taper inwardly towards the longitudinal axis <u>of the sleeve</u> in the direction from the first <u>sleeve</u> end to the second <u>sleeve</u> end, <u>and</u>	YES: Piepho discloses that in the axial direction, the internal facing surface at said region between the first and second sleeve ends extends transverse to the longitudinal axis so as to taper inwardly towards the longitudinal axis of the sleeve in the direction from the first to sleeve end the second sleeve end.
11b9. <u>wherein the external facing surface from the first sleeve end to the second sleeve end is parallel to the longitudinal axis of the sleeve such that the external facing surface of the sleeve when viewed externally has a cylindrical geometry.</u>	YES: Both Polinski and Piepho disclose that the external facing surface from the first sleeve end to the second sleeve end is parallel to the longitudinal axis of the sleeve such that the external facing surface of the sleeve when viewed externally has a cylindrical geometry.
12P. The gyratory crusher as claimed in claim <u>11</u> ,	YES: As disclosed in referenced chart, Polinski in view of Piepho and Pollak discloses the gyratory crusher as claimed in claim 11.
12a. wherein the region over which the thickness of the axial wall <u>tapers and</u> decreases extends <u>substantially</u> the full axial length of the sleeve.	YES: Polinski in view of Piepho and Pollak discloses that the region over which the thickness of the axial wall tapers and decreases extends the full axial length of the sleeve.
13P. The gyratory crusher as claimed in claim <u>11</u> ,	YES: As shown in referenced chart, Polinski in view of Piepho discloses the gyratory crusher as claimed in claim 11.
13a1. further comprising a radial wall extending perpendicular or transverse to	YES: Polinski discloses a radial wall extending perpendicular or transverse

the axial wall,	to the axial wall.
13a2. the radial wall being positioned at or towards the second end and extending inwardly towards the longitudinal axis.	YES: Polinski discloses that the radial wall is positioned at or towards the second end and extends inwardly towards the longitudinal axis.
14P. The gyratory crusher as claimed in claim 11,	YES: As shown in referenced chart, Polinski in view of Piepho discloses the gyratory crusher as claimed in claim 11.
14a. wherein a cross-sectional shape profile of the external facing surface is substantially circular.	YES: Both Polinski and Piepho disclose that the cross-sectional shape profile of the external facing surface is substantially circular.
15P. The gyratory crusher as claimed in claim 11,	YES: As shown in referenced chart, Polinski in view of Piepho discloses the gyratory crusher as claimed in claim 11.
wherein a cross-sectional shape profile of the internal facing surface is substantially circular.	YES: Both Polinski and Piepho disclose that the cross-sectional shape profile of the internal facing surface is substantially circular.
016P. The gyratory crusher as claimed in claim 11,	YES: As shown in referenced chart, Polinski in view of Piepho discloses the gyratory crusher as claimed in claim 11.
16a. Wherein a shape profile of the internal facing surface defines a section of a cone in the axial direction.	YES: Piepho discloses that the shape profile of the internal facing surface defines a section of a cone in the axial direction.

For further details *see* Ex. 1043 ¶¶ 28-31 and Table pp. 24 - 51.

2. Polinski in view of Piepho, and in further view of A.E. Bratt Render Claim 17 Obvious

Challenged Claim	Does the Prior Art disclose this?
17P. The gyratory crusher as claimed in claim 11,	YES: As shown herein and in Ex. ____ Polinski in view of Piepho discloses the gyratory crusher as claimed in claim 11.
17a. further comprising at least one bore provided through the axial wall to allow the passage of a fluid to the internal facing surface.	YES: Polinski in view of Piepho and further in view of A.E. Bratt discloses further comprising at least one bore provided through the axial wall to allow the passage of a fluid to the internal facing surface.

For further details *see* Ex. 1043 ¶¶ 32 – 32 and Table pp. 52- 53.

3. Polinski in view of Piepho, and in further view of Pollak Render Obvious Claims 18 and 19

Challenged Claim	Does the Prior Art disclose this?
18P. The gyratory crusher as claimed in claim 11,	YES: As shown above, Polinski in view of Piepho discloses the gyratory crusher as claimed in claim 11.
18a. wherein at a ~~curved~~ region [[of]] <u>proximal to the first sleeve end, the thickness of the axial wall reduces at an increased rate relative to a region of the axial wall proximal to the second sleeve end</u> ~~the internal facing surface is curved radially outward relative to the longitudinal axis in a direction towards the external facing surface such that the axial wall thickness decreases to zero at the curved region.~~	YES: Polinski in view of Piepho and in further view of Pollak or the knowledge of a POSITA discloses wherein at a region proximal to the first sleeve end, the thickness of the axial wall reduces at an increased rate relative to a region of the axial wall proximal to the second sleeve end.
19P. The gyratory crusher as claimed in claim 18,	YES: As shown above, Polinski in view of Piepho and Pollak discloses the gyratory crusher as claimed in claim 18.
19a. wherein the thickness of the axial wall reduces at a uniform rate along an entire axial length of the sleeve other than the region proximal to the first sleeve end.	YES: Polinski in view of Piepho and in further view of Pollak or the knowledge of a POSITA discloses wherein the thickness of the axial wall reduces at a uniform rate along an entire axial length

	of the sleeve other than the region proximal to the first sleeve end.
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For further details *see* Ex. 1043 ¶¶ 34-36 and Table pp. 56 – 59.

4. Coxhill in View of Piepho Render Claim 11-12, 14-16, 18-19 Obvious

Challenged Claim	Does the Prior Art disclose this?
11P. A gyratory crusher comprising:	YES: Although the preamble is generally not considered limiting, Coxhill discloses a gyratory crusher. In particular Coxhill states: <i>Referring to the drawing, there is shown a gyratory crusher 10 having a frame generally indicated at 11 and including a lower frame section 12 and an upper frame section 14.²</i>
11a1. a main shaft including a shaft body having a first end for positioning at a lower region of the crusher and a second end for positioning at an upper region of the crusher relative to the first end,	YES: As shown below, both Coxhill and Piepho disclose a main shaft including a shaft body having a first end for positioning at a lower region of the crusher and a second end for positioning at an upper region of the crusher relative to the first end.
11a2. a thickness of the shaft body being tapered in an axial direction of the main shaft at a <u>tapered</u> region of the second end so as to <u>taper and</u> decrease in cross-sectional area; and	YES: Coxhill in view of Piepho discloses a thickness of the shaft body being tapered in an axial direction of the main shaft at a tapered region of the second end so as to taper and decrease in cross-sectional area.
11b1. a sleeve fitted over the tapered region at the second end of the main shaft,	YES: Coxhill in view of Piepho discloses a sleeve fitted over the tapered region at the second end of the main shaft.

² EX. 1039 1:54-57

11b4. an external facing surface relative to the longitudinal axis,	YES: Both Coxhill and Piepho disclose a sleeve with an external facing surface relative to the longitudinal axis.
11b5. the axial wall extending between the internal and external facing surfaces,	YES: Both Coxhill and Piepho disclose a sleeve with an axial wall that extends between the internal and external facing surfaces.
11b6. the axial wall having a first <u>sleeve</u> end for positioning at a lower region of the main shaft and a second <u>sleeve</u> end for positioning at an upper region of the main shaft relative to the lower region,	YES: Both Coxhill and Piepho disclose an axial wall having a first sleeve end for positioning at a lower region of the main shaft and a second sleeve end for positioning at an upper region of the main shaft relative to the lower region.
11b7. wherein a thickness of the axial wall at a region between the first and second <u>sleeve</u> ends <u>tapers and</u> decreases in a direction from the second <u>sleeve</u> end to the first <u>sleeve</u> end,	YES: Piepho discloses that the thickness of the axial wall at a region between the first and second sleeve ends tapers and decreases in a direction from the second sleeve end to the first sleeve end.
11b8. in the axial direction the internal facing surface at said region between the first and second <u>sleeve</u> ends extending transverse to the longitudinal axis so as to taper inwardly towards the longitudinal axis <u>of the sleeve</u> in the direction from the first <u>sleeve</u> end to the second <u>sleeve</u> end, and	YES: Piepho discloses that in the axial direction, the internal facing surface at said region between the first and second sleeve ends extends transverse to the longitudinal axis so as to taper inwardly towards the longitudinal axis of the sleeve in the direction from the first to sleeve end the second sleeve end.
11B9. <u>wherein the external facing surface from the first sleeve end to the second sleeve end is parallel to the longitudinal axis of the sleeve such that the external facing surface of the sleeve when viewed externally has a cylindrical geometry.</u>	YES: Both Coxhill and Piepho disclose that the external facing surface from the first sleeve end to the second sleeve end is parallel to the longitudinal axis of the sleeve such that the external facing surface of the sleeve when viewed externally has a cylindrical geometry.
12P. The gyratory crusher as claimed in claim 11,	YES: As shown above, Coxhill in view of Piepho discloses the gyratory crusher as claimed in claim 11.
12a. wherein the region over which the thickness of the axial wall <u>tapers and</u>	YES: a combination of Piepho and Coxhill discloses that the region over

decreases extends ~~substantially~~ the full axial length of the sleeve.	which the thickness of the axial wall tapers and decreases extends the full axial length of the sleeve.
14P. The gyratory crusher as claimed in claim 11,	YES: As shown above, Coxhill in view of Piepho discloses the gyratory crusher as claimed in claim 11.
14a. wherein a cross-sectional shape profile of the external facing surface is substantially circular.	YES: Both Coxhill and Piepho disclose that the cross-sectional shape profile of the external facing surface is substantially circular.
15P. The gyratory crusher as claimed in claim 11,	YES: As shown above, Coxhill in view of Piepho discloses the gyratory crusher as claimed in claim 11.
15a. wherein a cross-sectional shape profile of the internal facing surface is substantially circular.	YES: Both Coxhill and Piepho disclose that the cross-sectional shape profile of the internal facing surface is substantially circular.
16P. The gyratory crusher as claimed in claim 11,	YES: As shown above, Coxhill in view of Piepho discloses the gyratory crusher as claimed in claim 11.
16a. wherein a shape profile of the internal facing surface defines a section of a cone in the axial direction.	YES: Piepho discloses that the shape profile of the internal facing surface defines a section of a cone in the axial direction.
18P. The gyratory crusher as claimed in claim 11,	YES: As shown above, Coxhill in view of Piepho discloses the gyratory crusher as claimed in claim 11.
18a. wherein at a ~~curved~~ region ~~[[of]]~~ proximal to the first sleeve end, <u>the thickness of the axial wall reduces at an increased rate relative to a region of the axial wall proximal to the second sleeve end</u> ~~the internal facing surface is curved radially outward relative to the longitudinal axis in a direction towards the external facing surface such that the axial wall thickness decreases to zero at the curved region.~~	YES: Coxhill in view of Piepho discloses wherein at a region proximal to the first sleeve end, the thickness of the axial wall reduces at an increased rate relative to a region of the axial wall proximal to the second sleeve end.

19P. The gyratory crusher as claimed in claim 18,	YES: As shown above, Coxhill in view of Piepho discloses the gyratory crusher as claimed in claim 18.
19a. wherein the thickness of the axial wall reduces at a uniform rate along an entire axial length of the sleeve other than the region proximal to the first sleeve end.	YES: Coxhill in view of Piepho discloses wherein the thickness of the axial wall reduces at a uniform rate along an entire axial length of the sleeve other than the region proximal to the first sleeve end.

For further details *see* Ex. 1043 Table pp. 60 – 79.

5. Coxhill in View of Piepho and Polinsky Render Claim 13 Obvious

Challenged Claim	Does the Prior Art disclose this?
13P. The gyratory crusher as claimed in claim 11,	YES: As shown above, Coxhill in view of Piepho discloses the gyratory crusher as claimed in claim 11.
13a1. further comprising a radial wall extending perpendicular or transverse to the axial wall,	YES: Polinski discloses a radial wall extending perpendicular or transverse to the axial wall.

For further details *see* Ex. 1043 Table pp. 80 - 81.

6. Coxhill in View of Piepho and Bratt Render Claim 17 Obvious

Challenged Claim	Does the Prior Art disclose this?
17P. The gyratory crusher as claimed in claim 11,	YES: As shown above, Coxhill in view of Piepho discloses the gyratory crusher as claimed in claim 11.
17a. further comprising at least one bore provided through the axial wall to allow the passage of a fluid to the internal facing surface.	YES: Polinski in view of Piepho and further in view of A.E. Bratt discloses further comprising at least one bore provided through the axial wall to allow the passage of a fluid to the internal facing surface.

For further details *see* Ex. 1043 Table pp. 81- 83.

IV. OBJECTIVE INDICIA OF NON-OBVIOUSNESS IS IRRELEVANT

For an obviousness analysis, courts should consider (1) “the scope and content of the prior art”; (2) “differences between the prior art and the claims at issue”; (3) “the level of ordinary skill in the pertinent art”; and (4) “secondary considerations,” which are also known as objective indicia of nonobviousness.⁵ *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). A claim of objective indicia of non-obviousness does not overcome the primary prima facie case of obviousness as presented herein. Furthermore, when considering the totality of the evidence presented by the Patent Owner, the biases of its expert renders should further nullify this defense.

V. THE ORIGINAL CLAIMS HAVE BEEN ABANDONED

Sandvik’s Motion to Amend is non-contingent. Accordingly, original claims 1-10 of the '568 patent are abandoned and should therefore be canceled, irrespective of the outcome of Fujifilm's Motion. *See* DHS v. Golden, IPR2014-00714, 2015 WL 5818910, *1, n.1 (PTAB Oct. 1, 2015); *Toshiba v. Optical Devices*, IPR2014-01441 (Paper No. 36), 9 (PTAB March 8, 2016).

VI. CONCLUSION

In view of the above, Patent Owner’s Motion to Amend should be denied.

Date: September 16, 2025

/Terry M. Sanks/
Terry M. Sanks
Reg. No. 45,069
BEUSSE SANKS, PLLC
612 E. Colonial Drive, Suite 250
Orlando, Florida 32803
Tel: (407) 644-8888

CERTIFICATE OF SERVICE

I hereby certify that, on September 16, 2025, a true and correct copy of the foregoing Response (and accompanying exhibits) was served on the Patent Owner via electronic means (by agreement of the parties) at the address listed below:

Mehran Arjomand
MArjomand@mofo.com
Alex S. Yap
AYap@mofo.com
MORRISON & FOERSTER LLP
707 Wilshire Blvd., Suite 6000 Los Angeles, CA 90017
Tel: 213-892-5200

- and –

Aaron G. Fountain
afountain@mofo.com
MORRISON & FOERSTER LLP
200 Clarendon Street, 21st Floor
Boston, MA 02116
Tel: 617-648-4700

-and-

Jeffrey G. Young
JeffreyYoung@mofo.com
MORRISON & FOERSTER LLP
2100 L Street, NW Suite 900
Washington, DC 20037
Tel: 202-877-1500

Attorneys for Patent Owner
Sandvik Intellectual Property AB

Date: September 16, 2025

/Terry M. Sanks/

Terry M. Sanks
Reg. No. 45,069