Patent Owner's Demonstratives

CMS CEPCOR LTD. and CMS CEPCOR AMERICAS LLC,
v.
SANDVIK INTELLECTUAL PROPERTY AB

***Inter Partes* Review No. IPR2024-01380**

U.S. Patent No. 9,827,568

January 13, 2026

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Roadmap

Piepho is non-analogous art

There is no motivation to combine Torrence and Piepho

Unrebutted objective evidence supports the patentability of the substitute claims

Claims 13-17 are patentable

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Claim 11 (Revised MTA)

11. (Substitute for claim 1) A gyratory crusher comprising:

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, 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, wherein the tapered region extends from an uppermost extremity of the shaft; and

a sleeve fitted over the tapered region at the second end of the main shaft, the sleeve including an elongate axial wall extending around a longitudinal axis of the sleeve, the axial wall having an internal facing surface for positioning in contact with an outward facing surface of the main shaft, and an external facing surface relative to the longitudinal axis, the axial wall extending between the internal and external facing surfaces, the 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,

wherein a 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, wherein the first sleeve end is a lowermost extremity of the sleeve,

in the axial direction the internal facing surface at said region between the first and second sleeve ends extending transverse to the longitudinal axis so as to taper inwardly towards the longitudinal axis of the sleeve in the direction from the first sleeve end to the second sleeve end, and

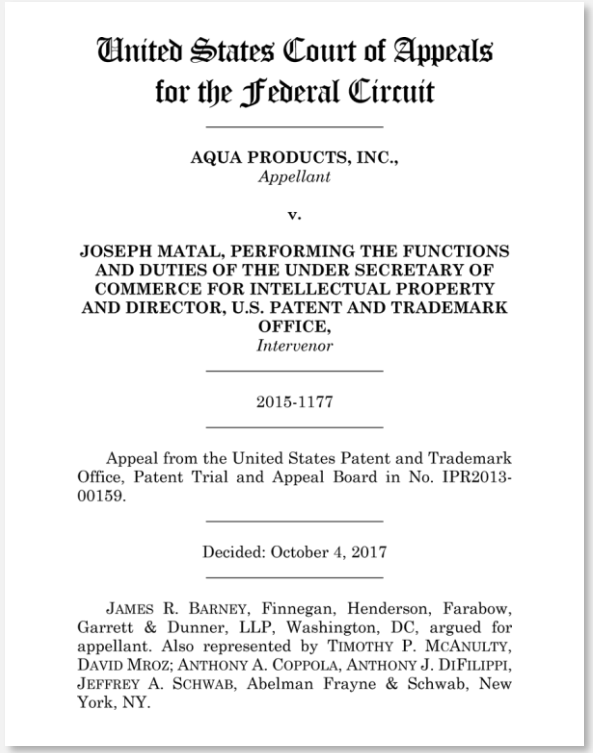
wherein the external facing surface from the first sleeve end to the second sleeve end is parallel to the longitudinal axis of the sleeve such that the external facing surface of the sleeve when viewed externally has a cylindrical geometry, and

wherein the second end of the shaft body is configured to be supported by a top bearing assembly such that the second end is rotatable eccentrically and freely rotatable about a longitudinal axis of the shaft within the bearing assembly.

RMTA (Paper 23)

RMTA (Paper 23), 40-41

Aqua Products: Burden on Petitioner



United States Court of Appeals
for the Federal Circuit

AQUA PRODUCTS, INC.,
Appellant

v.

JOSEPH MATAL, PERFORMING THE FUNCTIONS AND DUTIES OF THE UNDER SECRETARY OF COMMERCE FOR INTELLECTUAL PROPERTY AND DIRECTOR, U.S. PATENT AND TRADEMARK OFFICE,
Intervenor

2015-1177

Appeal from the United States Patent and Trademark Office, Patent Trial and Appeal Board in No. IPR2013-00159.

Decided: October 4, 2017

JAMES R. BARNEY, Finnegan, Henderson, Farabow, Garrett & Dunner, LLP, Washington, DC, argued for appellant. Also represented by TIMOTHY P. MCANULTY, DAVID MROZ; ANTHONY A. COPPOLA, ANTHONY J. DIFILIPPI, JEFFREY A. SCHWAB, Abelman Frayne & Schwab, New York, NY.

weight. The only legal conclusions that support and define the judgment of the court are: (1) the PTO has not adopted a rule placing the burden of persuasion with respect to the patentability of amended claims on the patent owner that is entitled to deference; and (2) in the absence of anything that might be entitled deference, the PTO may not place that burden on the patentee. All the rest of our cogitations, whatever label we have placed on them, are just that—cogitations. Even our discussions on whether the statute is ambiguous are mere academic exercises.

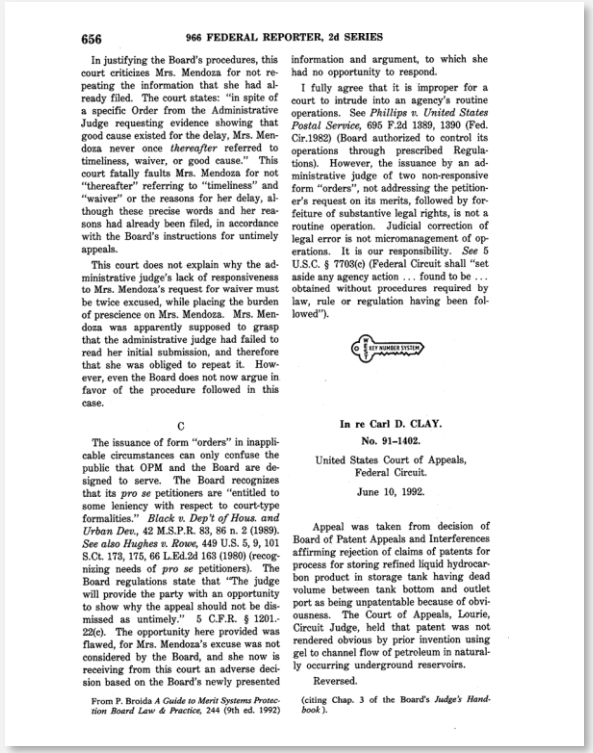
Aqua Prod., Inc. v. Matal, 872 F.3d 1290, 1327 (Fed. Cir. 2017)

RMTA (Paper 23), 1

Analogous Art

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

In re Clay: Analogous Art Criteria



656 966 FEDERAL REPORTER, 2d SERIES

In justifying the Board's procedures, this court criticizes Mrs. Mendoza for not repeating the information that she had already filed. The court states: "in spite of a specific Order from the Administrative Judge requesting evidence showing that good cause existed for the delay, Mrs. Mendoza never once *thereafter* referred to timeliness, waiver, or good cause." This court fatally faults Mrs. Mendoza for not "thereafter" referring to "timeliness" and "waiver" or the reasons for her delay, although these precise words and her reasons had already been filed, in accordance with the Board's instructions for untimely appeals.

This court does not explain why the administrative judge's lack of responsiveness to Mrs. Mendoza's request for waiver must be twice excused, while placing the burden of prescience on Mrs. Mendoza. Mrs. Mendoza was apparently supposed to grasp that the administrative judge had failed to read her initial submission, and therefore that she was obliged to repeat it. However, even the Board does not now argue in favor of the procedure followed in this case.

C

The issuance of form "orders" in inapplicable circumstances can only confuse the public that OPM and the Board are designed to serve. The Board recognizes that its *pro se* petitioners are "entitled to some leniency with respect to court-type formalities." *Black v. Dep't of Hous. and Urban Dev.*, 42 M.S.P.R. 83, 86 n. 2 (1989). *See also Hughes v. Rowe*, 449 U.S. 5, 9, 101 S.Ct. 173, 175, 66 L.Ed.2d 163 (1980) (recognizing needs of *pro se* petitioners). The Board regulations state that "The judge will provide the party with an opportunity to show why the appeal should not be dismissed as untimely." 5 C.F.R. § 1201.-22(e). The opportunity here provided was flawed, for Mrs. Mendoza's excuse was not considered by the Board, and she now is receiving from this court an adverse decision based on the Board's newly presented information and argument, to which she had no opportunity to respond.

I fully agree that it is improper for a court to intrude into an agency's routine operations. See *Phillips v. United States Postal Service*, 695 F.2d 1389, 1390 (Fed. Cir.1982) (Board authorized to control its operations through prescribed Regulations). However, the issuance by an administrative judge of two non-responsive form "orders", not addressing the petitioner's request on its merits, followed by forfeiture of substantive legal rights, is not a routine operation. Judicial correction of legal error is not micromanagement of operations. It is our responsibility. *See* 5 U.S.C. § 7703(c) (Federal Circuit shall "set aside any agency action ... found to be ... obtained without procedures required by law, rule or regulation having been followed").

KEY NUMBER SYSTEM

In re Carl D. CLAY.
No. 91-1402.

United States Court of Appeals, Federal Circuit.

June 10, 1992.

Appeal was taken from decision of Board of Patent Appeals and Interferences affirming rejection of claims of patents for process for storing refined liquid hydrocarbon product in storage tank having dead volume between tank bottom and outlet port as being unpatentable because of obviousness. The Court of Appeals, Lourie, Circuit Judge, held that patent was not rendered obvious by prior invention using gel to channel flow of petroleum in naturally occurring underground reservoirs.

Reversed.

From P. Broida *A Guide to Merit Systems Protection Board Law & Practice*, 244 (9th ed. 1992) (citing Chap. 3 of the Board's *Judge's Handbook*).

[3] Two criteria have evolved for determining whether prior art is analogous: (1) whether the art is from the same field of endeavor, regardless of the problem addressed, and (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved. *In re Deminski*, 796 F.2d 436, 442, 230 USPQ 313, 315 (Fed.Cir.1986); *In re Wood*, 599 F.2d 1032, 1036, 202 USPQ 171, 174 (CCPA 1979).

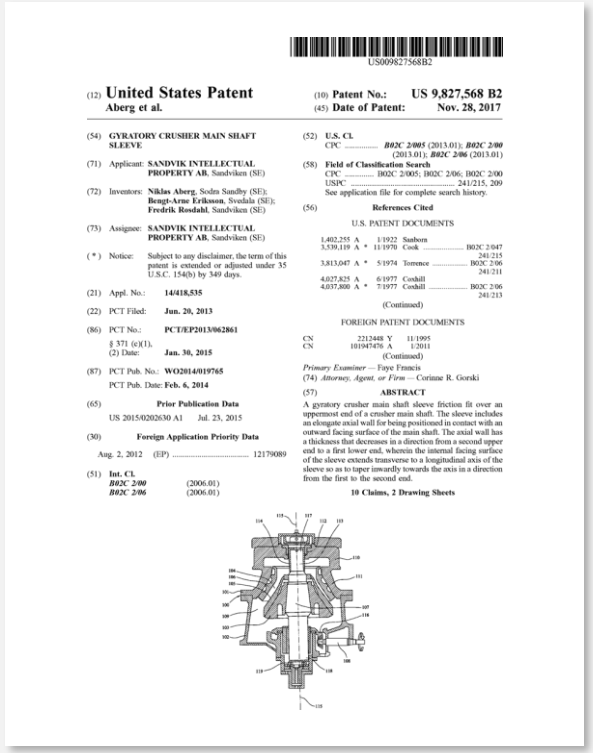
In re Clay, 966 F.2d 656, 658-59 (Fed. Cir. 1992)

Reply (Paper 34), 1

Field of Endeavor

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

’568 Patent’s Subject Matter



US009827568B2

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

(10) **Patent No.: US 9,827,568 B2**
(45) **Date of Patent: Nov. 28, 2017**

(54) **GYRATORY CRUSHER MAIN SHAFT SLEEVE**

(71) Applicant: **SANDVIK INTELLECTUAL PROPERTY AB**, Sandviken (SE)

(72) Inventors: **Niklas Aberg**, Sodra Sandby (SE); **Bengt-Arne Eriksson**, Svedala (SE); **Fredrik Rosdahl**, Sandviken (SE)

(73) Assignee: **SANDVIK INTELLECTUAL PROPERTY AB**, Sandviken (SE)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 349 days.

(21) Appl. No.: **14/418,535**

(22) PCT Filed: **Jun. 20, 2013**

(86) PCT No.: **PCT/EP2013/062861**
§ 371 (c)(1),
(2) Date: **Jan. 30, 2015**

(87) PCT Pub. No.: **WO2014/019765**
PCT Pub. Date: **Feb. 6, 2014**

(65) **Prior Publication Data**
US 2015/0202630 A1 Jul. 23, 2015

(30) **Foreign Application Priority Data**
Aug. 2, 2012 (EP) 12179089

(51) **Int. Cl.**
B02C 2/00 (2006.01)
B02C 2/06 (2006.01)

(52) **U.S. Cl.**
CPC ***B02C 2/005*** (2013.01); ***B02C 2/00*** (2013.01); ***B02C 2/06*** (2013.01)

(58) **Field of Classification Search**
CPC B02C 2/005; B02C 2/06; B02C 2/00
USPC 241/215, 209
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

1,402,255 A 1/1922 Sanborn
3,539,119 A * 11/1970 Cook B02C 2/047 241/215
3,813,047 A * 5/1974 Torrence B02C 2/06 241/211
4,027,825 A 6/1977 Coxhill
4,037,800 A * 7/1977 Coxhill B02C 2/06 241/213
(Continued)

FOREIGN PATENT DOCUMENTS

CN 2212448 Y 11/1995
CN 101947476 A 1/2011
(Continued)

Primary Examiner — Faye Francis
(74) *Attorney, Agent, or Firm* — Corinne R. Gorski

(57) **ABSTRACT**

A gyratory crusher main shaft sleeve friction fit over an uppermost end of a crusher main shaft. The sleeve includes an elongate axial wall for being positioned in contact with an outward facing surface of the main shaft. The axial wall has a thickness that decreases in a direction from a second upper end to a first lower end, wherein the internal facing surface of the sleeve extends transverse to a longitudinal axis of the sleeve so as to taper inwardly towards the axis in a direction from the first to the second end.

10 Claims, 2 Drawing Sheets

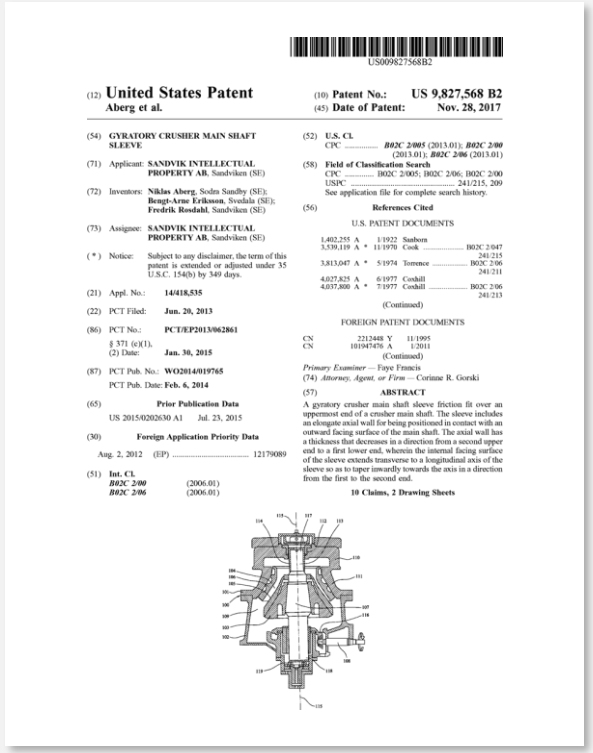
(12) **United States Patent**
Aberg et al.

(54) **GYRATORY CRUSHER MAIN SHAFT SLEEVE**

Ex. 1001

Reply (Paper 34), 2

’568 Patent’s Subject Matter



US009827568B2

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

(10) **Patent No.: US 9,827,568 B2**
(45) **Date of Patent: Nov. 28, 2017**

(54) **GYRATORY CRUSHER MAIN SHAFT SLEEVE**

(71) Applicant: **SANDVIK INTELLECTUAL PROPERTY AB**, Sandviken (SE)

(72) Inventors: **Niklas Aberg**, Sodra Sandby (SE); **Bengt-Arne Eriksson**, Svedala (SE); **Fredrik Rosdahl**, Sandviken (SE)

(73) Assignee: **SANDVIK INTELLECTUAL PROPERTY AB**, Sandviken (SE)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 349 days.

(21) Appl. No.: **14/418,535**

(22) PCT Filed: **Jun. 20, 2013**

(86) PCT No.: **PCT/EP2013/062861**
§ 371 (c)(1),
(2) Date: **Jan. 30, 2015**

(87) PCT Pub. No.: **WO2014/019765**
PCT Pub. Date: **Feb. 6, 2014**

(65) **Prior Publication Data**
US 2015/0202630 A1 Jul. 23, 2015

(30) **Foreign Application Priority Data**
Aug. 2, 2012 (EP) 12179089

(51) **Int. Cl.**
B02C 2/00 (2006.01)
B02C 2/06 (2006.01)

(52) **U.S. Cl.**
CPC ***B02C 2/005*** (2013.01); ***B02C 2/00*** (2013.01); ***B02C 2/06*** (2013.01)

(58) **Field of Classification Search**
CPC B02C 2/005; B02C 2/06; B02C 2/00
USPC 241/215, 209
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

1,402,255 A 1/1922 Sanborn
3,539,119 A * 11/1970 Cook B02C 2/047 241/215
3,813,047 A * 5/1974 Torrence B02C 2/06 241/211
4,027,825 A 6/1977 Coxhill
4,037,800 A * 7/1977 Coxhill B02C 2/06 241/213

(Continued)

FOREIGN PATENT DOCUMENTS

CN 2212448 Y 11/1995
CN 101947476 A 1/2011

(Continued)

Primary Examiner — Faye Francis
(74) *Attorney, Agent, or Firm* — Corinne R. Gorski

(57) **ABSTRACT**

A gyratory crusher main shaft sleeve friction fit over an uppermost end of a crusher main shaft. The sleeve includes an elongate axial wall for being positioned in contact with an outward facing surface of the main shaft. The axial wall has a thickness that decreases in a direction from a second upper end to a first lower end, wherein the internal facing surface of the sleeve extends transverse to a longitudinal axis of the sleeve so as to taper inwardly towards the axis in a direction from the first to the second end.

10 Claims, 2 Drawing Sheets

FIELD OF INVENTION

The present invention relates to a gyratory crusher main shaft sleeve for positioning at an uppermost end of a crusher main shaft and in particular, although not exclusively, to a sleeve having a tapered wall thickness.

Ex. 1001, 1:10-15

Reply (Paper 34), 2

’568 Patent’s Subject Matter

- **Every reference** cited in the background is **gyratory crusher art**.

BACKGROUND ART

Gyratory crushers are used for crushing ore, mineral and rock material to smaller sizes. Typically, the crusher comprises a crushing head mounted upon an elongate main shaft. A first crushing shell is mounted on the crushing head and a second crushing shell is mounted on a frame such that the first and second crushing shells define together a crushing gap through which the material to be crushed is passed. A driving device is arranged to rotate an eccentric assembly about the lower portion of the shaft so as to cause the crushing head to perform a gyratory pendulum movement and crush the material introduced in the crushing gap. US 2009/0008489 discloses a hydraulically adjustable cone crusher in which an axial bearing assembly comprises a hydraulic adjustment cylinder for adjusting the setting of the crusher. U.S. Pat. No. 4,919,349 discloses a gyratory crusher having a dual seal arrangement that utilises forced air and a gasket arrangement to block contaminants entering the crusher. SU 897280 describes a cone crusher that has a step cup bearing to absorb and transmit the crushing force of the crusher head.

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. Typically, the main shaft upper end is protected against wear by a sleeve. Commonly, the protective sleeve comprises a cylindrical geometry and is held at the main shaft via an interference or friction fit. This arrangement however requires the sleeve to be heated to increase its diameter to enable mounting and possible disassembly at the main shaft.

Example protective sleeves are disclosed in U.S. Pat. No. 1,592,313; U.S. Pat. No. 1,748,102; RU 718160 and RU 940837.

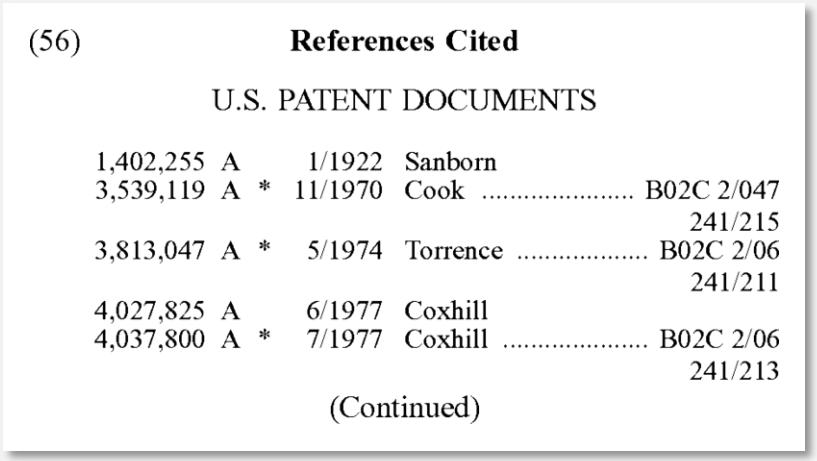
However, a number of problems exist with conventional protective sleeves. In particular, if the time taken to friction fit the heated sleeve onto the main shaft end is too great it is not uncommon for the sleeve to cool and shrink before it is forced onto the shaft to the correct and final position. Additionally, disassembly is often problematic as the sleeve is required to be cut before it can be removed. On large crushers, protective sleeves have a substantial wall thickness and this cutting operation can be time and labour intensive with the added risk of potential damage to the shaft. What is required is a main shaft sleeve that addresses the above problem.

Ex. 1001, 1:19-62

Reply (Paper 34), 2

’568 Patent’s Subject Matter

- **Prosecution:** Examiner cited only gyratory crusher references.

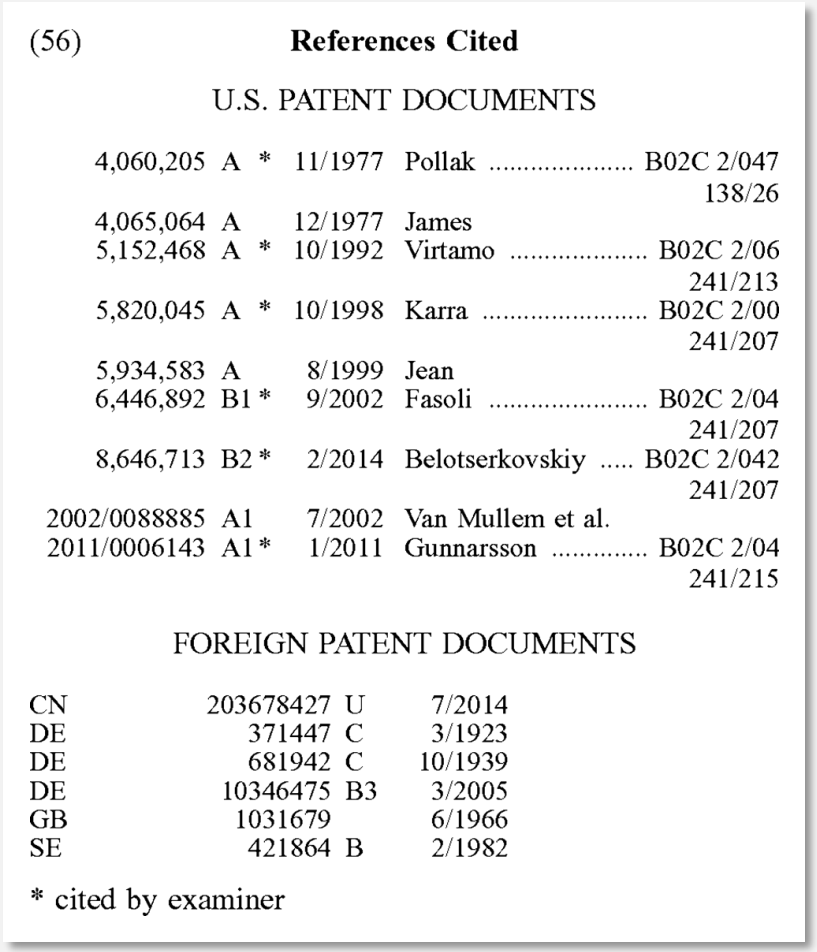


(56) **References Cited**

U.S. PATENT DOCUMENTS

1,402,255	A		1/1922	Sanborn	
3,539,119	A	*	11/1970	Cook	B02C 2/047 241/215
3,813,047	A	*	5/1974	Torrence	B02C 2/06 241/211
4,027,825	A		6/1977	Coxhill	
4,037,800	A	*	7/1977	Coxhill	B02C 2/06 241/213

(Continued)



(56) **References Cited**

U.S. PATENT DOCUMENTS

4,060,205	A	*	11/1977	Pollak	B02C 2/047 138/26
4,065,064	A		12/1977	James	
5,152,468	A	*	10/1992	Virtamo	B02C 2/06 241/213
5,820,045	A	*	10/1998	Karra	B02C 2/00 241/207
5,934,583	A		8/1999	Jean	
6,446,892	B1	*	9/2002	Fasoli	B02C 2/04 241/207
8,646,713	B2	*	2/2014	Belotserkovskiy	B02C 2/042 241/207
2002/0088885	A1		7/2002	Van Mullem et al.	
2011/0006143	A1	*	1/2011	Gunnarsson	B02C 2/04 241/215

FOREIGN PATENT DOCUMENTS

CN	203678427	U	7/2014
DE	371447	C	3/1923
DE	681942	C	10/1939
DE	10346475	B3	3/2005
GB	1031679		6/1966
SE	421864	B	2/1982

* cited by examiner

Ex. 1001

Reply (Paper 34), 2

Piepho's Subject Matter

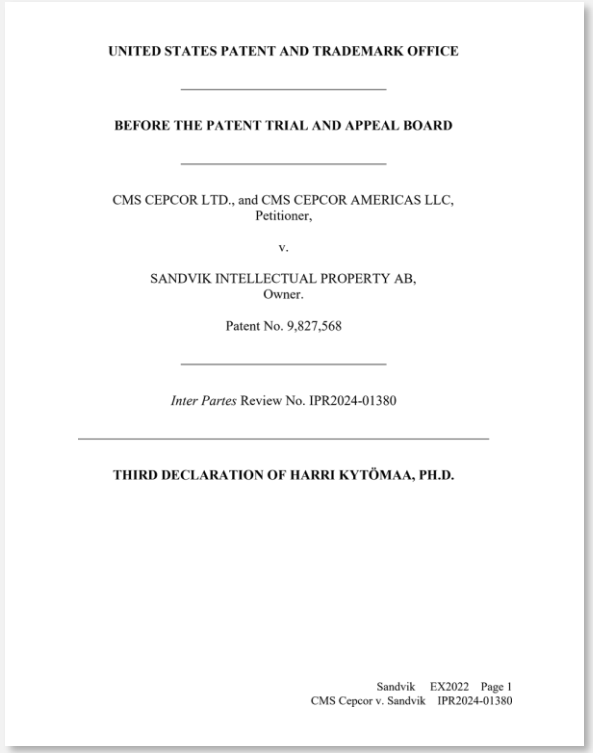
1. Field of the Invention

The present invention relates in general to an improved main shaft for a coal pulverizer, and more particularly to an improved main shaft for use in B&W Type E and EL pulverizers

Ex. 1016, 1:3-7

Reply (Paper 34), 2-3

Dr. Kytömaa and Mr. Smith on Piepho's Subject Matter



UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

SANDVIK INTELLECTUAL PROPERTY AB,
Owner.

Patent No. 9,827,568

Inter Partes Review No. IPR2024-01380

THIRD DECLARATION OF HARRI KYTÖMAA, PH.D.

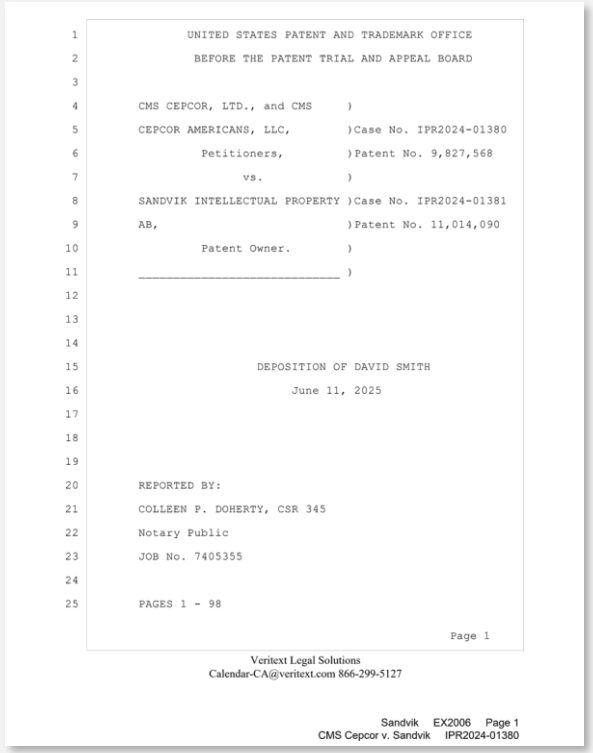
Sandvik EX2022 Page 1
CMS Cepcor v. Sandvik IPR2024-01380

15. In contrast, Piepho is not directed to a gyratory crusher at all. Piepho instead relates "to an improved main shaft for a coal pulverizer, and more particularly to an improved main shaft for use in B&W Type E and EL pulverizers." (Ex. 1016, 1:5–8; see also Ex. 2006, 57:17–20.) Moreover, its purported invention is not a sleeve, but a coating layer for a coal pulverizer shaft: "the present invention comprises an intervening layer of a material such as a thermal sprayed ceramic coating . . . for reducing local stresses in the shaft within the joint by reducing the relative movement." (Ex. 1016, 2:16–25; see also 2:55–58, 3:24–27.) Mr. Smith also understood Piepho's purported invention to be "a coating that can be placed on the shaft to reduce or eliminate fretting." (Ex. 2006, 57:11–16.) As such, Piepho touts that its coating invention does not require changing the geometries of the shaft and its yoke in contrast to the '568 patent's focus on a wear sleeve's geometry. (Ex. 1016, 4:24–26.)

Ex. 2022, ¶ 15

Reply (Paper 34), 2-3

Mr. Smith on Piepho's Subject Matter



UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

CMS CEPCOR, LTD., and CMS CEPCOR AMERICANS, LLC, Petitioners, vs. SANDVIK INTELLECTUAL PROPERTY AB, Patent Owner.

Case No. IPR2024-01380
Patent No. 9,827,568
Case No. IPR2024-01381
Patent No. 11,014,090

DEPOSITION OF DAVID SMITH
June 11, 2025

REPORTED BY:
COLLEEN P. DOHERTY, CSR 345
Notary Public
JOB No. 7405355

PAGES 1 - 98

Page 1

Veritext Legal Solutions
Calendar-CA@veritext.com 866-299-5127

Sandvik EX2006 Page 1
CMS Cepcor v. Sandvik IPR2024-01380

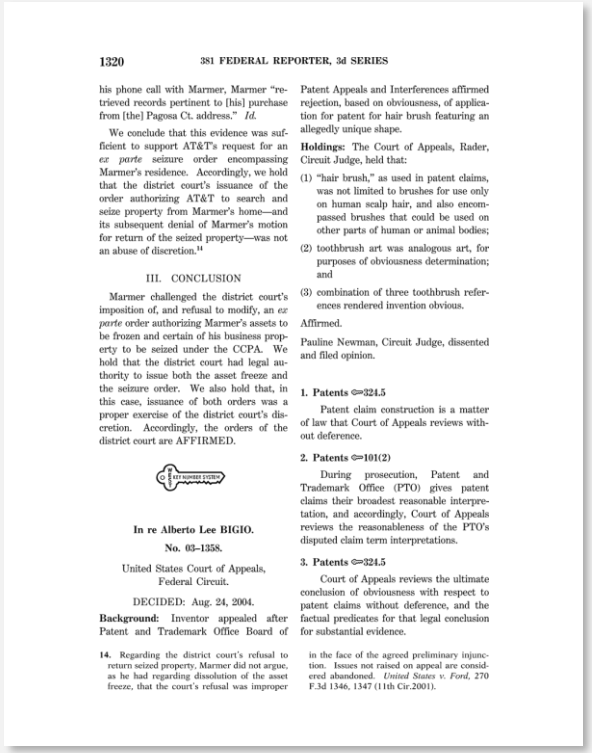
Q. And what type of apparatus is Piepho directed to?

A. My recollection is that it's directed to a coal pulverizer.

Ex. 2006, 57:17-20

Reply (Paper 34), 2-3

In Re Bigio



1320 381 FEDERAL REPORTER, 3d SERIES

his phone call with Marmer, Marmer "retrieved records pertinent to [his] purchase from [the] Pagosa Ct. address." *Id.*

We conclude that this evidence was sufficient to support AT&T's request for an *ex parte* seizure order encompassing Marmer's residence. Accordingly, we hold that the district court's issuance of the order authorizing AT&T to search and seize property from Marmer's home—and its subsequent denial of Marmer's motion for return of the seized property—was not an abuse of discretion.[14]

III. CONCLUSION

Marmer challenged the district court's imposition of, and refusal to modify, an *ex parte* order authorizing Marmer's assets to be frozen and certain of his business property to be seized under the CCPA. We hold that the district court had legal authority to issue both the asset freeze and the seizure order. We also hold that, in this case, issuance of both orders was a proper exercise of the district court's discretion. Accordingly, the orders of the district court are AFFIRMED.

In re Alberto Lee BIGIO.

No. 03–1358.

United States Court of Appeals, Federal Circuit.

DECIDED: Aug. 24, 2004.

Background: Inventor appealed after Patent and Trademark Office Board of Patent Appeals and Interferences affirmed rejection, based on obviousness, of application for patent for hair brush featuring an allegedly unique shape.

Holdings: The Court of Appeals, Rader, Circuit Judge, held that:

(1) "hair brush," as used in patent claims, was not limited to brushes for use only on human scalp hair, and also encompassed brushes that could be used on other parts of human or animal bodies;

(2) toothbrush art was analogous art, for purposes of obviousness determination; and

(3) combination of three toothbrush references rendered invention obvious.

Affirmed.

Pauline Newman, Circuit Judge, dissented and filed opinion.

1. Patents ⇐324.5

Patent claim construction is a matter of law that Court of Appeals reviews without deference.

2. Patents ⇐101(2)

During prosecution, Patent and Trademark Office (PTO) gives patent claims their broadest reasonable interpretation, and accordingly, Court of Appeals reviews the reasonableness of the PTO's disputed claim term interpretations.

3. Patents ⇐324.5

Court of Appeals reviews the ultimate conclusion of obviousness with respect to patent claims without deference, and the factual predicates for that legal conclusion for substantial evidence.

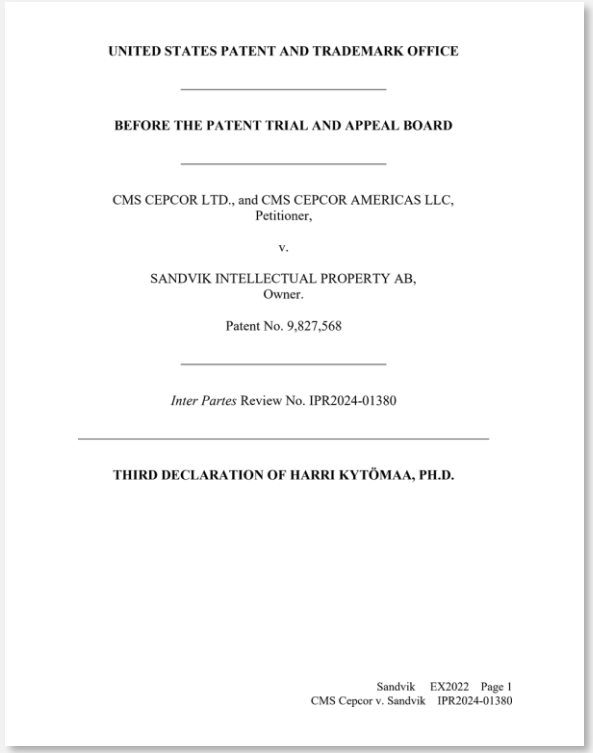
14. Regarding the district court's refusal to return seized property, Marmer did not argue, as he had regarding dissolution of the asset freeze, that the court's refusal was improper in the face of the agreed preliminary injunction. Issues not raised on appeal are considered abandoned. *United States v. Ford*, 270 F.3d 1346, 1347 (11th Cir.2001).

This test for analogous art requires the PTO to determine the appropriate field of endeavor by reference to explanations of the invention's subject matter in the patent application, including the embodiments, function, and structure of the claimed invention. *See Wood*, 599 F.2d at

In re Bigio, 381 F.3d 1320, 1325 (Fed. Cir. 2004) (citation omitted)

Reply (Paper 34), 1

’568’s Gyratory Crusher v. Piepho’s Coal Pulverizer: Structure, Function, Embodiments



UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

SANDVIK INTELLECTUAL PROPERTY AB,
Owner.

Patent No. 9,827,568

Inter Partes Review No. IPR2024-01380

THIRD DECLARATION OF HARRI KYTÖMAA, PH.D.

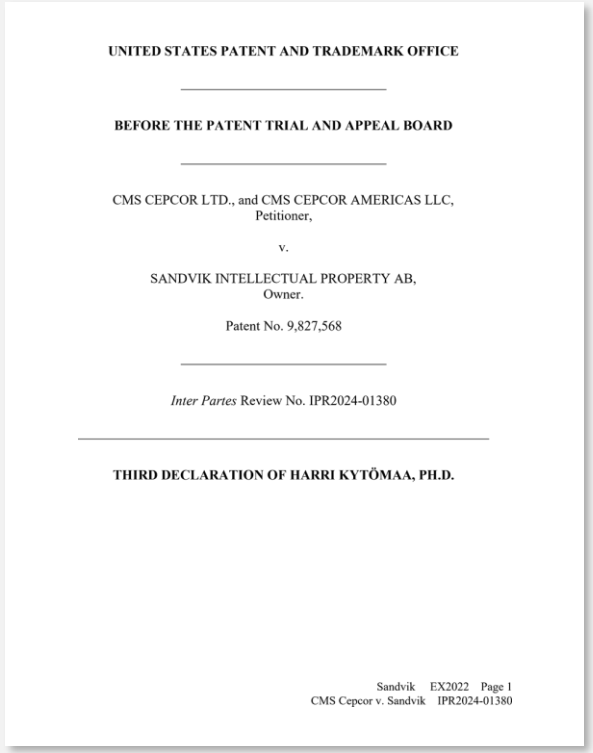
Sandvik EX2022 Page 1
CMS Cepcor v. Sandvik IPR2024-01380

17. A coal pulverizer and a gyratory crusher are very different machines. The embodiments, functions, and structure of the coal pulverizer described in Piepho are not analogous to the embodiments, functions and structure of the gyratory crusher as described in the ‘568 patent. For example, the size of the coal supplied to a B&W Type EL coal pulverizer, the type described in Piepho, should ideally be 0.75 to 1 inch and the output pulverized coal particle sizes should be 0.003-0.012 inches. (*See* Ex. 2024.)

Ex. 2022, ¶ 17

Reply (Paper 34), 4

Input and Output Rock Size



UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

SANDVIK INTELLECTUAL PROPERTY AB,
Owner.

Patent No. 9,827,568

Inter Partes Review No. IPR2024-01380

THIRD DECLARATION OF HARRI KYTÖMAA, PH.D.

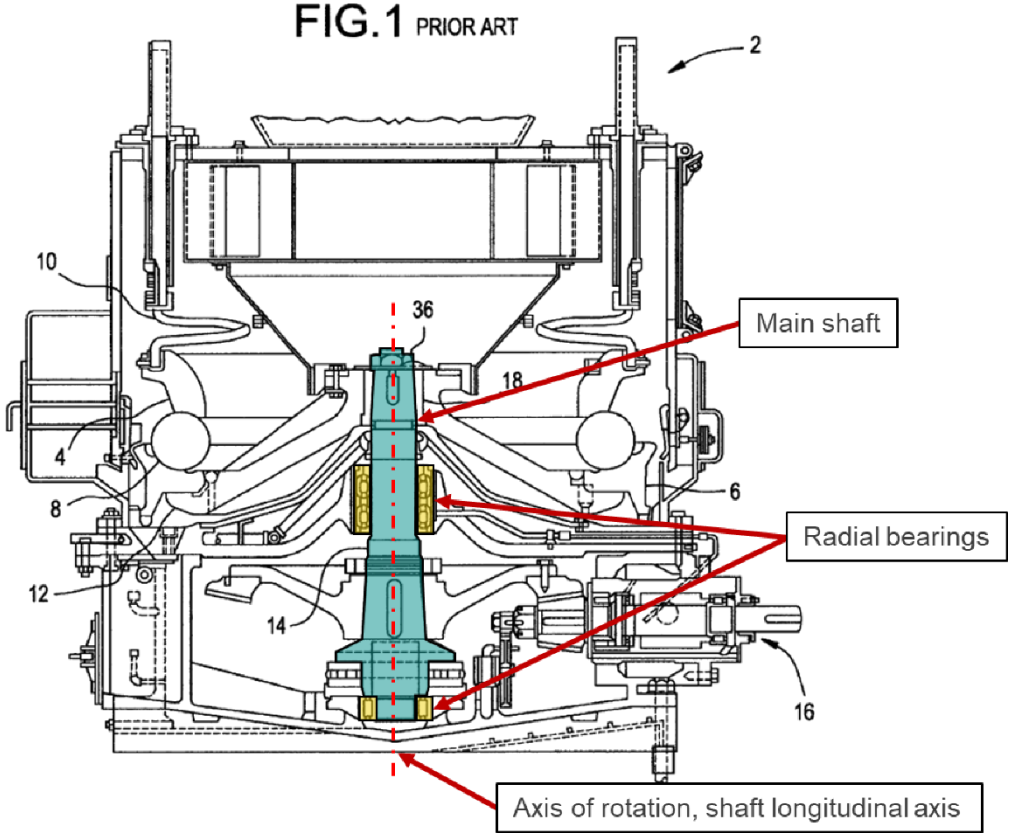
Sandvik EX2022 Page 1
CMS Cepcor v. Sandvik IPR2024-01380

19. Turning back to the size of the pulverized coal, it is so small that it can be entrained in air flow and removed out the top of the coal pulverizer. A Sandvik CH440 cone crusher accepts rock up to 9.8 inches wide and has an adjustable output size of 0.3 to 1.8 inches. (*See* Ex. 2024.) It must handle much larger input material with a wide range of sizes. The coal pulverizer requires a relatively small range of input sizes and coal itself is relatively soft compared to rocks such as granite. Below, I set forth additional significant distinctions between a coal pulverizer, as described in Piepho, and a gyratory crusher.

Ex. 2022, ¶ 19

Reply (Paper 34), 3

’568’s Gyratory Crusher v. Piepho’s Coal Pulverizer: Structure, Function, Embodiments

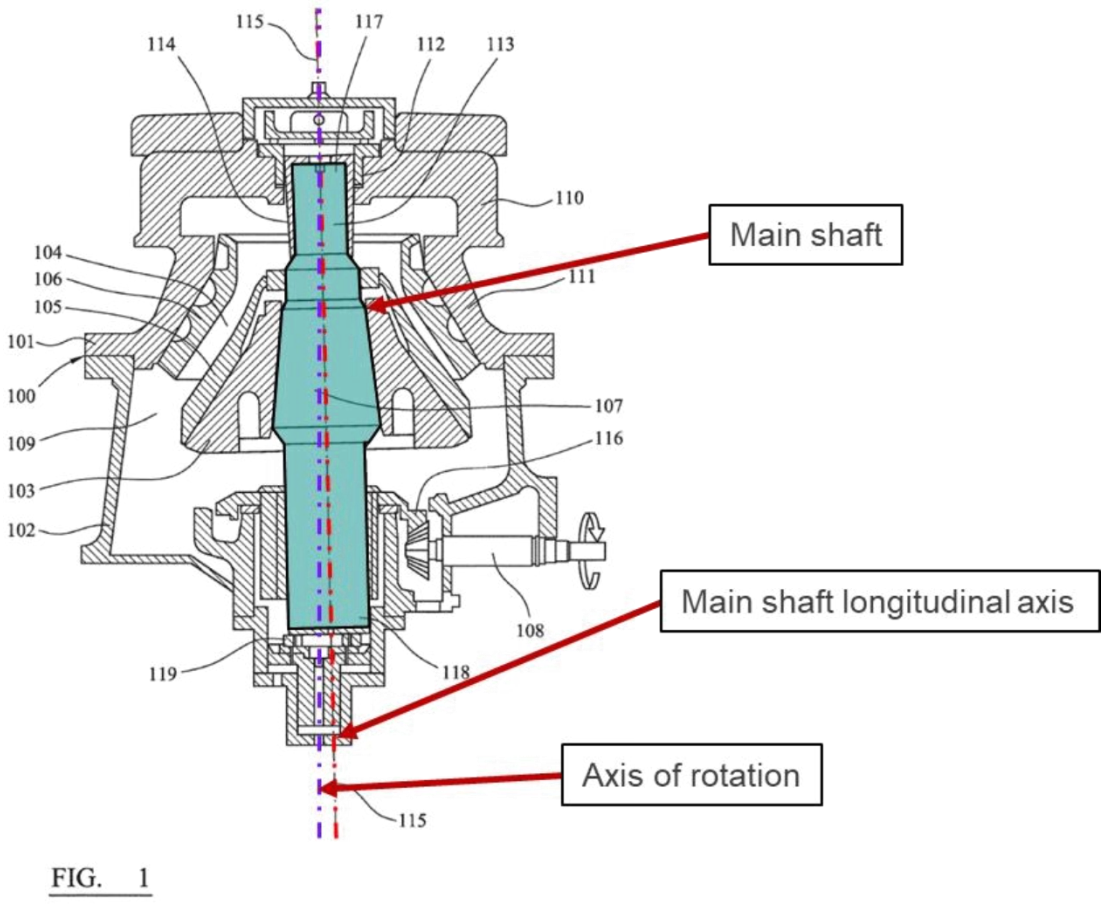


20. **First, operation.** A major distinction between the coal pulverizer described in Piepho and a gyratory crusher is the design and behavior of the main shaft in each machine. The main shaft of the coal pulverizer is designed to rotate concentrically about the longitudinal axis of the shaft, and the longitudinal axis of the shaft is therefore nominally stationary and always aligned with the longitudinal axis of the coal pulverizer itself. (*See* Ex. 1016, 1:38–44; FIG. 1.) The concentrically rotating shaft of a coal pulverizer allows the use of conventional anti-friction bearings (i.e., roller bearings or ball bearings) to allow the shaft to rotate while constraining the shaft in all other directions, as illustrated in annotated FIG. 1 of Piepho, below.

Ex. 2022, ¶ 20

Reply (Paper 34), 3-4

’568’s Gyratory Crusher v. Piepho’s Coal Pulverizer: Structure, Function, Embodiments



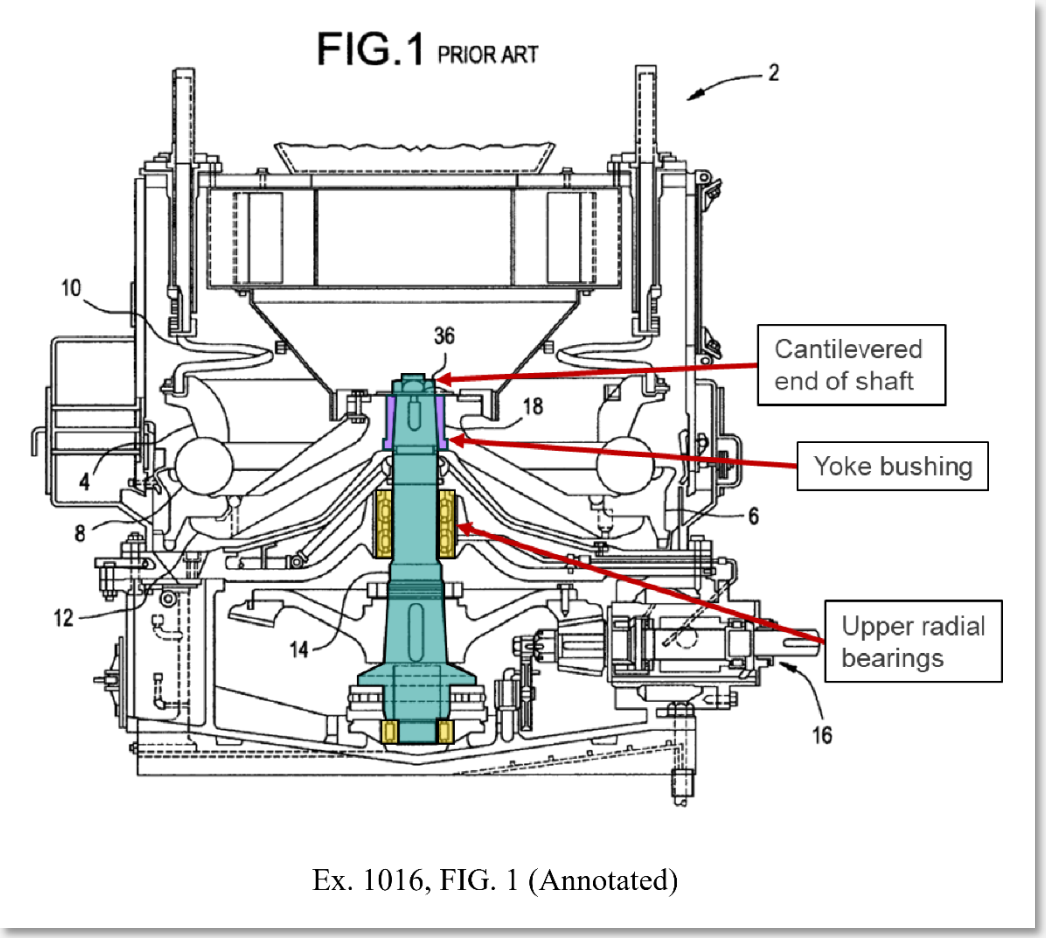
Ex. 1001, FIG. 1 (Annotated)

21. The shaft of a gyratory crusher, on the other hand, is designed to rotate eccentrically, that is, gyrate, with the longitudinal axis of the main shaft angled relative to the longitudinal axis of the rock crusher itself. (Ex. 1001, 3:59–63.) The axis of main shaft sweeps a conical pattern as the crusher operates, shifting the location of the main shaft in a pendulum motion relative to the outer crushing shell. The eccentric rotation of the gyratory crusher shaft means that the shaft axis must move and requires that the upper bearing be capable of allowing tilting of the main shaft axis. The lower end of the gyratory crusher shaft is mounted in an eccentric bushing to control the amount of eccentric motion, whereas the coal pulverizer shaft uses conventional anti-friction bearings for radial support at upper and lower bearing locations. The main shaft of the gyratory rock crusher is free to rotate about its longitudinal axis as a consequence of interactions with the material being processed. This gyrating motion is illustrated in annotated FIG. 1 of the ’568 patent, below.

Reply (Paper 34), 3-4

Ex. 2022, ¶ 21

’568’s Gyratory Crusher v. Piepho’s Coal Pulverizer: Structure, Function, Embodiments



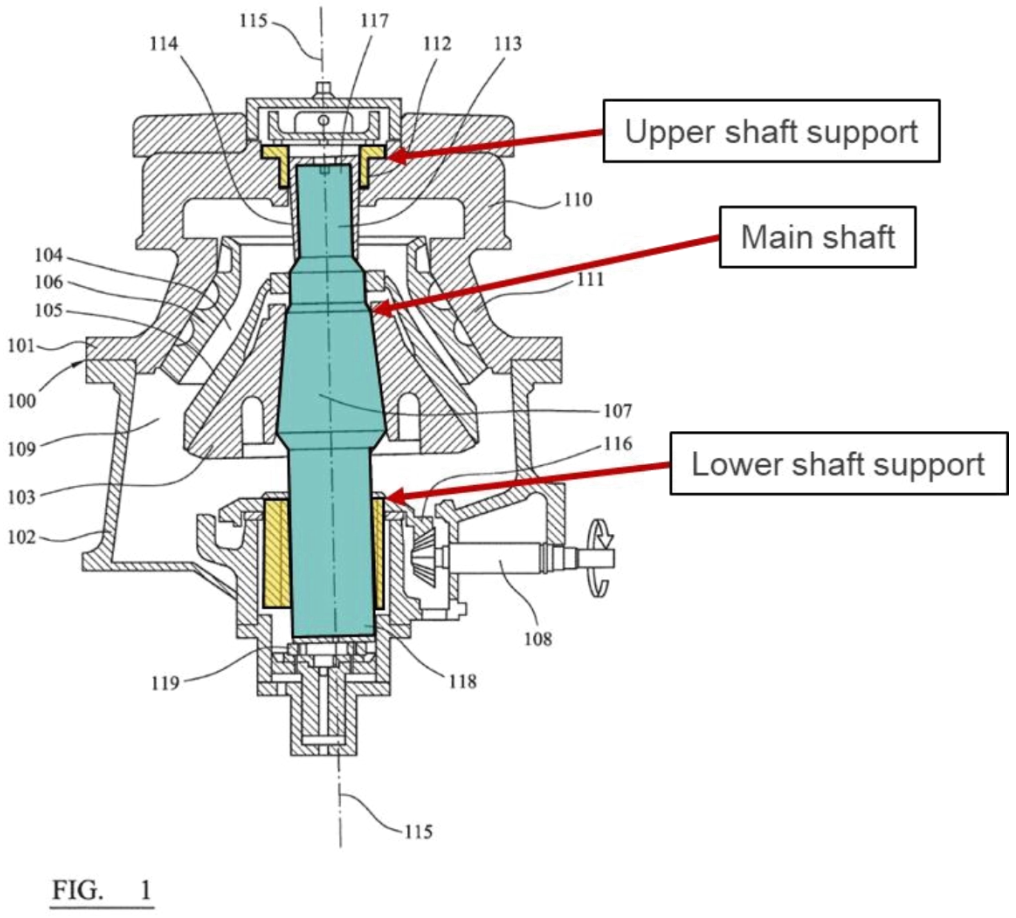
Ex. 1016, FIG. 1 (Annotated)

22. The main shaft of the coal pulverizer in Piepho is also supported with a different configuration than the main shaft of the gyratory crusher described in the ’568 patent. The main shaft 14 of the coal pulverizer in Piepho has an upper bearing located roughly in the middle of shaft with the upper end of the shaft cantilevered above the upper bearing. (Ex. 1016, FIG. 1.) The yoke 12 and yoke bushing 18 are attached to the cantilevered end of the shaft 14 as illustrated below.

Ex. 2022, ¶ 22

Reply (Paper 34), 3-4

’568’s Gyratory Crusher v. Piepho’s Coal Pulverizer: Structure, Function, Embodiments



Ex. 1001, FIG. 1 (Annotated)

23. The main shaft of the gyratory crusher of the ’568 patent is not cantilevered. Rather, it is supported by bearings near each end of the shaft and is therefore simply supported, (Ex. 1001, 3:67–4:3), as illustrated below.

Ex. 2022, ¶ 22

Reply (Paper 34), 3-4

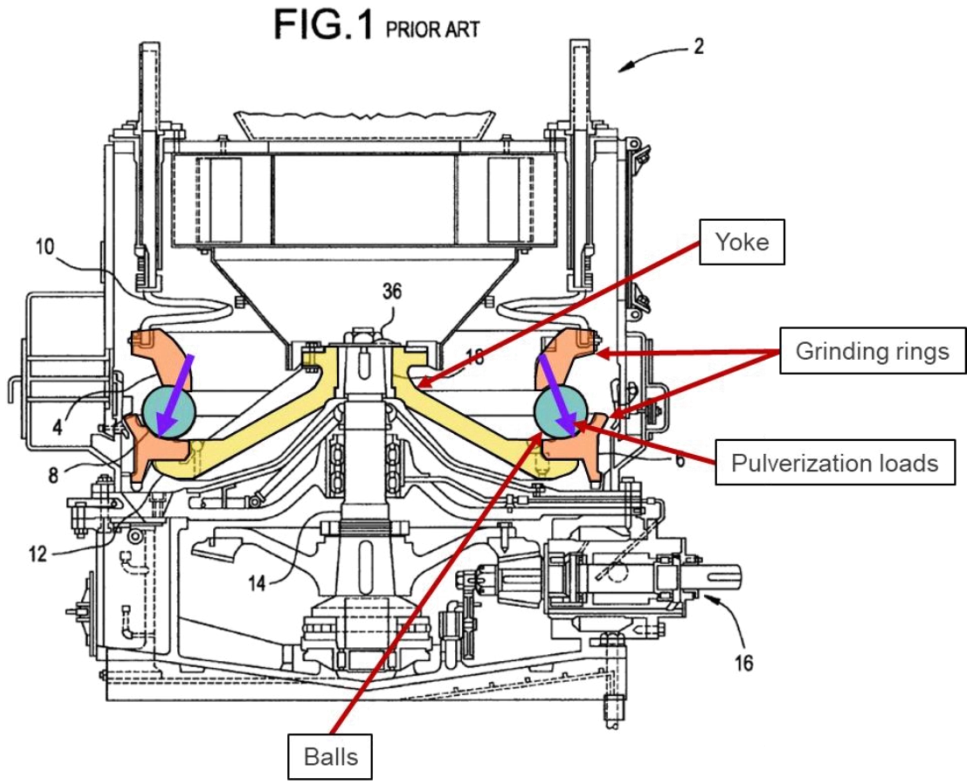
Dr. Kytömaa on Shaft Support Configuration

24. The difference in shaft support configuration results in a significant difference in dynamic behavior, loading, and stress for the shaft and attached components. The main shaft sleeve for the gyratory crusher of the '568 patent is aligned with the upper shaft support point (bearing assembly 112), so it predominately supports radial loads and is intended to minimize the transmission of torsional loads, whereas in Piepho the upper end region of the shaft primarily transmits torsional loads to drive the yoke while accepting bending, axial, and radial loads. (Ex. 1001, FIG. 1.)

Ex. 2022, ¶ 24

Reply (Paper 34), 3-4

’568’s Gyratory Crusher v. Piepho’s Coal Pulverizer: Structure, Function, Embodiments



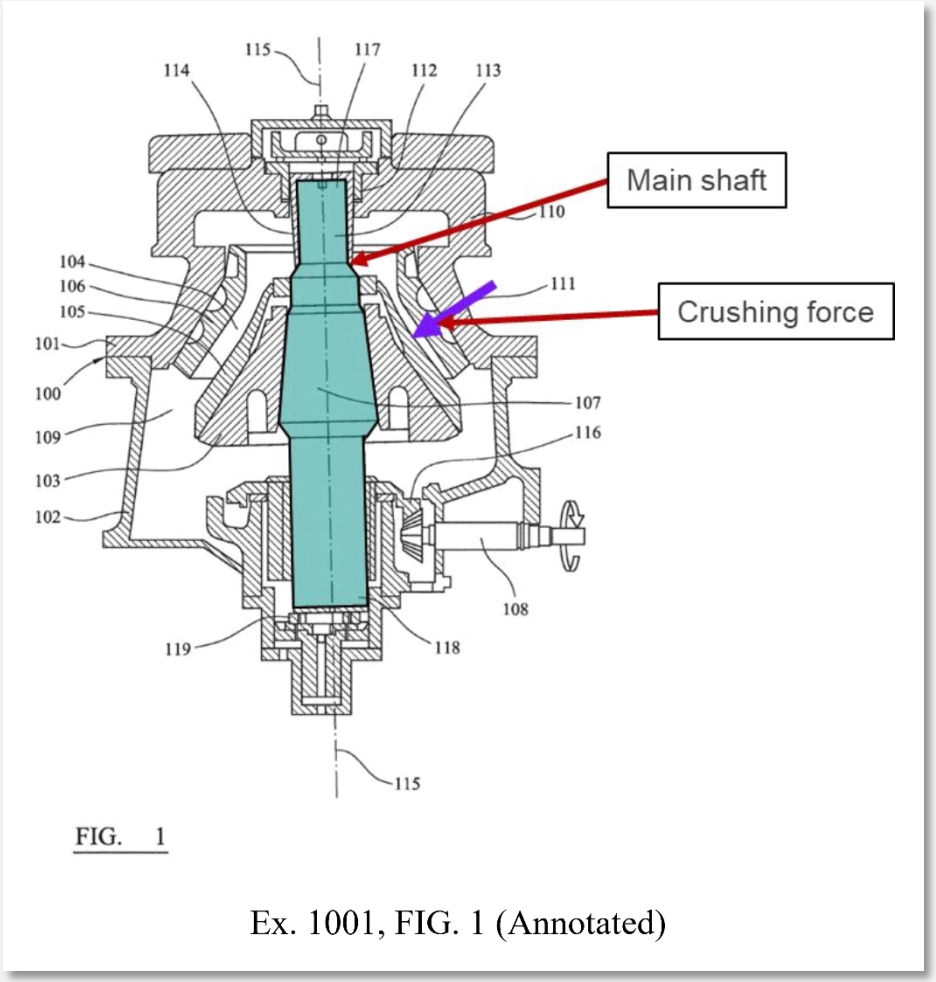
Ex. 1018, FIG. 1 (Annotated)

25. **Second, loading.** In the coal pulverizer described in Piepho, coal is pulverized by balls that roll in grinding rings which extend around the entire circumference of the yoke. The grinding loads are therefore applied around the entire circumference of the yoke as illustrated below.

Ex. 2022, ¶ 25

Reply (Paper 34), 3-4

’568’s Gyratory Crusher v. Piepho’s Coal Pulverizer: Structure, Function, Embodiments



Ex. 1001, FIG. 1 (Annotated)

26. In contrast, in the gyratory crusher described in the ’568 patent, crushing force is only applied on one side of the shaft when the gyratory motion reduces the size of the crushing zone between the opposing crushing shells. Unlike the coal pulverizer, crushing forces are always concentrated on one side of the shaft and not distributed around the circumference, as illustrated below.

Ex. 2022, ¶ 26

Reply (Paper 34), 3-4

’568’s Gyratory Crusher v. Piepho’s Coal Pulverizer: Structure, Function, Embodiments

27. **Third, wear environment.** The yoke bushing described in Piepho is not directly exposed to the coal being processed and the resulting abrasive environment. In contrast, the main shaft sleeve described in the ’568 Patent is directly exposed to the materials being processed and the resulting abrasive environment.

Ex. 2022, ¶ 27

Reply (Paper 34), 3-4

’568’s Gyratory Crusher v. Piepho’s Coal Pulverizer: Structure, Function, Embodiments

28. **Fourth, rotation.** The purpose of the yoke bushing in Piepho is to secure the yoke to the main shaft. (Ex. 1016, 3:6–7.) The yoke bushing must be able to transmit torque between the shaft and the yoke. Consequently, there is not intended to be any relative motion between the yoke and the yoke bushing or the yoke bushing and the shaft. This is in contrast with the main shaft sleeve of a gyratory crusher described in the ‘568 patent, which is intended to slide within the bearing assembly as the main shaft moves. (*See* Ex. 1001, 4:4–12.)

Ex. 2022, ¶ 28

Reply (Paper 34), 3-4

’568’s Gyratory Crusher v. Piepho’s Coal Pulverizer: Structure, Function, Embodiments

29. **Fifth, assembly and disassembly.** The yoke bushing is not a wear component in the coal pulverizer and, as such, a POSITA would recognize that the yoke bushing would not be expected to require regular replacement. The main wear components in the coal pulverizer in Peipho are in the grinding zone including the balls and the grinding rings, not the yoke bushing. (*See* Ex. 1016, 1:62–64.) The main shaft sleeve of the ‘568 patent, in contrast, is a wear component in a gyratory crusher, and Sandvik recommends that the main shaft sleeve for its CH440 rock crusher be replaced annually or after 2000 hours of operation. (*See* Ex. 2024.)

Ex. 2022, ¶ 29

Reply (Paper 34), 3-4

’568’s Gyratory Crusher v. Piepho’s Coal Pulverizer: Structure, Function, Embodiments

30. The main shaft sleeve of the ’568 patent performs a very different function than the yoke bushing in Piepho and the difference in function is directly related to the invention of the ’568 patent. The main shaft sleeve is a wear component exposed to relative motion and abrasive materials on its exterior surface whereas the yoke bushing in Piepho is not exposed to abrasive materials or relative motion on any surface. The main shaft sleeve therefore requires more frequent replacement.

Ex. 2022, ¶ 30

Reply (Paper 34), 3-4

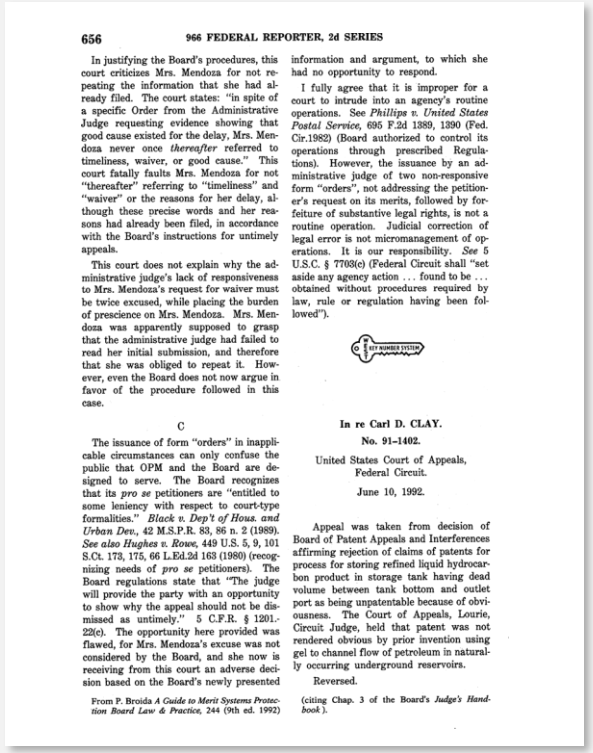
’568’s Gyratory Crusher v. Piepho’s Coal Pulverizer: Structure, Function, Embodiments

	Gyratory Crusher	Coal Pulverizer
Eccentric Rotation	✓	⊘
Cantilevered Shaft	⊘	✓
Load Distributed Around Main Shaft	⊘	✓
Load Concentrated On One Side of Shaft	✓	⊘
Main Shaft Wear Sleeve Replacement	✓	⊘
Torque Transmission	⊘	✓

Ex. 2022 ¶¶ 17-31

Reply (Paper 34), 3-5

In re Clay



656 966 FEDERAL REPORTER, 2d SERIES

In justifying the Board's procedures, this court criticizes Mrs. Mendoza for not repeating the information that she had already filed. The court states: "in spite of a specific Order from the Administrative Judge requesting evidence showing that good cause existed for the delay, Mrs. Mendoza never once *thereafter* referred to timeliness, waiver, or good cause." This court fatally faults Mrs. Mendoza for not "thereafter" referring to "timeliness" and "waiver" or the reasons for her delay, although these precise words and her reasons had already been filed, in accordance with the Board's instructions for untimely appeals.

This court does not explain why the administrative judge's lack of responsiveness to Mrs. Mendoza's request for waiver must be twice excused, while placing the burden of prescience on Mrs. Mendoza. Mrs. Mendoza was apparently supposed to grasp that the administrative judge had failed to read her initial submission, and therefore that she was obliged to repeat it. However, even the Board does not now argue in favor of the procedure followed in this case.

C

The issuance of form "orders" in inapplicable circumstances can only confuse the public that OPM and the Board are designed to serve. The Board recognizes that its *pro se* petitioners are "entitled to some leniency with respect to court-type formalities." *Black v. Dep't of Hous. and Urban Dev.*, 42 M.S.P.R. 83, 86 n. 2 (1989). *See also Hughes v. Rowe*, 449 U.S. 5, 9, 101 S.Ct. 173, 175, 66 L.Ed.2d 163 (1980) (recognizing needs of *pro se* petitioners). The Board regulations state that "The judge will provide the party with an opportunity to show why the appeal should not be dismissed as untimely." 5 C.F.R. § 1201.22(e). The opportunity here provided was flawed, for Mrs. Mendoza's excuse was not considered by the Board, and she now is receiving from this court an adverse decision based on the Board's newly presented information and argument, to which she had no opportunity to respond.

I fully agree that it is improper for a court to intrude into an agency's routine operations. See *Phillips v. United States Postal Service*, 695 F.2d 1389, 1390 (Fed. Cir.1982) (Board authorized to control its operations through prescribed Regulations). However, the issuance by an administrative judge of two non-responsive form "orders", not addressing the petitioner's request on its merits, followed by forfeiture of substantive legal rights, is not a routine operation. Judicial correction of legal error is not micromanagement of operations. It is our responsibility. *See* 5 U.S.C. § 7703(c) (Federal Circuit shall "set aside any agency action ... found to be ... obtained without procedures required by law, rule or regulation having been followed").

KEY NUMBER SYSTEM

In re Carl D. CLAY.

No. 91-1402.

United States Court of Appeals, Federal Circuit.

June 10, 1992.

Appeal was taken from decision of Board of Patent Appeals and Interferences affirming rejection of claims of patents for process for storing refined liquid hydrocarbon product in storage tank having dead volume between tank bottom and outlet port as being unpatentable because of obviousness. The Court of Appeals, Lourie, Circuit Judge, held that patent was not rendered obvious by prior invention using gel to channel flow of petroleum in naturally occurring underground reservoirs.

Reversed.

From P. Broida *A Guide to Merit Systems Protection Board Law & Practice*, 244 (9th ed. 1992)

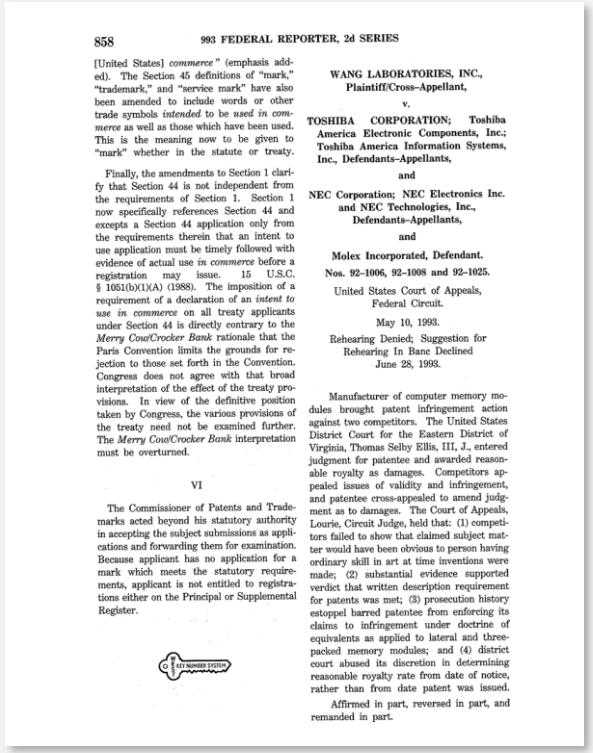
(citing Chap. 3 of the Board's *Judge's Handbook*).

The PTO argues that Sydansk and Clay's inventions are part of a common endeavor—"maximizing withdrawal of petroleum stored in petroleum reservoirs." However, Sydansk cannot be considered to be within Clay's field of endeavor merely because both relate to the petroleum industry. Sy-

In re Clay, 966 F.2d 656, 659 (Fed. Cir. 1992)

Reply (Paper 34), 6

Wang Lab'ys Inc. v. Toshiba Corp.



858 993 FEDERAL REPORTER, 2d SERIES

[United States] *commerce*" (emphasis added). The Section 45 definitions of "mark," "trademark," and "service mark" have also been amended to include words or other trade symbols *intended* to be *used in commerce* as well as those which have been used. This is the meaning now to be given to "mark" whether in the statute or treaty.

Finally, the amendments to Section 1 clarify that Section 44 is not independent from the requirements of Section 1. Section 1 now specifically references Section 44 and excepts a Section 44 application only from the requirements therein that an intent to use application must be timely followed with evidence of actual use *in commerce* before a registration may issue. 15 U.S.C. § 1051(b)(1)(A) (1988). The imposition of a requirement of a declaration of an *intent to use in commerce* on all treaty applicants under Section 44 is directly contrary to the *Merry Coal/Crocker Bank* rationale that the Paris Convention limits the grounds for rejection to those set forth in the Convention. Congress does not agree with that broad interpretation of the effect of the treaty provisions. In view of the definitive position taken by Congress, the various provisions of the treaty need not be examined further. The *Merry Coal/Crocker Bank* interpretation must be overturned.

VI

The Commissioner of Patents and Trademarks acted beyond his statutory authority in accepting the subject submissions as applications and forwarding them for examination. Because applicant has no application for a mark which meets the statutory requirements, applicant is not entitled to registrations either on the Principal or Supplemental Register.

WANG LABORATORIES, INC., Plaintiff/Cross-Appellant,

v.

TOSHIBA CORPORATION; Toshiba America Electronic Components, Inc.; Toshiba America Information Systems, Inc., Defendants-Appellants,

and

NEC Corporation; NEC Electronics Inc. and NEC Technologies, Inc., Defendants-Appellants,

and

Molex Incorporated, Defendant.

Nos. 92-1006, 92-1008 and 92-1025.

United States Court of Appeals, Federal Circuit.

May 10, 1993.

Rehearing Denied; Suggestion for Rehearing In Banc Declined June 28, 1993.

Manufacturer of computer memory modules brought patent infringement action against two competitors. The United States District Court for the Eastern District of Virginia, Thomas Selby Ellis, III, J., entered judgment for patentee and awarded reasonable royalty as damages. Competitors appealed issues of validity and infringement, and patentee cross-appealed to amend judgment as to damages. The Court of Appeals, Lourie, Circuit Judge, held that: (1) competitors failed to show that claimed subject matter would have been obvious to person having ordinary skill in art at time inventions were made; (2) substantial evidence supported verdict that written description requirement for patents was met; (3) prosecution history estoppel barred patentee from enforcing its claims to infringement under doctrine of equivalents as applied to lateral and three-packed memory modules; and (4) district court abused its discretion in determining reasonable royalty rate from date of notice, rather than from date patent was issued.

Affirmed in part, reversed in part, and remanded in part.

The '392 patent is entitled "Memory Circuit for Programmable Machines"; it discloses a SIMM containing nine memory chips, eight for storing data and one for error detection, mounted in a single row. In the late 1970's, Allen–Bradley manufactured and sold the X9 SIMM for use in its 9–bit programmable controller. This product consisted of nine memory chips encapsulated in ceramic dual in-line packages (ceramic DIPs) mounted on an epoxy-glass printed circuit board substrate.

The Allen–Bradley art is not in the same field of endeavor as the claimed subject matter merely because it relates to memories.

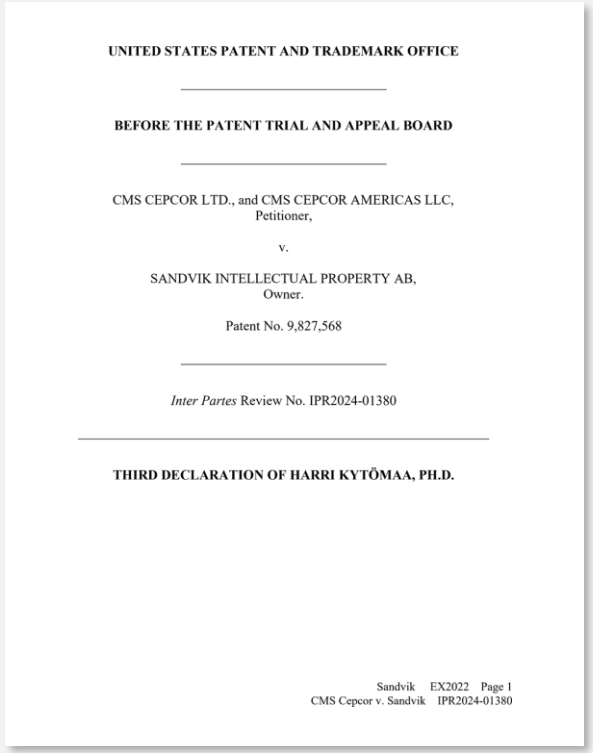
Reply (Paper 34), 6

Wang Lab'ys, Inc. v. Toshiba Corp., 993 F.2d 858, 864 (Fed. Cir. 1993)

Reasonably Pertinent to the Problem Solved by ’568 Patent

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Dr. Kytömaa



UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

SANDVIK INTELLECTUAL PROPERTY AB,
Owner.

Patent No. 9,827,568

Inter Partes Review No. IPR2024-01380

THIRD DECLARATION OF HARRI KYTÖMAA, PH.D.

Sandvik EX2022 Page 1
CMS Cepcor v. Sandvik IPR2024-01380

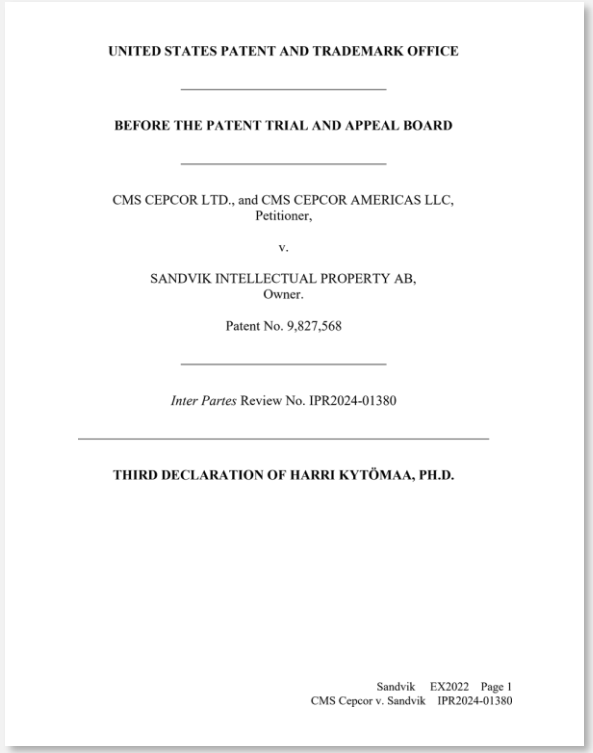
B. Reasonably Pertinent To The Problem

32. A POSITA would not view Piepho as reasonably pertinent to the problem solved by the '568 patent. The '568 patent and Piepho are directed to different problems. The '568 patent concerns the problem of assembling and disassembling a wear sleeve from a main shaft of a gyratory crusher. (Ex. 1001, 1:66–2:2 *see also* Ex. 2006, 21:9–22:1 (Mr. Smith stating that the problem addressed by the '568 Patent are "the best ways for seating or assembling of the sleeve over the conical section of the main shaft.").)

Ex. 2022, ¶ 32

Reply (Paper 34), 7-8

Dr. Kytömaa



UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

SANDVIK INTELLECTUAL PROPERTY AB,
Owner.

Patent No. 9,827,568

Inter Partes Review No. IPR2024-01380

THIRD DECLARATION OF HARRI KYTÖMAA, PH.D.

Sandvik EX2022 Page 1
CMS Cepcor v. Sandvik IPR2024-01380

33. Piepho, on the other hand, addresses the problem of a coal pulverizer shaft failing due to fretting-induced bending fatigue at the joint between the yoke bushing and the main shaft. (Ex. 1016, 1:45–2:14.) The wear components in Piepho are its balls and rings—not a sleeve (which Piepho does not disclose) or even the yoke bushing. There is also no discussion in Piepho on the yoke bushing being disassembled from the shaft or the yoke. Indeed, the reason that Piepho is concerned with *fretting-induced* fatigue is because the yoke bushing remains assembled with the main shaft, such that fretting wear would not be readily identifiable during machine maintenance.

Ex. 2022, ¶ 33

Reply (Paper 34), 7-8

Mr. Smith

Q. Okay. I guess my question was a little bit different. It was, in your opinion, what problem is addressed by the invention of the 090 patent?

A. On a broad scale, I would probably say, that it's talking about how the -- what are the best ways for seating or assembling of the sleeve over the conical section of the main shaft.

Ex. 2006, 21:20–22:1

Reply (Paper 34), 7-8

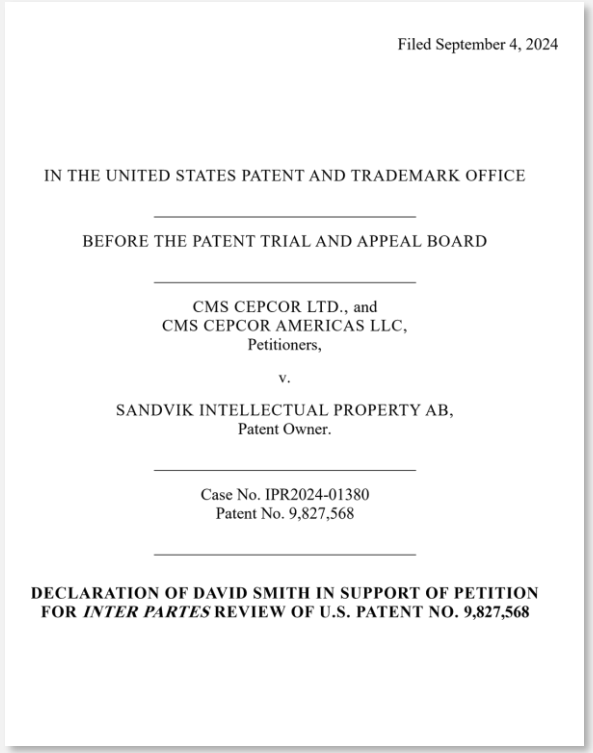
Piepho Interchangeability

The present invention provides an intervening material between the shaft end **(25)** and the mating bore in yoke bushing **(18)** fitted within the bore of yoke **(12)** to prevent fretting damage. For accurate alignment and for reliable support of the yoke, this joint **(21)** must be capable of accepting radial, axial, and bending or overturning loads. Preferably, the joint **(21)** is a tapered joint with the tapered end **(25)** of shaft **(14)**. The yoke bushing **(18)** has a mating bore similarly tapered. Shaft end **(25)** may be constructed for either a keyless or a keyed fit. Also, shaft end **(25)** alternatively may be cylindrical rather than tapered as seen in FIG. **4**.

Ex. 1016, 3:23-35

Reply (Paper 34), 8-9

Mr. Smith: "Interchangeability"



Filed September 4, 2024

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

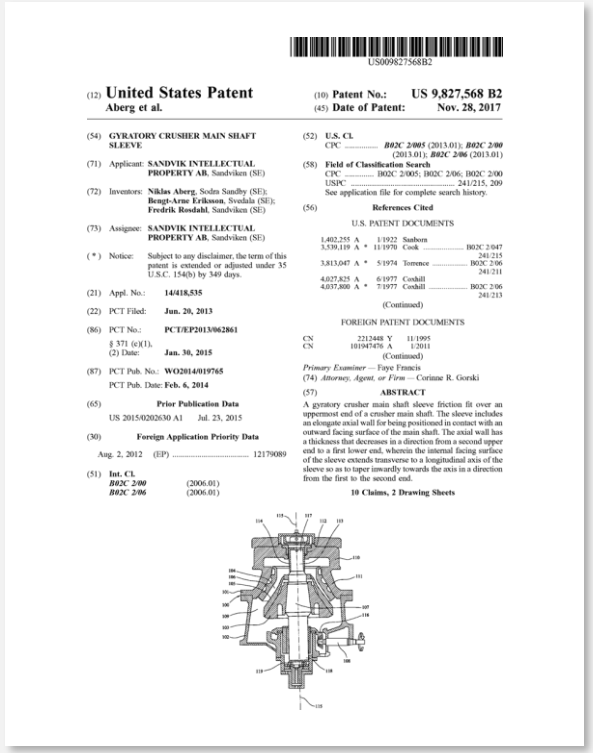
DECLARATION OF DAVID SMITH IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 9,827,568

80. As a rock crushing apparatus, Piepho is in the same field of endeavor as Polinski and thus (being analogous art) would easily be withing the purview of a POSITA. Further, Piepho teaches the interchangeability between a cylindrical joint and a tapered joint. Piepho also teaches that a tapered joint is preferable.

Ex. 1002, ¶ 80

Reply (Paper 34), 7-8

’568 Patent Conventional Cylindrical Sleeves



US009827568B2

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

(10) **Patent No.: US 9,827,568 B2**
(45) **Date of Patent: Nov. 28, 2017**

(54) **GYRATORY CRUSHER MAIN SHAFT SLEEVE**

(71) Applicant: **SANDVIK INTELLECTUAL PROPERTY AB**, Sandviken (SE)

(72) Inventors: **Niklas Aberg**, Sodra Sandby (SE); **Bengt-Arne Eriksson**, Svedala (SE); **Fredrik Rosdahl**, Sandviken (SE)

(73) Assignee: **SANDVIK INTELLECTUAL PROPERTY AB**, Sandviken (SE)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 349 days.

(21) Appl. No.: **14/418,535**

(22) PCT Filed: **Jun. 20, 2013**

(86) PCT No.: **PCT/EP2013/062861**
§ 371 (c)(1),
(2) Date: **Jan. 30, 2015**

(87) PCT Pub. No.: **WO2014/019765**
PCT Pub. Date: **Feb. 6, 2014**

(65) **Prior Publication Data**
US 2015/0202630 A1 Jul. 23, 2015

(30) **Foreign Application Priority Data**
Aug. 2, 2012 (EP) 12179089

(51) **Int. Cl.**
B02C 2/00 (2006.01)
B02C 2/06 (2006.01)

(52) **U.S. Cl.**
CPC ***B02C 2/005*** (2013.01); ***B02C 2/00*** (2013.01); ***B02C 2/06*** (2013.01)

(58) **Field of Classification Search**
CPC B02C 2/005; B02C 2/06; B02C 2/00
USPC 241/215, 209
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

1,402,255 A 1/1922 Sanborn
3,539,119 A * 11/1970 Cook B02C 2/047 241/215
3,813,047 A * 5/1974 Torrence B02C 2/06 241/211
4,027,825 A 6/1977 Coxhill
4,037,800 A * 7/1977 Coxhill B02C 2/06 241/213

(Continued)

FOREIGN PATENT DOCUMENTS

CN 2212448 Y 11/1995
CN 101947476 A 1/2011

(Continued)

Primary Examiner — Faye Francis
(74) *Attorney, Agent, or Firm* — Corinne R. Gorski

(57) **ABSTRACT**

A gyratory crusher main shaft sleeve friction fit over an uppermost end of a crusher main shaft. The sleeve includes an elongate axial wall for being positioned in contact with an outward facing surface of the main shaft. The axial wall has a thickness that decreases in a direction from a second upper end to a first lower end, wherein the internal facing surface of the sleeve extends transverse to a longitudinal axis of the sleeve so as to taper inwardly towards the axis in a direction from the first to the second end.

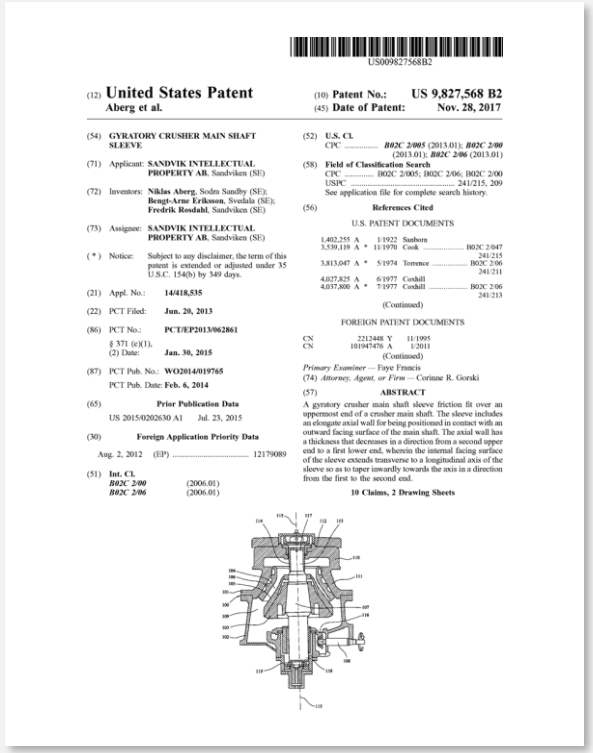
10 Claims, 2 Drawing Sheets

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. Typically, the main shaft upper end is protected against wear by a sleeve. Commonly, the protective sleeve comprises a cylindrical geometry and is held at the main shaft via an interference or friction fit. This arrangement however requires the sleeve to be heated to increase its diameter to enable mounting and possible dis-assembly at the main shaft.

Ex. 1001, 1:38-47

Reply (Paper 34), 2

’568 Patent Sleeve



US009827568B2

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

(10) **Patent No.: US 9,827,568 B2**
(45) **Date of Patent: Nov. 28, 2017**

(54) **GYRATORY CRUSHER MAIN SHAFT SLEEVE**

(71) Applicant: **SANDVIK INTELLECTUAL PROPERTY AB**, Sandviken (SE)

(72) Inventors: **Niklas Aberg**, Sodra Sandby (SE); **Bengt-Arne Eriksson**, Svedala (SE); **Fredrik Rosdahl**, Sandviken (SE)

(73) Assignee: **SANDVIK INTELLECTUAL PROPERTY AB**, Sandviken (SE)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 349 days.

(21) Appl. No.: **14/418,535**

(22) PCT Filed: **Jun. 20, 2013**

(86) PCT No.: **PCT/EP2013/062861**
§ 371 (c)(1),
(2) Date: **Jan. 30, 2015**

(87) PCT Pub. No.: **WO2014/019765**
PCT Pub. Date: **Feb. 6, 2014**

(65) **Prior Publication Data**
US 2015/0202630 A1 Jul. 23, 2015

(30) **Foreign Application Priority Data**
Aug. 2, 2012 (EP) 12179089

(51) **Int. Cl.**
B02C 2/00 (2006.01)
B02C 2/06 (2006.01)

(52) **U.S. Cl.**
CPC ***B02C 2/005*** (2013.01); ***B02C 2/00*** (2013.01); ***B02C 2/06*** (2013.01)

(58) **Field of Classification Search**
CPC B02C 2/005; B02C 2/06; B02C 2/00
USPC 241/215, 209
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

1,402,255 A 1/1922 Sanborn
3,539,119 A * 11/1970 Cook B02C 2/047 241/215
3,813,047 A * 5/1974 Torrence B02C 2/06 241/211
4,027,825 A 6/1977 Coxhill
4,037,800 A * 7/1977 Coxhill B02C 2/06 241/213

(Continued)

FOREIGN PATENT DOCUMENTS

CN 2212448 Y 11/1995
CN 101947476 A 1/2011

(Continued)

Primary Examiner — Faye Francis
(74) *Attorney, Agent, or Firm* — Corinne R. Gorski

(57) **ABSTRACT**

A gyratory crusher main shaft sleeve friction fit over an uppermost end of a crusher main shaft. The sleeve includes an elongate axial wall for being positioned in contact with an outward facing surface of the main shaft. The axial wall has a thickness that decreases in a direction from a second upper end to a first lower end, wherein the internal facing surface of the sleeve extends transverse to a longitudinal axis of the sleeve so as to taper inwardly towards the axis in a direction from the first to the second end.

10 Claims, 2 Drawing Sheets

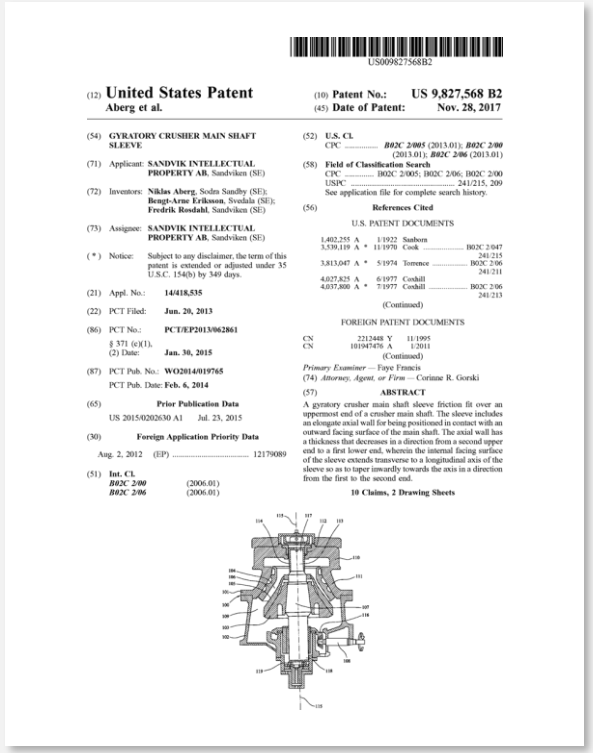
SUMMARY OF THE INVENTION

It is an object of the present invention to provide a sleeve for a main shaft of a gyratory crusher that enables convenient attachment and detachment at the shaft so as to be quickly and conveniently assembled and disassembled.

Ex. 1001, 1:63-2:2

Reply (Paper 34), 7-8

’568 Patent: Cylindrical Sleeve Problems



US009827568B2

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

(10) **Patent No.: US 9,827,568 B2**
(45) **Date of Patent: Nov. 28, 2017**

(54) **GYRATORY CRUSHER MAIN SHAFT SLEEVE**

(71) Applicant: **SANDVIK INTELLECTUAL PROPERTY AB**, Sandviken (SE)

(72) Inventors: **Niklas Aberg**, Sodra Sandby (SE); **Bengt-Arne Eriksson**, Svedala (SE); **Fredrik Rosdahl**, Sandviken (SE)

(73) Assignee: **SANDVIK INTELLECTUAL PROPERTY AB**, Sandviken (SE)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 349 days.

(21) Appl. No.: **14/418,535**

(22) PCT Filed: **Jun. 20, 2013**

(86) PCT No.: **PCT/EP2013/062861**
§ 371 (c)(1),
(2) Date: **Jan. 30, 2015**

(87) PCT Pub. No.: **WO2014/019765**
PCT Pub. Date: **Feb. 6, 2014**

(65) **Prior Publication Data**
US 2015/0202630 A1 Jul. 23, 2015

(30) **Foreign Application Priority Data**
Aug. 2, 2012 (EP) 12179089

(51) **Int. Cl.**
B02C 2/00 (2006.01)
B02C 2/06 (2006.01)

(52) **U.S. Cl.**
CPC ***B02C 2/005*** (2013.01); ***B02C 2/00*** (2013.01); ***B02C 2/06*** (2013.01)

(58) **Field of Classification Search**
CPC B02C 2/005; B02C 2/06; B02C 2/00
USPC 241/215, 209
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

1,402,255 A 1/1922 Sanborn
3,539,119 A * 11/1970 Cook B02C 2/047 241/215
3,813,047 A * 5/1974 Torrence B02C 2/06 241/211
4,027,825 A 6/1977 Coxhill
4,037,800 A * 7/1977 Coxhill B02C 2/06 241/213

(Continued)

FOREIGN PATENT DOCUMENTS

CN 2212448 Y 11/1995
CN 101947476 A 1/2011

(Continued)

Primary Examiner — Faye Francis
(74) *Attorney, Agent, or Firm* — Corinne R. Gorski

(57) **ABSTRACT**

A gyratory crusher main shaft sleeve friction fit over an uppermost end of a crusher main shaft. The sleeve includes an elongate axial wall for being positioned in contact with an outward facing surface of the main shaft. The axial wall has a thickness that decreases in a direction from a second upper end to a first lower end, wherein the internal facing surface of the sleeve extends transverse to a longitudinal axis of the sleeve so as to taper inwardly towards the axis in a direction from the first to the second end.

10 Claims, 2 Drawing Sheets

However, a number of problems exist with conventional protective sleeves. 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. Additionally, disassembly is often problematic as the sleeve is required to be cut before it can be removed. On large crushers, protective sleeves have a substantial wall thickness and this cutting operation can be time and labour intensive with the added risk of potential damage to the shaft. What is required is a main shaft sleeve that addresses the above problem.

Ex. 1001, 1:51-62

Reply (Paper 34), 7-8

Piepho's Problem

Currently, there is some concern as to main shaft **14** failure. It is believed that the failures occur because of bending fatigue originating at fretted surfaces in the lower contact land with the yoke bushing bore. Fretting damage, sometimes referred to as fretting corrosion, is a condition of surface deterioration brought on by very small relative movements between bodies in contact. The fit between the yoke bushing and main shaft is an interference type fit. This type fit generates a stress concentration or multiplier. The pulverizer design generates cyclic or alternating type bending loads in the top end of the main shaft. Because the loads are cyclic, rubbing or fretting corrosion will occur. Also of concern is fatigue failure when stress concentration, cyclic loading and fretting corrosion are combined. Like fretting, fatigue has a definite set of characteristics which combine to identify this failure phenomenon. Pulverizer vibration usually results in high shaft stress levels and may have a role in main shaft failures. Vibration may be caused by abnormal grinding element wear such as out-of-round wear of balls or rings. Pulverizer vibration also will occur if proper air/fuel regulation for the burners is not provided.

Ex. 1016, 1:45-65

Reply (Paper 34), 7-8

Piepho's Problem

Because of the foregoing, there have been many attempts to correct main shaft failure frequency such as employing an anti-seize compound at the taper joint, using a bushing with a undercut center portion, using full contact bushings with no undercut center portion, shot peening, and nitriding as a surface hardening process. Remedial efforts notwithstanding, even carefully fitted taper joints, when subjected to cyclic bending forces often exhibit vulnerability to fatigue failure of shafts because of fretting and strain produced within the assembly.

Ex. 1016, 1:65-2:8

Reply (Paper 34), 7-8

Piepho's Problem

There still exists a need for an improved main shaft assembly for these types of pulverizers, one that will provide improved fretting resistance to reduce shaft failure due to fretting-induced bending fatigue on ball-race coal pulverizers.

Ex. 1016, 2:9-14

Reply (Paper 34), 7-8

Alignment in Piepho

The present invention provides an intervening material between the shaft end **(25)** and the mating bore in yoke bushing **(18)** fitted within the bore of yoke **(12)** to prevent fretting damage. For accurate alignment and for reliable support of the yoke, this joint **(21)** must be capable of accepting radial, axial, and bending or overturning loads. Preferably, the joint **(21)** is a tapered joint with the tapered end **(25)** of shaft **(14)**. The yoke bushing **(18)** has a mating bore similarly tapered. Shaft end **(25)** may be constructed for either a keyless or a keyed fit. Also, shaft end **(25)** alternatively may be cylindrical rather than tapered as seen in FIG. **4**.

Ex. 1016, 3:23-34

Reply (Paper 34), 8-9

Alignment in Piepho

elements. The pressure required for efficient grinding is obtained from externally adjustable dual purpose springs **10**. The bottom ring **6** is driven by the yoke **12** which is attached to a vertical main shaft assembly **14** of the pulverizer. The top ring **4** is held stationary by the dual purpose springs **10**. Raw coal is fed into the grinding zone where it mixes with partially ground coal that forms a circulating load. Pulver-

Ex. 1016, 1:23-29

Reply (Paper 34), 8-9

Alignment in Piepho

35. Petitioner and Mr. Smith also emphasize that a tapered shaft aids in sleeve-shaft alignment. But fretting-induced fatigue—not yoke bushing-shaft alignment—is the problem on which Piepho focuses. To be sure, Piepho describes "accurate alignment" but that is with respect to the yoke—not the yoke bushing. (Ex. 1016, 3:27–29 ("For accurate alignment and for reliable support of the yoke, this joint (21) must be capable of accepting radial, axial, and bending or overturning loads.") (emphasis added).) The yoke must be aligned accurately to drive the pulverizer's balls—something that Mr. Smith with his limited understanding of Piepho's coal pulverizer missed. (Ex. 1016, 1:25–26.) The yoke also has a much greater inertia than the yoke bushing, so the yoke is more susceptible to dynamic imbalance, and the resulting undesired vibration, than the yoke bushing. A cylindrical interference fit is at least equally capable of accurate alignment and load capacity as compared to the tapered fit. A tapered fit, in fact, has less load capacity for upward axial loads than a cylindrical interference fit. Thus, under either test, Piepho is not analogous art.

Ex. 2022, ¶ 35

Reply (Paper 34), 8-9

Piepho: Shaft Geometry Need Not Be Changed

Some 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. 1016, 4:24-36

Reply (Paper 34), 3

Piepho: Shaft Geometry Need Not Be Changed

16. The '568 patent discloses a particular geometric design of gyratory crusher components, specifically providing a tapered main shaft sleeve and associated tapered main shaft, to facilitate attachment and detachment of the sleeve to the shaft (Ex. 1001, 2:3–14). Piepho, meanwhile, describes a ceramic coating applied to a region of a coal pulverizer main shaft. The shaft in Piepho can be tapered or cylindrical. The purported invention in Piepho does not relate to the design of the tapered or cylindrical portion of the shaft. In fact, one of the advantages described for the purported invention of Piepho is that "the existing shaft and yoke geometries need not be changed." (Ex. 1016, 4:25–26). Moreover, Piepho does not address the frequency of replacement of the yoke bushing nor does it address the ease of replacement of the yoke bushing. A POSITA, therefore, would not look to Piepho when considering the geometric design of a shaft sleeve and associated shaft for a gyratory crusher, since Piepho does not address the geometric design of such components.

Ex. 2022, ¶ 16

Reply (Paper 34), 3

Petitioner's Failure to Establish Analogous Art

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Mr. Smith's Declaration Accompanying Opposition

13. In determining the scope and content of the prior art, I understand a reference is considered prior art for the obviousness analysis if it falls within the inventors' field of endeavor. Additionally, a reference is prior art for the obviousness analysis, even if from a different field of endeavor, if it is reasonably pertinent to the particular problem for which the invention was made. A reference is reasonably pertinent if it is something a person of ordinary skill in the art would have looked to when attempting to solve the problem.

Ex. 1049, ¶ 13

Reply (Paper 34), 5

Must Compare Reference to Challenged Patent



> "In evaluating whether a reference is analogous, we have consistently held that a patent challenger must compare the reference to the challenged patent."

Sanofi-Aventis Deutschland GmbH v. Mylan Pharms. Inc., 66 F.4th 1373, 1377 (Fed. Cir. 2023)

Reply (Paper 34), 6-7

Mr. Smith's Declaration Accompanying Opposition

51. U.S. Patent 2,833,486 to MacLeod (hereinafter MacLeod) was filed January 10, 1955 and is titled Gyratory Crusher with Hydraulic Means for Adjusting Crusher Head. MacLeod is in the same field of endeavor as the '568 Patent and is prior art.

Ex. 1049, ¶ 51

Reply (Paper 34), 5

Petition

Furthermore, Piepho, which discloses another rock-crushing apparatus in the same field of endeavor as Polinski, teaches a similar rock crusher. Ex. 1002, at 48.

"The present invention relates in general to an improved main Shaft for a **coal pulverizer**, and more particularly to an improved main shaft for use in B&W Type E and EL pulverizers." Ex. 1016, at 1:5–8.

Petition (Paper 2), 18

Reply (Paper 34), 6

Mr. Smith's First Declaration: Comparing Piepho and Polinski

80. As a rock crushing apparatus, Piepho is in the same field of endeavor as Polinski and thus (being analogous art) would easily be withing the purview of a POSITA. Further, Piepho teaches the interchangeability between a cylindrical joint and a tapered joint. Piepho also teaches that a tapered joint is preferable.

Ex. 1002 ¶ 80

Reply (Paper 34), 5-6

Petition

11.1. Claims 1–8 are rendered obvious by Polinski in view of Piepho

Claims 1–8 of the '568 patent do not disclose anything other than a gyratory rock crusher with a tapered joint between a main shaft and a sleeve. Polinski and Piepho each disclose a gyratory rock crusher. *See* Ex. 1015, 1010. Piepho is further designed to crush coal. Ex. 1016. Furthermore, Piepho further teaches the inter-changeability between a cylindrical joint and a tapered joint. Specifically,

Petition (Paper 2), 16

Reply (Paper 34), 6

High Level Industry Label Insufficient



> In *Clay*, the Court held that the prior art reference (Sydansk) "cannot be considered to be within Clay's field of endeavor merely because both relate to the petroleum industry."

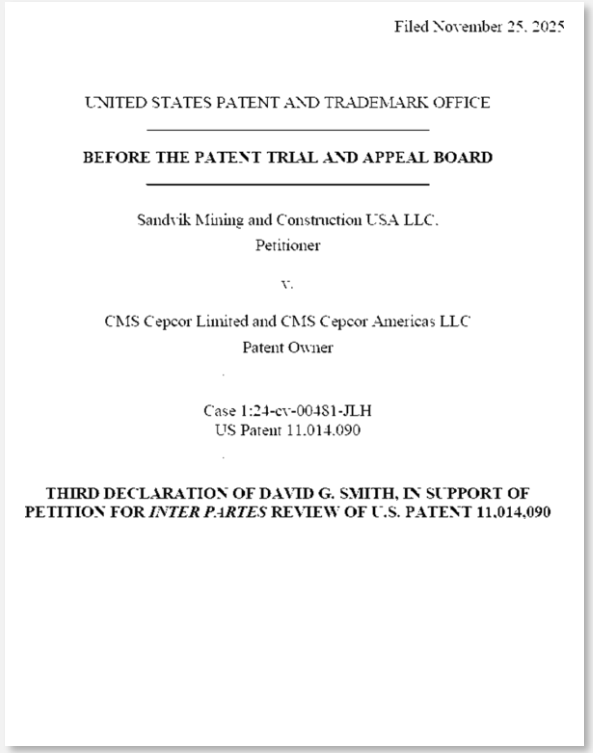
In re Clay, 966 F.2d 656, 659 (Fed. Cir. 1992)

> Allen-Bradley was not in the same field of endeavor "merely because it relates to memories."

Wang Lab'ys, Inc. v. Toshiba Corp., 993 F.2d 858, 864 (Fed. Cir. 1993)

Reply (Paper 34), 6-7

Mr. Smith's Assertion That Other References Were Reasonably Pertinent to the Problem Solved by the '090 Patent in the -01381 Proceeding



Filed November 25, 2025

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Sandvik Mining and Construction USA LLC.
Petitioner

v.

CMS Cepcor Limited and CMS Cepcor Americas LLC
Patent Owner

Case 1:24-cv-00481-JLH
US Patent 11,014,090

THIRD DECLARATION OF DAVID G. SMITH, IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT 11,014,090

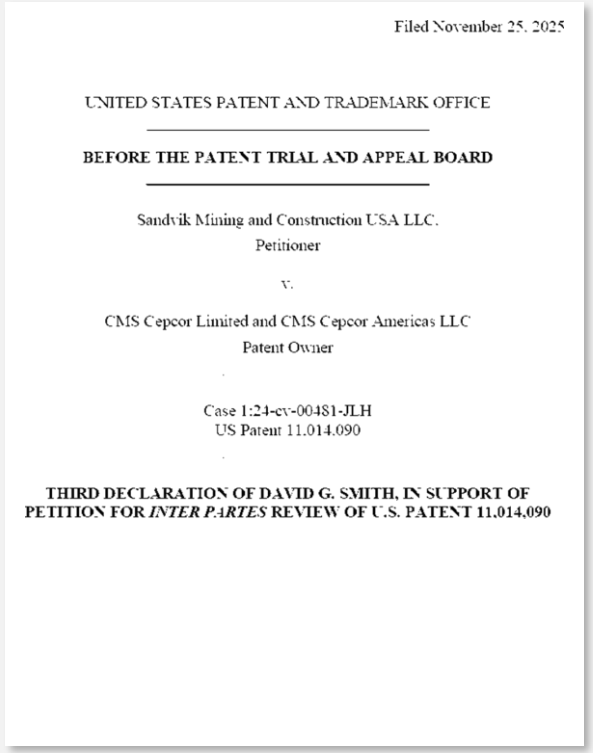
US 8,302,754 to Yagi

46. US 8,302,754 to Katsuki Yagi (hereafter, the '754 patent, or Yagi) filed on July 23, 2009. This is also well in advance of the priority date of the '090 patent. Yagi is reasonably pertinent to one of the problems the inventor was trying to solve and is thus in the same field of endeavor.

IPR2024-01381, Ex. 1051, ¶ 46

Reply (Paper 34), 7

Mr. Smith's Assertion That Other References Were Reasonably Pertinent to the Problem Solved in the -01381 Proceeding



Filed November 25, 2025

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Sandvik Mining and Construction USA LLC.
Petitioner

v.

CMS Cepcor Limited and CMS Cepcor Americas LLC
Patent Owner

Case 1:24-cv-00481-JLH
US Patent 11,014,090

THIRD DECLARATION OF DAVID G. SMITH, IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT 11,014,090

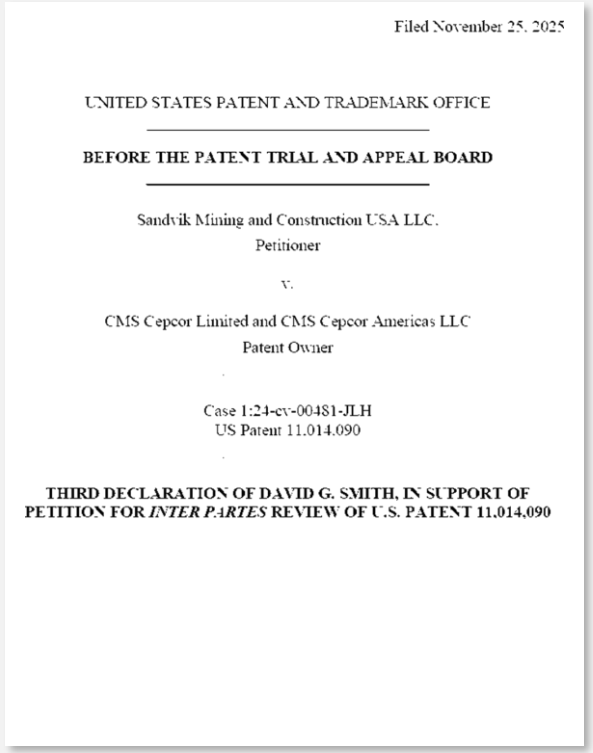
US 2,381,697 to Shepard

56. US 2,381,697 to F. B. Shepard (hereinafter "Shepard") was filed April 27, 1944 and is titled HUB STRUCTURE. Shepard relates to using a tapered sleeve to lock a pulley, gear, or the like onto a shaft and to facilitate release therefrom as well. **Shepard is reasonably pertinent to the problem the inventor was trying to solve and is prior art.**

IPR2024-01381, Ex. 1051, ¶ 56

Reply (Paper 34), 7

Mr. Smith's Assertion That Other References Were Reasonably Pertinent to the Problem Solved in the -01381 Proceeding



Filed November 25, 2025

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Sandvik Mining and Construction USA LLC,
Petitioner

v.

CMS Cepcor Limited and CMS Cepcor Americas LLC
Patent Owner

Case 1:24-cv-00481-JLH
US Patent 11,014,090

THIRD DECLARATION OF DAVID G. SMITH, IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT 11,014,090

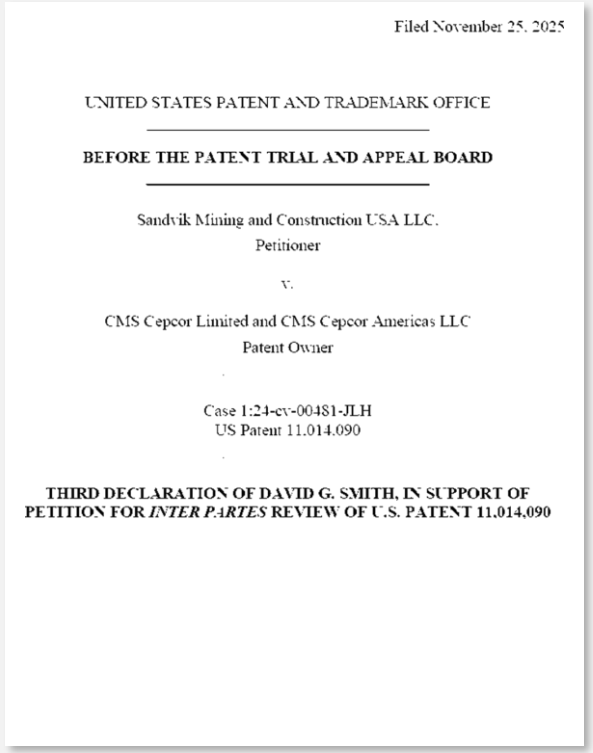
US 2,377,046 to Siegerist

60. The US Patent 2,377,046 to Siegerist (hereinafter Siegerist) was filed on February 23, 1944. Siegerist is titled "Mounting for Sheaves and the Like" and is directed to ways of mounting and demounting components, such as a sleeve, on a shaft, and is reasonably pertinent to the problem the inventor of the '090 patent was trying to solve. Siegerist is prior art to the '090 Patent.

IPR2024-01381, Ex. 1051, ¶ 60

Reply (Paper 34), 7

Mr. Smith's Assertion That Other References Were Reasonably Pertinent to the Problem Solved in the -01381 Proceeding



Filed November 25, 2025

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Sandvik Mining and Construction USA LLC.
Petitioner

v.

CMS Cepcor Limited and CMS Cepcor Americas LLC
Patent Owner

Case 1:24-cv-00481-JLH
US Patent 11,014,090

THIRD DECLARATION OF DAVID G. SMITH, IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT 11,014,090

US 2,519,958 to Firth

64. The US Patent 2,519,958 to Firth (hereinafter Firth) was filed on November 21. 1947. Firth is titled "Wheel Mounting" and is directed to ways of mounting and demounting wheels or pulleys on a shaft. and is reasonably pertinent to the problem the inventor of the '090 patent was trying to solve. Firth is prior art to the '090 Patent.

IPR2024-01381, Ex. 1051, ¶ 64

Reply (Paper 34), 7

Mr. Smith's Assertion That Other References Were Reasonably Pertinent to the Problem Solved in the -01381 Proceeding

Filed November 25, 2025

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Sandvik Mining and Construction USA LLC.
Petitioner

v.

CMS Cepcor Limited and CMS Cepcor Americas LLC
Patent Owner

Case 1:24-cv-00481-JLH
US Patent 11,014,090

THIRD DECLARATION OF DAVID G. SMITH, IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT 11,014,090

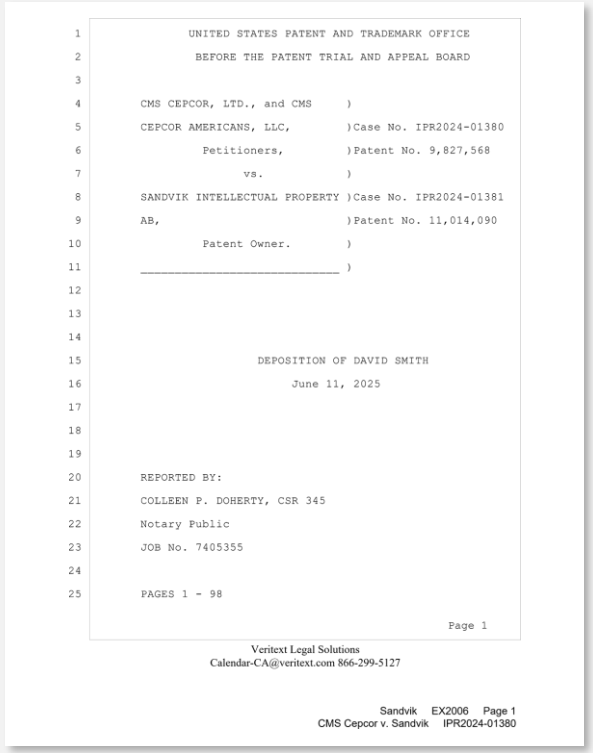
US 2,668,454 to Schumb

68. The US Patent 2.668.454 to Schumb (hereinafter Schumb) was filed on October 22. 1952. Firth is titled "Mounting for Sprockets. Pinions or the Like" and is directed to ways of mounting and demounting sprockets or pinions on a shaft. Schumb specifically discloses mounting a pinion (Figure 4) on a tapered bushing on a shaft (Figure 5) and is reasonably pertinent to the problem the inventor of the '090 patent was trying to solve. Schumb is prior art to the '090 Patent.

IPR2024-01381, Ex. 1051, ¶ 68

Reply (Paper 34), 7

Mr. Smith's Limited Knowledge



UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

CMS CEPCOR, LTD., and CMS CEPCOR AMERICANS, LLC, Petitioners, vs. SANDVIK INTELLECTUAL PROPERTY AB, Patent Owner.

Case No. IPR2024-01380
Patent No. 9,827,568
Case No. IPR2024-01381
Patent No. 11,014,090

DEPOSITION OF DAVID SMITH
June 11, 2025

REPORTED BY:
COLLEEN P. DOHERTY, CSR 345
Notary Public
JOB No. 7405355

PAGES 1 - 98

Page 1

Veritext Legal Solutions
Calendar-CA@veritext.com 866-299-5127

Sandvik EX2006 Page 1
CMS Cepcor v. Sandvik IPR2024-01380

Q. And do you have any experience as an expert with coal pulverizers?

A. Not specifically, no.

Q. Would it be possible for you to explain to me how the coal pulverizer operates? Maybe as it's explained on Piepho, if that's easier for you?

A. So the Piepho reference to my recollection doesn't specifically describe the inner workings of the coal pulverizer. It does talk about cyclic motion, but maybe focuses on the main shaft. So I recall going and looking at the website for BMW coal crushers, but I don't recall specifically at this point how it works.

Ex. 2006, 57:21-58:7

Reply (Paper 34), 3, 6

Mr. Smith's Limited Knowledge

Q. Okay. I want to ask you, as an expert in this field, how do you understand what happens to the coal once it exits the hopper, and goes towards the balls 8?

* * *

A. So I'm not terribly familiar with that particular coal pulverizer. I've never seen one in person. I've used this particular reference to talk about the main shaft, and the tapered section of the main shaft. So I don't want to guess, and I don't particularly know. I don't specifically know exactly how it works, because it's not described in great detail in this reference.

Ex. 2021, 65:5-16 (objection omitted)

Reply (Paper 34), 3

Mr. Smith's Limited Knowledge

Q. Okay. All right. Let's direct your attention to the main shaft 14, since you just referenced that in your previous response. How does the main shaft 14 rotate in Piepho Figure 1? Maybe I should ask that question a little differently, because that was a little vague.

Looking at picture Piepho Figure 1, would a POSITA understand that the shaft 14 rotates about its longitudinal axis?

A. I don't think the Piepho referenced one way or the other. And I don't want to speculate as to whether it does or not. It's not something that I've actually looked at.

Ex. 2021, 65:17-66:4

Reply (Paper 34), 3

Mr. Smith's Limited Knowledge

Q. So would it be fair to say, as you sit here today, you don't know what the role of yoke bushing 18 is, in Figure 1, in Piepho?

A. I don't know exactly how it's used in the prior art that's referenced in Piepho.

Ex. 2021, 71:11-15

Reply (Paper 34), 3

Motivation To Combine

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Non-Analogous Art → Hindsight



> "The combination of elements from nonanalogous sources, in a manner that reconstructs the applicant's invention only with the benefit of hindsight, is insufficient to present a prima facie case of obviousness."

In re Oetiker, 977 F.2d 1443, 1447 (Fed. Cir. 1992)

> "If [the reference] is directed to a different purpose, the inventor would accordingly have had less motivation or occasion to consider it."

In re Clay, 966 F.2d 656, 659 (Fed. Cir. 1992)

Reply (Paper 34), 9

Hindsight Driven Selection of Piepho

Q. Okay. I want to ask you, as an expert in this field, how do you understand what happens to the coal once it exits the hopper, and goes towards the balls 8?

* * *

A. So I'm not terribly familiar with that particular coal pulverizer. I've never seen one in person. I've used this particular reference to talk about the main shaft, and the tapered section of the main shaft. So I don't want to guess, and I don't particularly know. I don't specifically know exactly how it works, because it's not described in great detail in this reference.

Ex. 2021, 65:5-16 (objection omitted)

Reply (Paper 34), 9

Piepho

The present invention provides an intervening material between the shaft end (**25**) and the mating bore in yoke bushing (**18**) fitted within the bore of yoke (**12**) to prevent fretting damage. For accurate alignment and for reliable support of the yoke, this joint (**21**) must be capable of accepting radial, axial, and bending or overturning loads. Preferably, the joint (**21**) is a tapered joint with the tapered end (**25**) of shaft (**14**). The yoke bushing (**18**) has a mating bore similarly tapered. Shaft end (**25**) may be constructed for either a keyless or a keyed fit. Also, shaft end (**25**) alternatively may be cylindrical rather than tapered as seen in FIG. **4**.

Ex. 1016, 3:23-34

Reply (Paper 34), 8-10

Objective Evidence

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Objective Indicia of Non-Obviousness



"Evidence of objective indicia of nonobviousness, if present, must always be considered before reaching a determination on the issue of obviousness."

Quanergy Sys. v. Velodyne Lidar USA, Inc., 24 F.4th 1406, 1417 (Fed. Cir. 2022)

Objective indicia of non-obviousness "may often be the most probative and cogent evidence in the record."

Medtronic, Inc. v. Teleflex Innovations S.a.r.l., 70 F.4th 1331, 1342 (Fed. Cir. 2023)

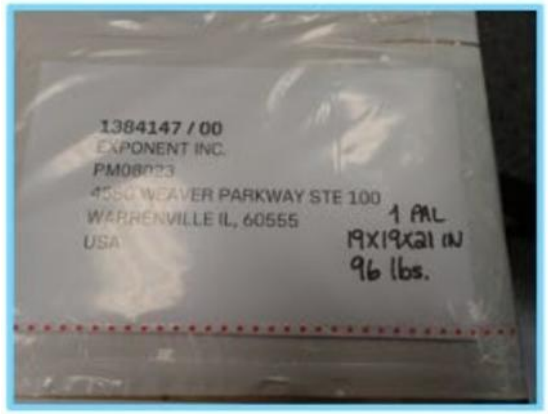
Nexus is presumed "when the patentee shows that the asserted objective evidence is tied to a specific product and that product embodies the claimed features, and is coextensive with them."

Quanergy, 24 F.4th at 1417

RMTA (Paper 23), 28

Presumed Nexus: CH 440 Main Shaft Sleeve

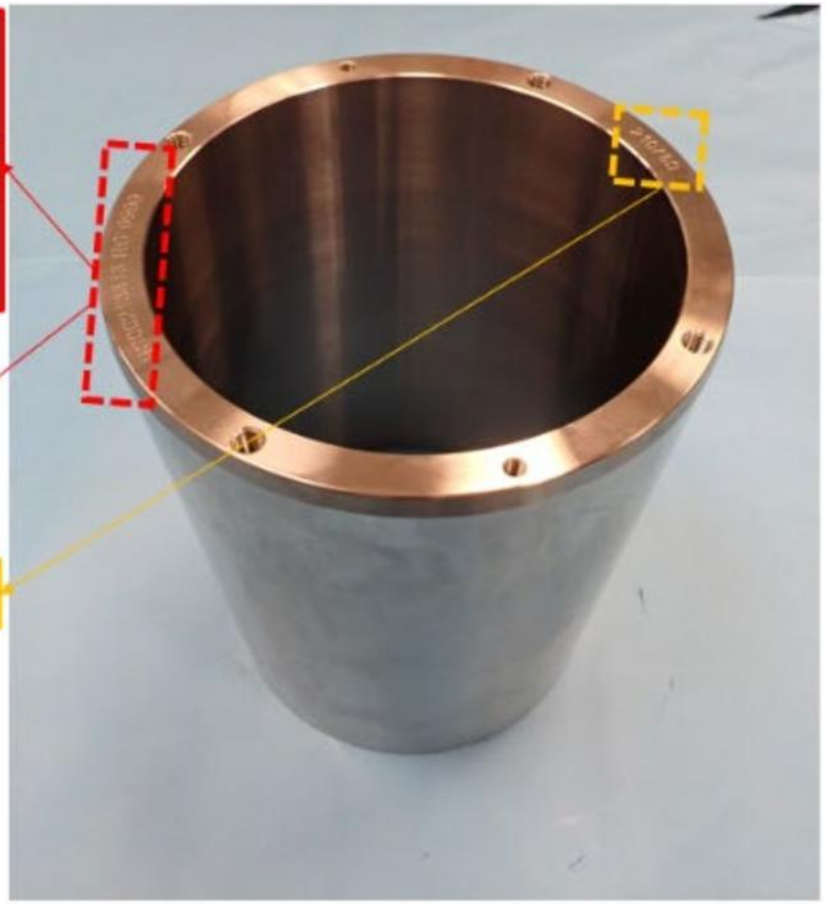






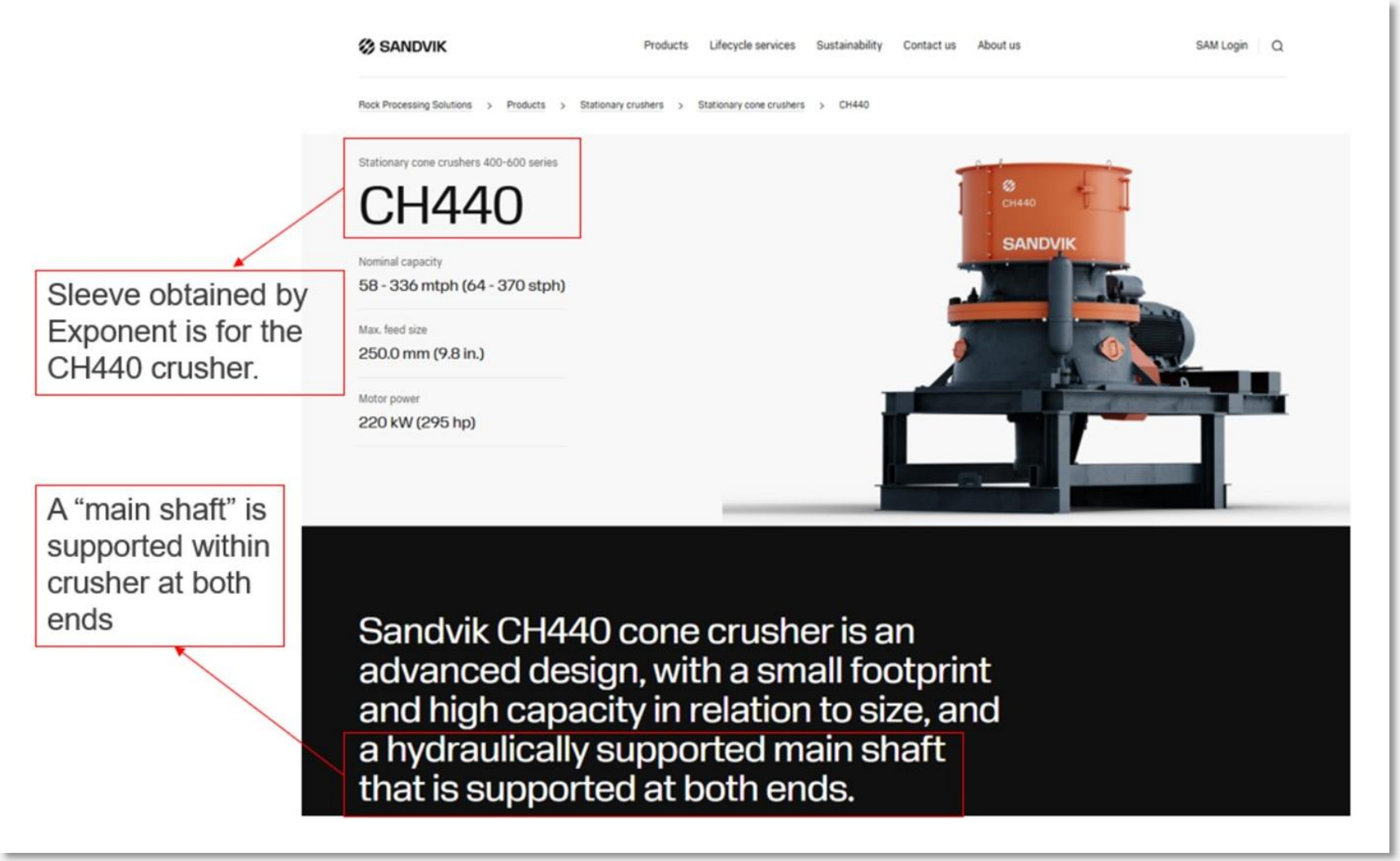
OEM#:
BG00213813

210760



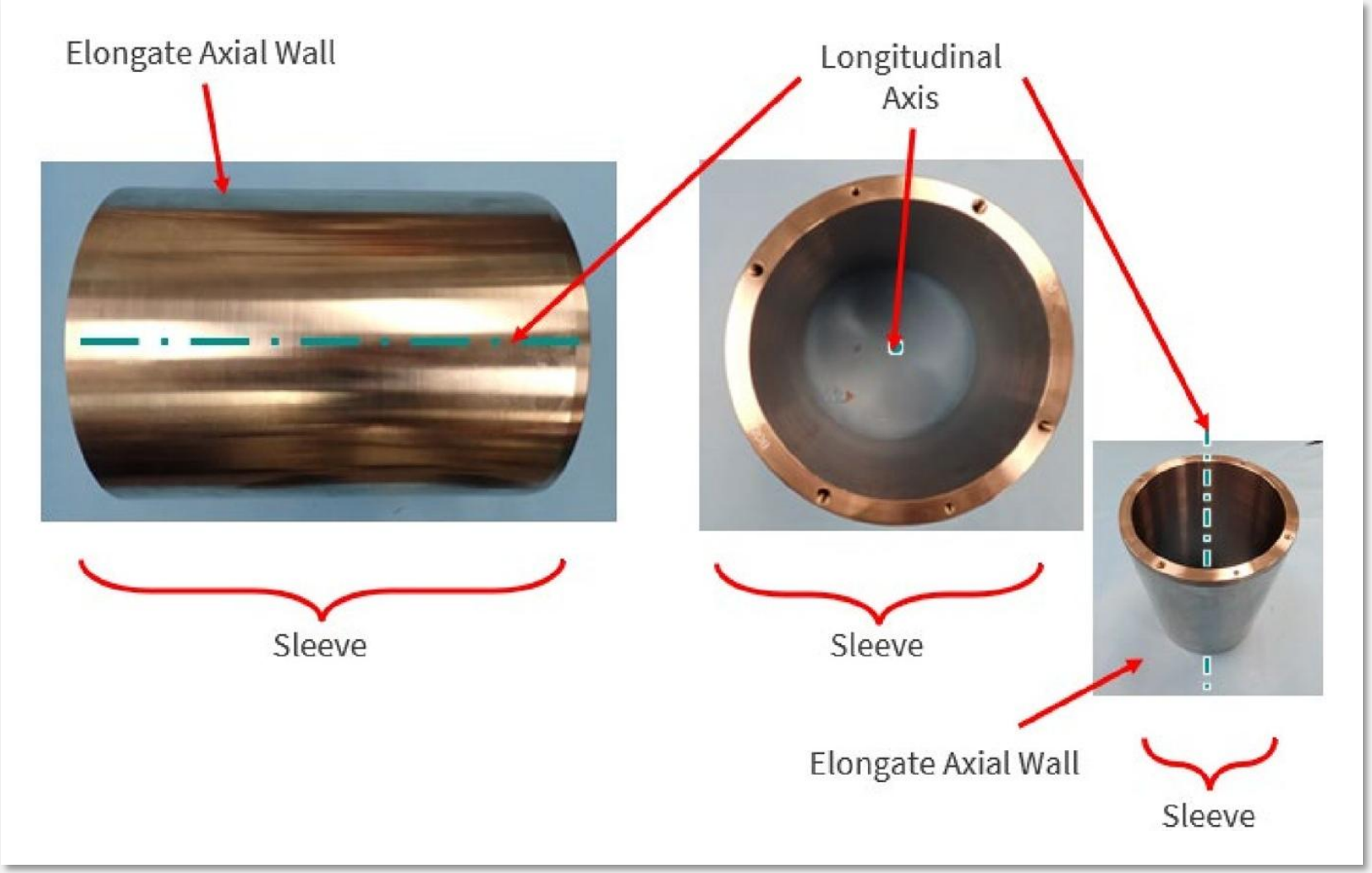
RMTA (Paper 23), 28-33

Presumed Nexus: CH 440 Main Shaft



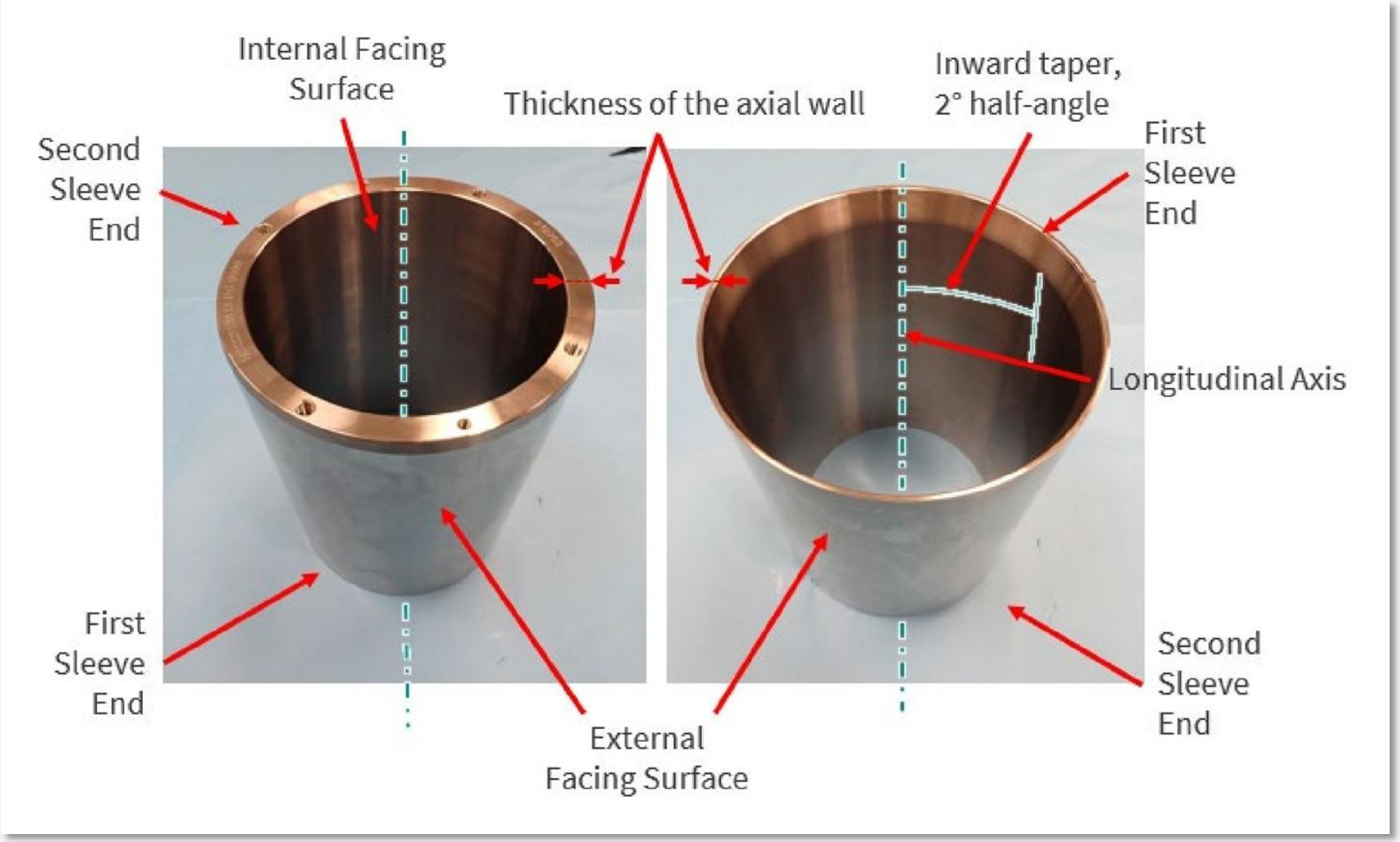
RMTA (Paper 23), 28-33

Presumed Nexus: Embodies and Coextensive



Paper 23, 28-33

Presumed Nexus: Embodies and Coextensive



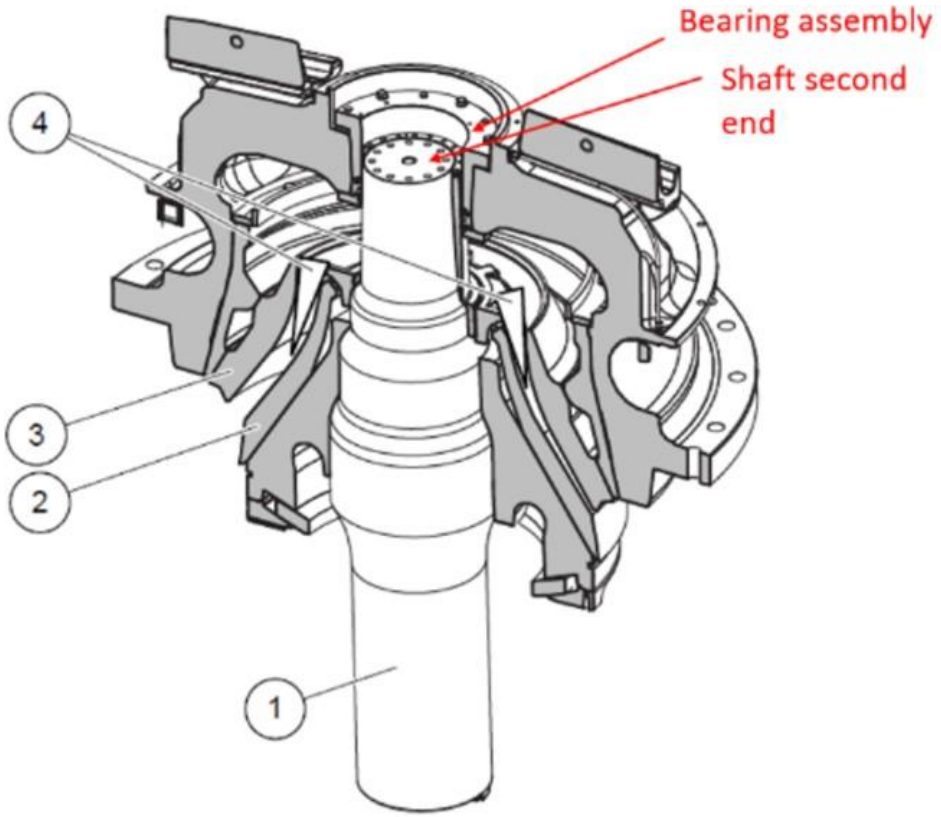
RMTA (Paper 23), 28-33

Presumed Nexus: Embodies and Coextensive

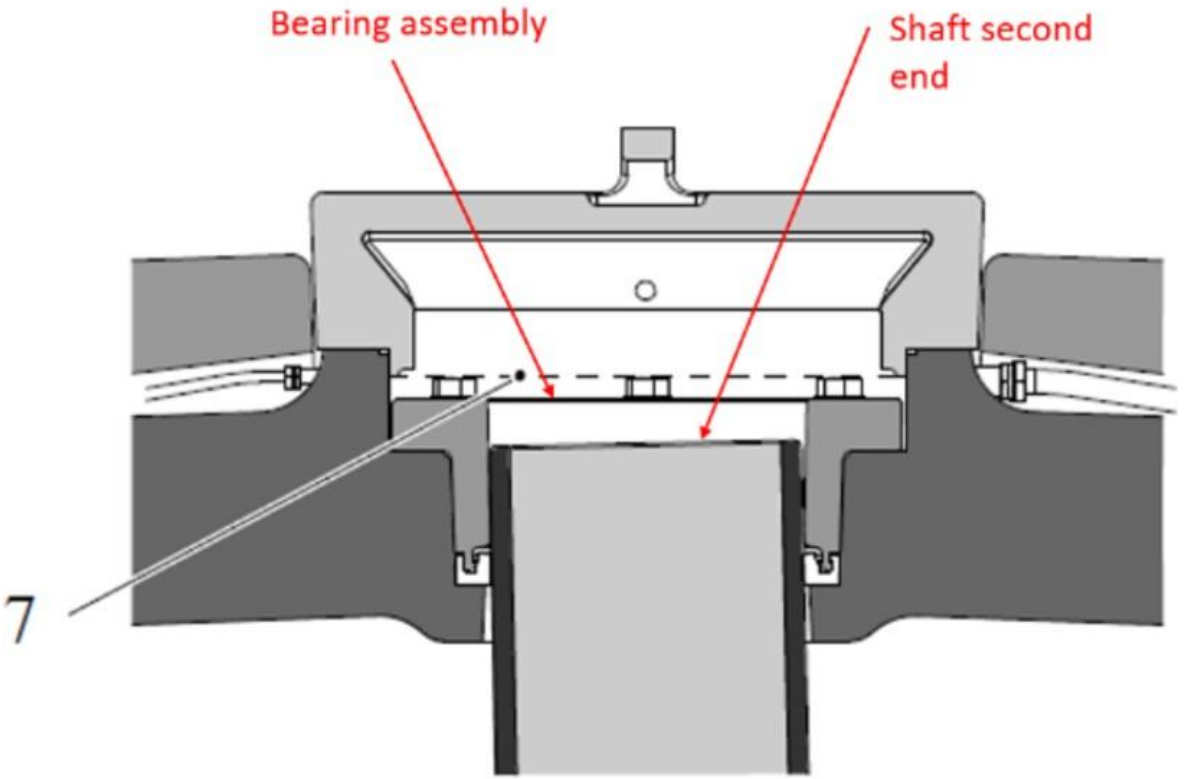


RMTA (Paper 23), 28-33

Presumed Nexus: Embody and Coextensive



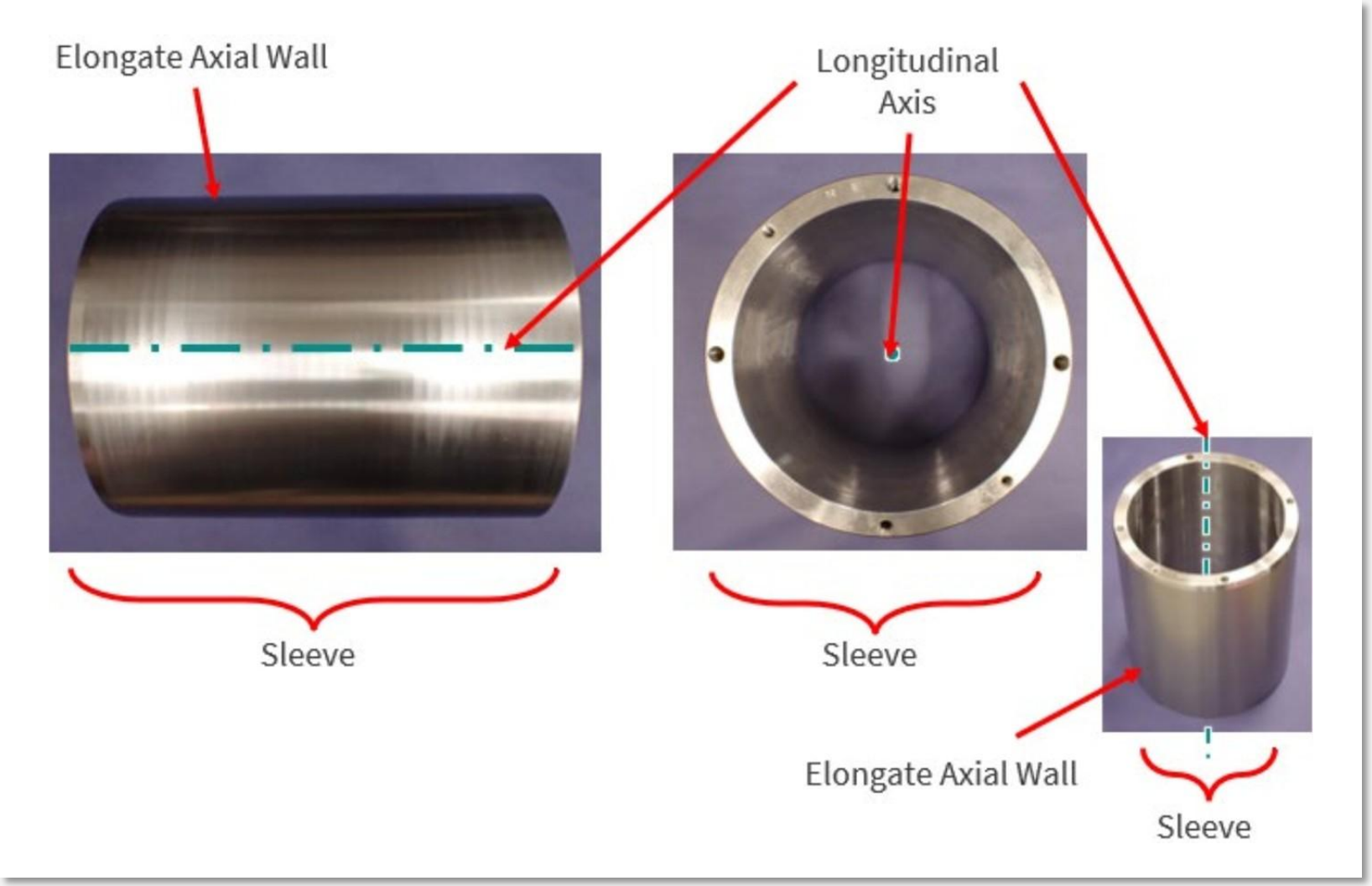
1 Main shaft
2 Mantle
3 Concave ring
4 Wooden wedge



7 Grease level

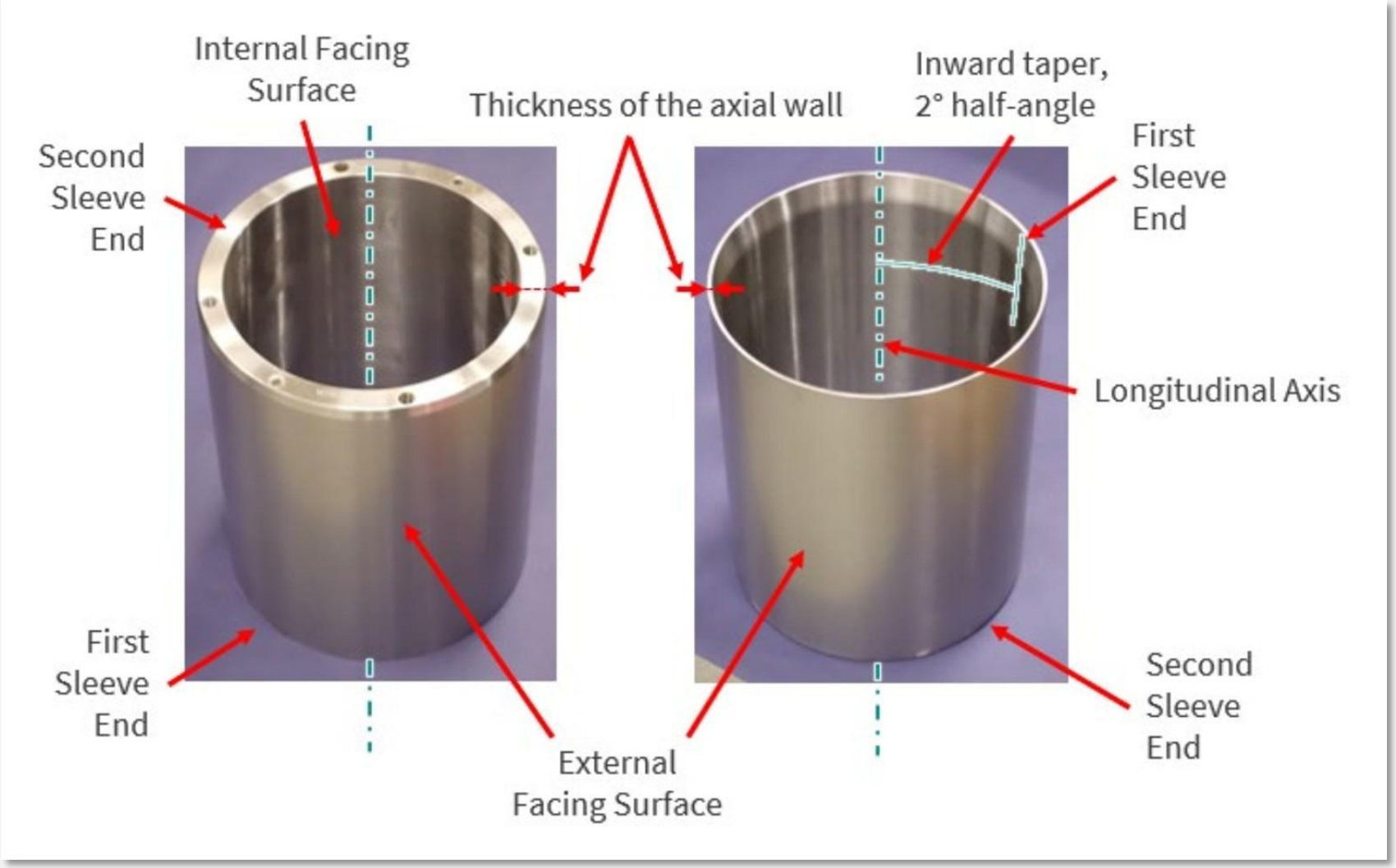
RMTA (Paper 23), 28-33

Petitioner's Main Shaft Sleeve Embodies and Coextensive With Substitute Claim 11



RMTA (Paper 23), 34-35

Petitioner's Main Shaft Sleeve Embodies and Coextensive With Substitute Claim 11



RMTA (Paper 23), 34-35

Petitioner's Main Shaft Sleeve Embodies and Coextensive With Substitute Claim 11

CH440 Spare Parts & Replacements

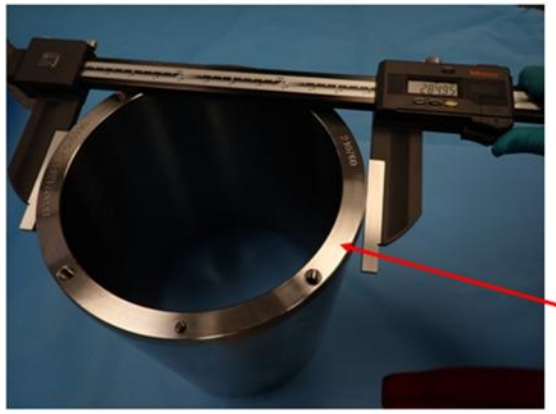
CMS Cepcor offer all the replacement parts you need for CH440. All of our Sandvik® CH | CS Range crusher parts and crusher spares are available brand new and manufactured in consideration of original tolerances at our Coalville headquarters in the UK.

Ex. 2010

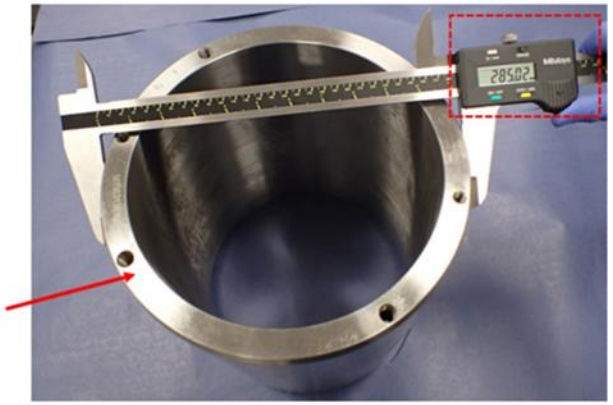
RMTA (Paper 23), 34-35

Essentially Identical

Sandvik



CMS Cepcor



Upper End External Diameter	
Sandvik	285.0 mm
CMS Cepcor	285.0 mm



Upper End Internal Diameter	
Sandvik	240.7 mm
CMS Cepcor	240.9 mm

Lower End External Diameter	
Sandvik	285.1 mm
CMS Cepcor	284.9 mm

Lower End Internal Diameter	
Sandvik	277.5 mm
CMS Cepcor	277.3 mm

Sleeve Length	
Sandvik	353.4 mm
CMS Cepcor	354.1 mm

Axial Wall Taper	
Sandvik	2° half-angle
CMS Cepcor	2° half-angle

Taper Near Lower End	
Sandvik	15° half-angle
CMS Cepcor	15° half-angle

Ex. 2020 ¶¶ 130-139

RMTA (Paper 23), 35-37

Nexus in Fact

Even if nexus is not presumed, Sandvik is still afforded an opportunity to prove nexus "via a showing that the evidence is a direct result of the unique characteristics of the claimed invention."

Volvo Penta of the Americas, LLC v. Brunswick Corp., 81 F.4th 1202, 1210 (Fed. Cir. 2023)

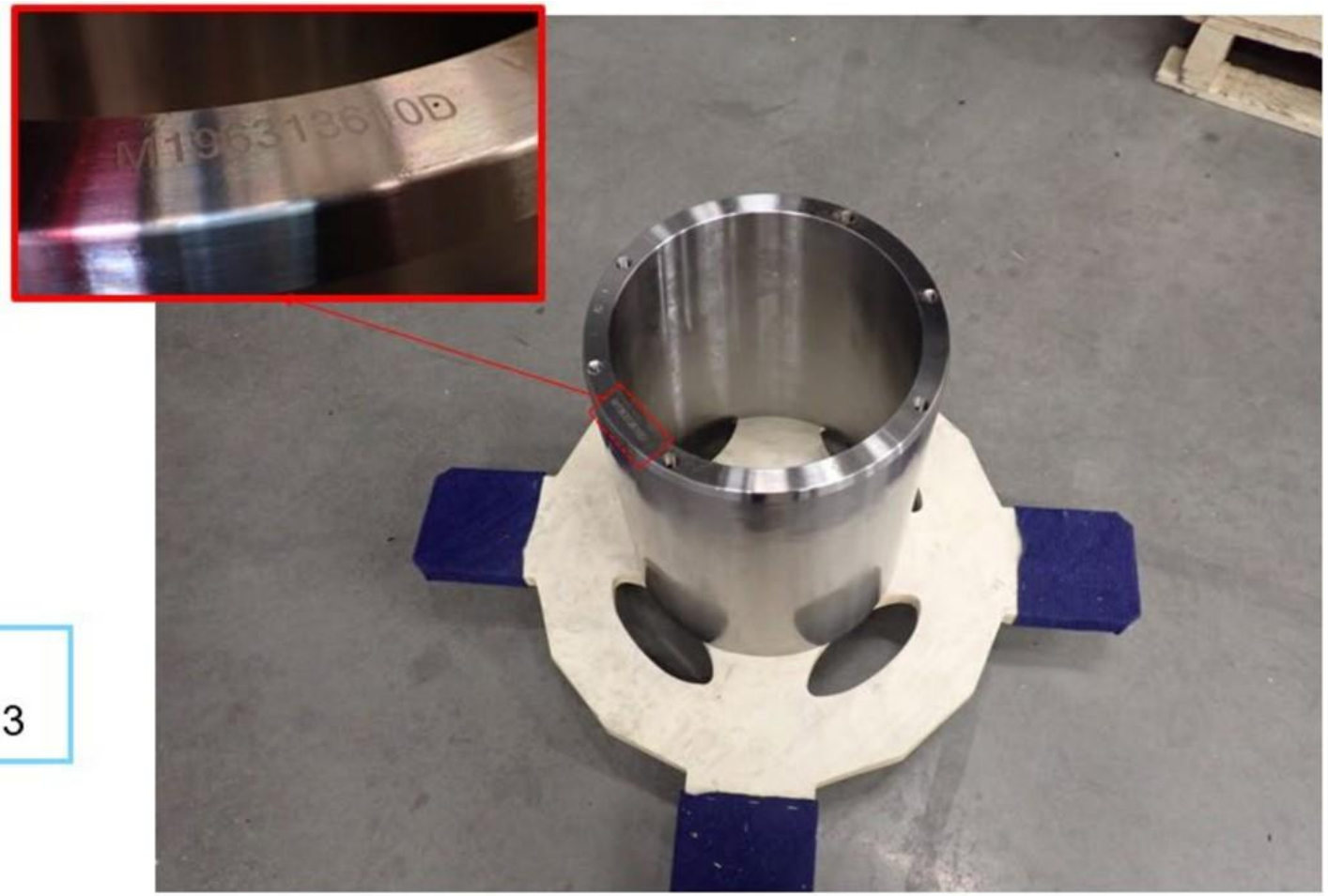
RMTA (Paper 23), 34

Unique Characteristics: Petitioner's Main Shaft Sleeve



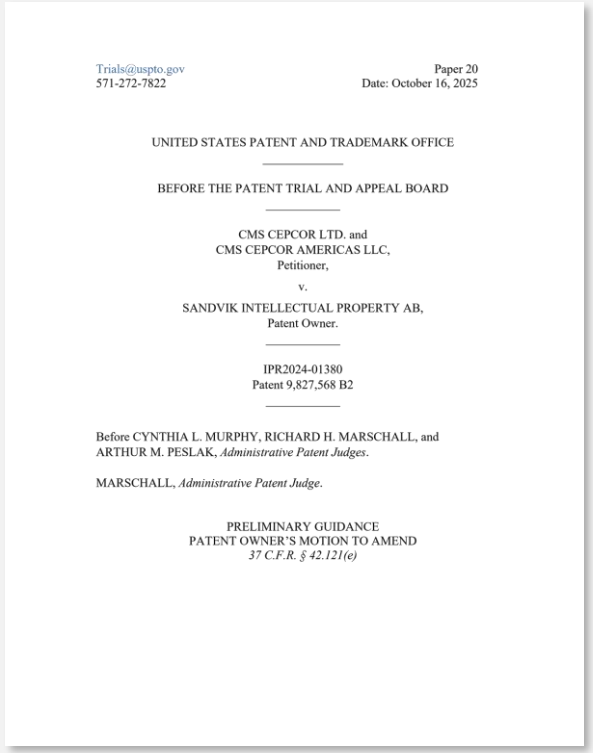


OEM#:
BG00213813



RMTA (Paper 23), 34

Preliminary Guidance



Trials@uspto.gov
571-272-7822

Paper 20
Date: October 16, 2025

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

SANDVIK INTELLECTUAL PROPERTY AB,
Patent Owner.

IPR2024-01380
Patent 9,827,568 B2

Before CYNTHIA L. MURPHY, RICHARD H. MARSCHALL, and ARTHUR M. PESLAK, *Administrative Patent Judges*.

MARSCHALL, *Administrative Patent Judge*.

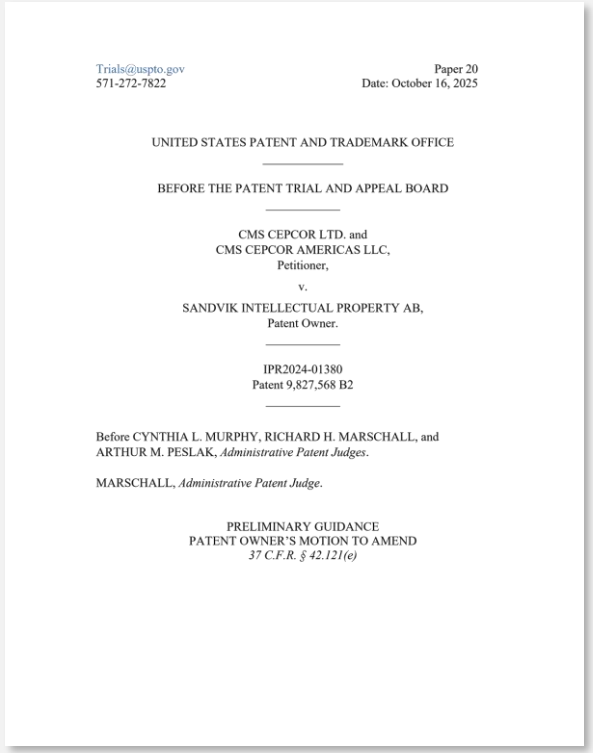
PRELIMINARY GUIDANCE
PATENT OWNER'S MOTION TO AMEND
37 C.F.R. § 42.121(e)

We make the following initial observations based on Patent Owner's evidence of copying and Petitioner's arguments in opposition. As an initial matter, Petitioner does not argue that it did not copy Patent Owner's product, that the copied product fails to include any limitations of proposed amended claim 11, or that Patent Owner fails to show a nexus to the copying evidence. Opp. 25. Instead, Petitioner merely argues the amount of weight that we should give to this objective evidence and that "the biases of [Patent Owner's] expert" "should further nullify this defense." *Id.* Accordingly, the substance of Patent Owner's assertions are largely unrebutted on the current record.

Preliminary Guidance (Paper 20), 7

Reply (Paper 34), 10-12

Preliminary Guidance



Trials@uspto.gov
571-272-7822

Paper 20
Date: October 16, 2025

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

SANDVIK INTELLECTUAL PROPERTY AB,
Patent Owner.

IPR2024-01380
Patent 9,827,568 B2

Before CYNTHIA L. MURPHY, RICHARD H. MARSCHALL, and ARTHUR M. PESLAK, *Administrative Patent Judges*.

MARSCHALL, *Administrative Patent Judge*.

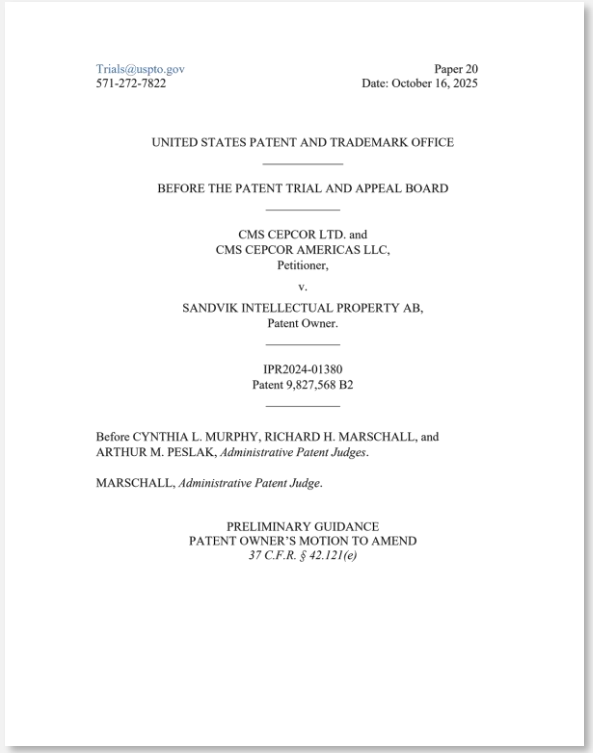
PRELIMINARY GUIDANCE
PATENT OWNER'S MOTION TO AMEND
37 C.F.R. § 42.121(e)

As to Petitioner's arguments concerning Dr. Kytömaa's biases, the arguments go to the weight to be given those opinions. *See* Opp. 2–7. At this stage of the proceeding, we are not persuaded that Dr. Kytömaa's testimony should be disregarded for alleged bias or that his biases "nullify" Patent Owner's arguments. Petitioner's arguments are particularly unconvincing in this context, where Petitioner does not argue that any of opinions supporting Patent Owner's objective indicia arguments lack merit. *See id.* at 25.

Preliminary Guidance (Paper 20), 7

Reply (Paper 34), 10-12

Preliminary Guidance



Trials@uspto.gov
571-272-7822

Paper 20
Date: October 16, 2025

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

SANDVIK INTELLECTUAL PROPERTY AB,
Patent Owner.

IPR2024-01380
Patent 9,827,568 B2

Before CYNTHIA L. MURPHY, RICHARD H. MARSCHALL, and ARTHUR M. PESLAK, *Administrative Patent Judges*.

MARSCHALL, *Administrative Patent Judge*.

PRELIMINARY GUIDANCE
PATENT OWNER'S MOTION TO AMEND
37 C.F.R. § 42.121(e)

At this stage of the proceeding, based on Patent Owner's largely unrebutted showing, we give Patent Owner's objective indicia evidence some weight in our obviousness analysis below. Nevertheless, we keep in mind that often "a showing of copying is only equivocal evidence of nonobviousness in the absence of more compelling objective indicia of other secondary considerations." *See Ecolochem, Inc. v. S. Cal. Edison Co.*, 227 F.3d 1361, 1380 (Fed. Cir. 2000); *see also In re GPAC Inc.*, 57 F.3d 1573, 1580 (Fed. Cir. 1995) ("[M]ore than the mere fact of copying by an accused infringer is needed to make that action significant to a determination of the obviousness issue." (quoting *Cable Elec. Prods. v. Genmark, Inc.*, 770 F.2d 1015, 1028 (Fed. Cir. 1985))).

Preliminary Guidance (Paper 20), 7

Reply (Paper 34), 10-12

Long-Felt Need

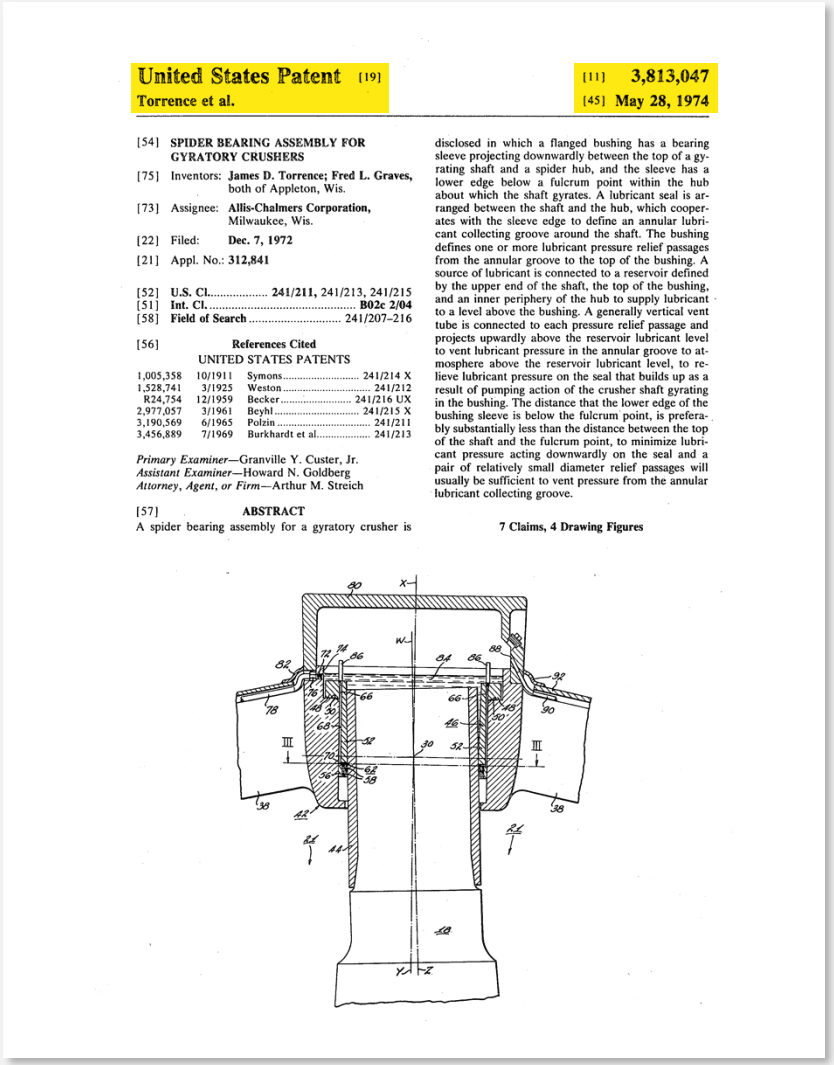


> "The length of [] time between the publication dates of the prior art and the claimed invention can also qualify as an objective indicator of nonobviousness."

Leo Pharm. Prods., LTD. v. Rea, 726 F.3d 1346, 1359 (Fed. Cir. 2013)

Reply (Paper 34), 12

Long-Felt Need: 40+ Years After Torrence



United States Patent [19]
Torrence et al.

[11] 3,813,047
[45] May 28, 1974

[54] SPIDER BEARING ASSEMBLY FOR GYRATORY CRUSHERS

[75] Inventors: James D. Torrence; Fred L. Graves, both of Appleton, Wis.

[73] Assignee: Allis-Chalmers Corporation, Milwaukee, Wis.

[22] Filed: Dec. 7, 1972

[21] Appl. No.: 312,841

[52] U.S. Cl. 241/211, 241/213, 241/215
[51] Int. Cl. B02c 2/04
[58] Field of Search 241/207-216

[56] References Cited
UNITED STATES PATENTS

1,005,358	10/1911	Symons	241/214 X
1,528,741	3/1925	Weston	241/212
R24,754	12/1959	Becker	241/216 UX
2,977,057	3/1961	Beyhl	241/215 X
3,190,569	6/1965	Polzin	241/211
3,456,889	7/1969	Burkhardt et al.	241/213

Primary Examiner—Granville Y. Custer, Jr.
Assistant Examiner—Howard N. Goldberg
Attorney, Agent, or Firm—Arthur M. Streich

[57] ABSTRACT

A spider bearing assembly for a gyratory crusher is disclosed in which a flanged bushing has a bearing sleeve projecting downwardly between the top of a gyrating shaft and a spider hub, and the sleeve has a lower edge below a fulcrum point within the hub about which the shaft gyrates. A lubricant seal is arranged between the shaft and the hub, which cooperates with the sleeve edge to define an annular lubricant collecting groove around the shaft. The bushing defines one or more lubricant pressure relief passages from the annular groove to the top of the bushing. A source of lubricant is connected to a reservoir defined by the upper end of the shaft, the top of the bushing, and an inner periphery of the hub to supply lubricant to a level above the bushing. A generally vertical vent tube is connected to each pressure relief passage and projects upwardly above the reservoir lubricant level to vent lubricant pressure in the annular groove to atmosphere above the reservoir lubricant level, to relieve lubricant pressure on the seal that builds up as a result of pumping action of the crusher shaft gyrating in the bushing. The distance that the lower edge of the bushing sleeve is below the fulcrum point, is preferably substantially less than the distance between the top of the shaft and the fulcrum point, to minimize lubricant pressure acting downwardly on the seal and a pair of relatively small diameter relief passages will usually be sufficient to vent pressure from the annular lubricant collecting groove.

7 Claims, 4 Drawing Figures

United States Patent [19]
Torrence et al.

[11] 3,813,047
[45] May 28, 1974

Ex. 1011

Reply (Paper 34), 11-12

Long-Felt Need: 40+ Years After Torrence

Shaft **18** is fitted with a replaceable wear sleeve **44.** The bearing assembly for shaft **18** and wear sleeve **44** includes a bushing **46** having a radial flange **48** which is seated upon a generally horizontal shoulder **50** of hub **42.** A bearing sleeve **52** projects downwardly from

Ex. 1011, 3:48-52

Reply (Paper 34), 11-12

Prior Consideration of Torrence/Coxhill and § 325(d)

Notice of References Cited	Application/Control No. 14/418,535	Applicant(s)/Patent Under Reexamination ABERG ET AL.	
	Examiner FAYE FRANCIS	Art Unit 3725	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-3,539,119 A	11-1970	COOK EUGENE B	B02C2/047	241/215
*	B	US-3,813,047 A	05-1974	Torrence; James D.	B02C2/06	241/211
*	C	US-4,037,800 A	07-1977	Coxhill; Major	B02C2/06	241/213
*	D	US-4,060,205 A	11-1977	Pollak; Robert J.	B02C2/047	138/26
*	E	US-5,152,468 A	10-1992	Virtamo; Jussi	B02C2/06	241/213
*	F	US-5,820,045 A	10-1998	Karra; Vijia Kumar	B02C2/00	241/207
*	G	US-6,446,892 B1	09-2002	Fasoli; Ralph	B02C2/04	241/207
*	H	US-2011/0006143 A1	01-2011	Gunnarsson; Johan	B02C2/04	241/215
*	I	US-8,646,713 B2	02-2014	Belotserkovskiy; Konstantin	B02C2/042	241/207
	J	US-				
	K	US-				
	L	US-				
	M	US-				

Ex. 1001-1, 213

Reply (Paper 34), 12

Prior Consideration of Torrence/Coxhill and § 325(d)

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claim(s) 1-8 and 9-11 is/are rejected as best understood under pre-AIA 35 U.S.C. 102b as being anticipated by Coxhill (4,037,800).

Ex. 1001-1, 209

Reply (Paper 34), 12

Torrence & Coxhill

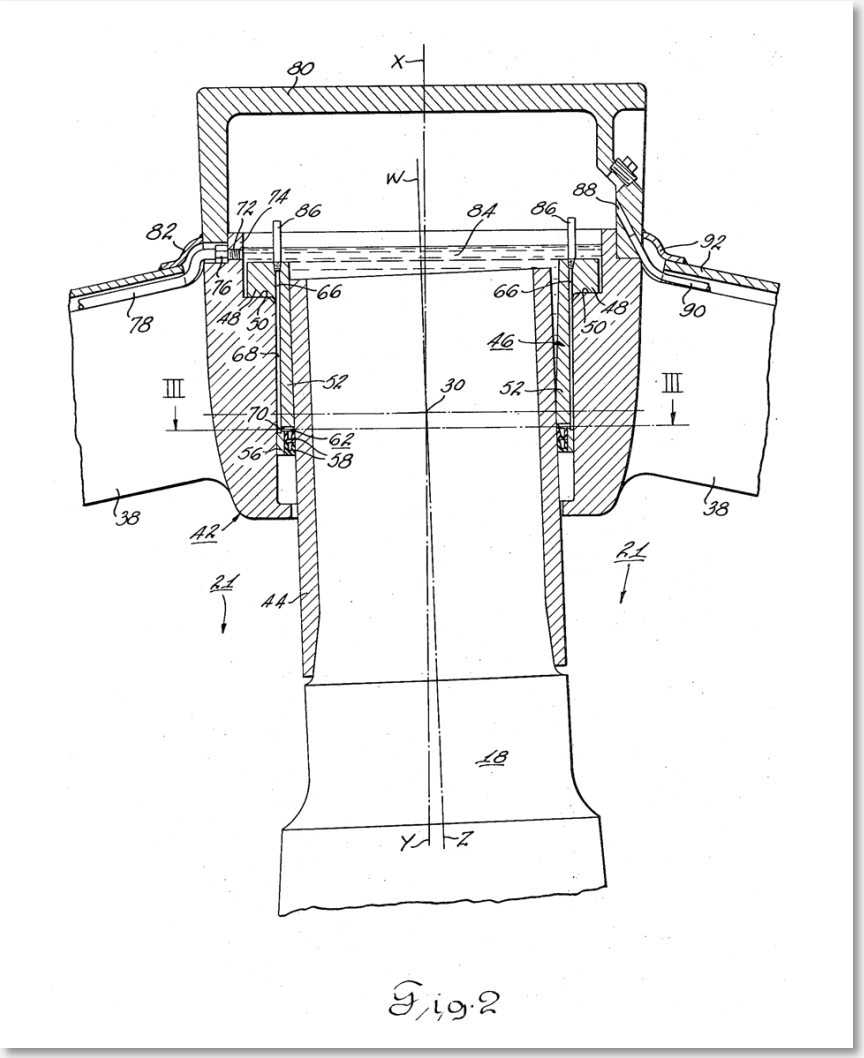


Fig. 2

Ex. 1011 (Torrence)

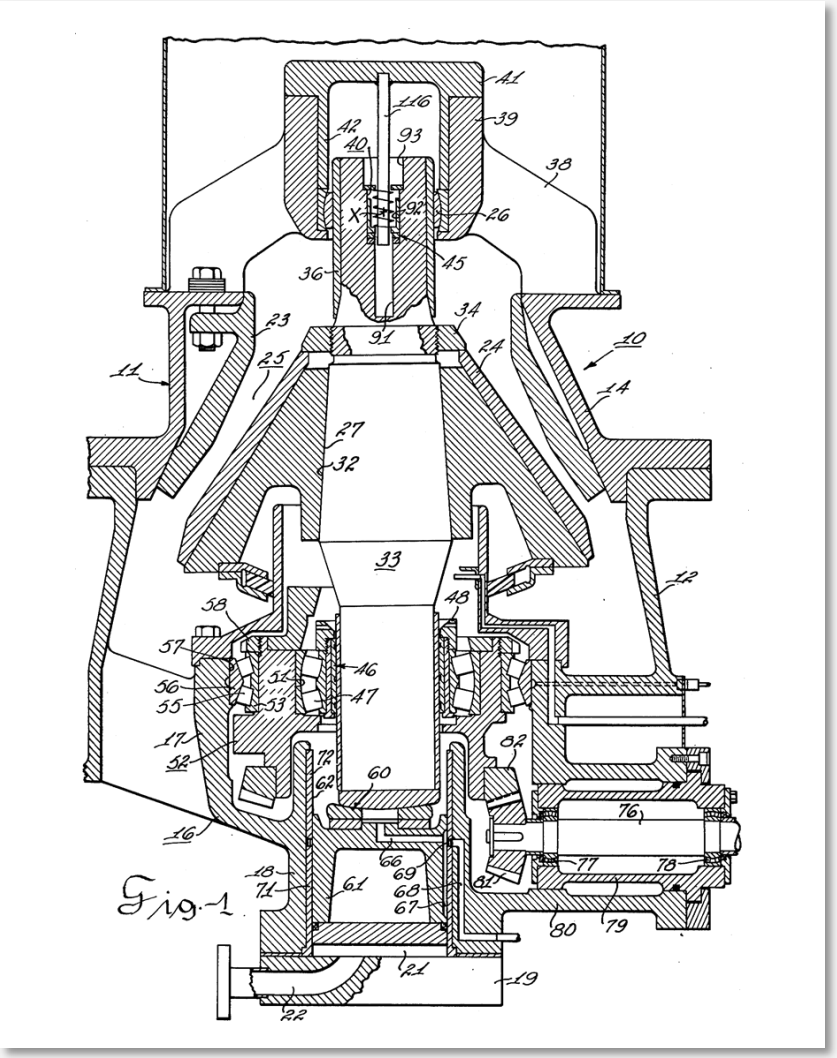
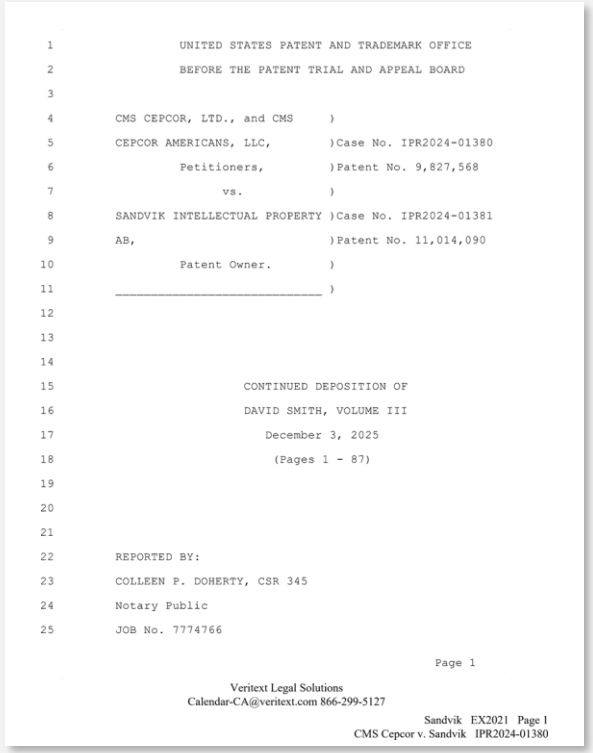


Fig. 1

Ex. 1039 (Coxhill '800)

Reply (Paper 34), 12

Mr. Smith on Torrence & Coxhill



UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

CMS CEPCOR, LTD., and CMS CEPCOR AMERICANS, LLC, Petitioners, vs. SANDVIK INTELLECTUAL PROPERTY AB, Patent Owner.

Case No. IPR2024-01380
Patent No. 9,827,568
Case No. IPR2024-01381
Patent No. 11,014,090

CONTINUED DEPOSITION OF
DAVID SMITH, VOLUME III
December 3, 2025
(Pages 1 - 87)

REPORTED BY:
COLLEEN P. DOHERTY, CSR 345
Notary Public
JOB No. 7774766

Page 1

Veritext Legal Solutions
Calendar-CA@veritext.com 866-299-5127

Sandvik EX2021 Page 1
CMS Cepcor v. Sandvik IPR2024-01380

Q. So now, having taken a look at both Coxhill 800 and Torrence, would you agree that the fit between the sleeve 44 and shaft 18, in Figure 2, of Torrence, is similar to the fit between the sleeve 36 and shaft 33 in Coxhill 800, Figure 1?

A. I think that's a reasonable comparison. They have a very similar shape.

Ex. 2021, 60:4-10

Reply (Paper 34), 12

Prima Facie Case Insufficient



Objective evidence is sufficient to overcome a prima facie case, especially here where the evidence is unrebutted.

Tec Air, Inc. v. Denso Mfg. Michigan Inc., 192 F.3d 1353, 1360 (Fed. Cir. 1999);
Medtronic, Inc. v. Teleflex Innovations S.a.r.l., 70 F.4th 1331, 1343 (Fed. Cir 2023)
(a "close" prima facie case overcome by "strong" objective evidence)

Reply (Paper 34), 11

Preliminary Guidance

At this stage of the proceeding, based on Patent Owner's largely unrebutted showing, we give Patent Owner's objective indicia evidence some weight in our obviousness analysis below. Nevertheless, we keep in mind that often "a showing of copying is only equivocal evidence of nonobviousness in the absence of more compelling objective indicia of other secondary considerations." *See Ecolochem, Inc. v. S. Cal. Edison Co.*, 227 F.3d 1361, 1380 (Fed. Cir. 2000); *see also In re GPAC Inc.*, 57 F.3d 1573, 1580 (Fed. Cir. 1995) ("[M]ore than the mere fact of copying by an accused infringer is needed to make that action significant to a determination of the obviousness issue." (quoting *Cable Elec. Prods. v. Genmark, Inc.*, 770 F.2d 1015, 1028 (Fed. Cir. 1985))).

Preliminary Guidance (Paper 20), 7

Reply (Paper 34), 11

Recent Federal Circuit Cases



> "[A]lthough copying is not alone dispositive of nonobviousness, we have usually considered a determination of copying to be strong evidence of nonobviousness."

Volvo Penta of the Americas, LLC v. Brunswick Corp., 81 F.4th 1202, 1213 (Fed. Cir. 2023) (quotation and citation omitted)

> Such evidence "may often be the most probative and cogent evidence in the record."

See, e.g., Medtronic, Inc. v. Teleflex Innovations S.a.r.l., 70 F.4th 1331, 1342 (Fed. Cir 2023) (quotation and citation omitted)

Reply (Paper 34), 11; RMTA (Paper 23), 37

Claims 13-17

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Petitioner Forfeited Any Challenge to Claims 13-17

This sort of incorporation by reference is not acceptable practice under the Board's rules. A declaration may provide evidentiary support for an argument in a brief, but a party may not incorporate arguments made in a declaration by reference. *See* 37 C.F.R. § 42.6(a)(3) ("Arguments must not be incorporated by reference from one document into another document."). Nevertheless, for purposes of this preliminary guidance we will consider Petitioner's arguments set forth in the declarations of Mr. Smith. The parties are reminded that improperly incorporated arguments from a declaration in violation of 37 C.F.R. § 42.6(a)(3) may not be considered by the Board. If the briefing limits imposed by our Rules are too difficult to meet given the number of issues, the parties may seek leave for additional pages rather than resorting to improper incorporation by reference.

Paper 20, 8-9

Reply (Paper 34), 12

Appendix

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Dependent Claims

12. (Substitute for claim 2) The gyratory crusher as claimed in claim 11, wherein the region over which the thickness of the axial wall tapers and decreases extends ~~substantially~~ the full axial length of the sleeve.

13. (Substitute for claim 3) The gyratory crusher as claimed in claim 11, further comprising a radial wall extending perpendicular or transverse to the axial wall, the radial wall being positioned at or towards the second end and extending inwardly towards the longitudinal axis.

Ex. 1044, 80

RMTA (Paper 23)

Dependent Claims

14. (Substitute for claim 5) The gyratory crusher as claimed in claim 11, wherein a cross-sectional shape profile of the external facing surface is substantially circular.

15. (Substitute for claim 6) The gyratory crusher as claimed in claim 11, wherein a cross-sectional shape profile of the internal facing surface is substantially circular.

16. (Substitute for claim 8) The gyratory crusher as claimed in claim 11, wherein a shape profile of the internal facing surface defines a section of a cone in the axial direction.

RMTA (Paper 23)

Ex. 1044, 81

Dependent Claims

17. (Substitute for claim 9) The gyratory crusher as claimed in claim 11, further comprising at least one bore provided through the axial wall to allow the passage of a fluid to the internal facing surface.

18. (Substitute for claim 10) The gyratory crusher as claimed in claim 11, wherein at a ~~curved~~ region [[of]] 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 ~~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~~.

Ex. 1044, 81-82

RMTA (Paper 23)

Dependent Claims

19. (Substitute for claim 4) The gyratory crusher as claimed in claim [[3]]18, 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 ~~the radial wall includes a through bore positioned at the longitudinal axis of the sleeve~~.

Ex. 1044, 82

RMTA (Paper 23)

Support for Substitute Claims

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

Written Description Support

"the existing knowledge in the particular field, the extent and content of the prior art, the maturity of the science or technology, [and] the predictability of the aspect at issue."

Ariad Pharms, Inc. v. Eli Lilly & Co., 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc)

"description requirement does not demand any particular form of disclosure" or that the "specification recite the claimed invention *in haec verba*."

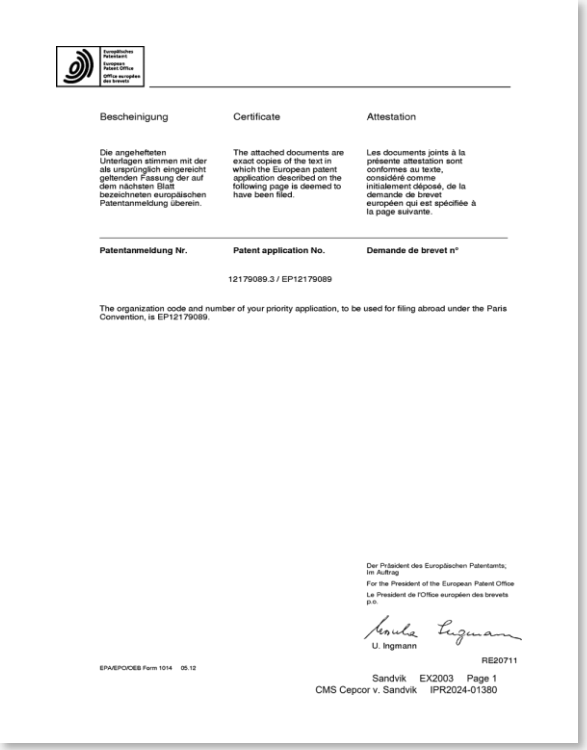
Ariad Pharms, Inc., 598 F.3d 1336 at 1352.

The drawings and/or figures alone can be enough to show written description support.

Vas-Cath Inc. v. Mahurkar, 935 F.2d 1555, 1564 (Fed. Cir. 1991)

RMTA (Paper 23), 6

Freely Rotatable



Bescheinigung | Certificate | Attestation

Die angehefteten Unterlagen stimmen mit der als ursprünglich eingereicht geltenden Fassung der auf dem nächsten Blatt bezeichneten europäischen Patentanmeldung überein.

The attached documents are exact copies of the text in which the European patent application described on the following page is deemed to have been filed.

Les documents joints à la présente attestation sont conformes au texte, considéré comme initialement déposé, de la demande de brevet européen qui est spécifiée à la page suivante.

Patentanmeldung Nr. **Patent application No.** **Demande de brevet n°**

12179089.3 / EP12179089

The organization code and number of your priority application, to be used for filing abroad under the Paris Convention, is EP12179089.

Der Präsident des Europäischen Patentamts;
Im Auftrag
For the President of the European Patent Office
Le Président de l'Office européen des brevets
p.o.

U. Ingmann

RE20711

EPA/EPO/OEB Form 1014 05.12

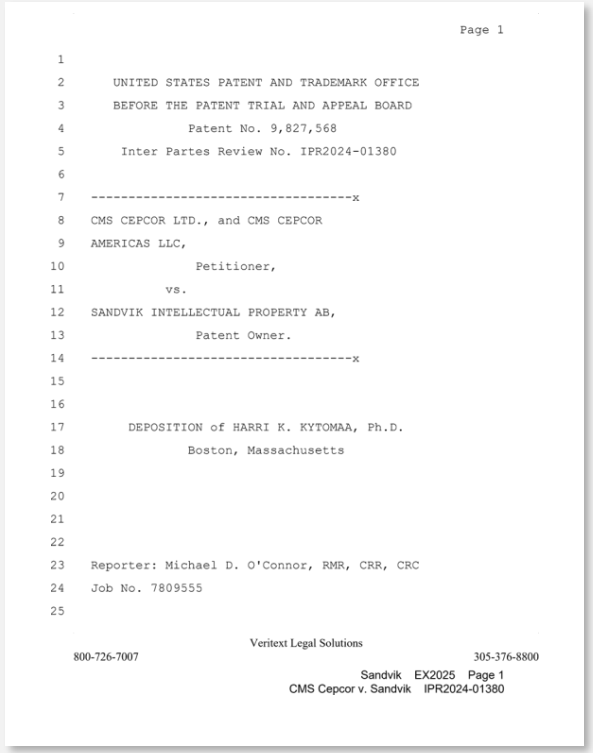
Sandvik EX2003 Page 1
CMS Cepcor v. Sandvik IPR2024-01380

introduced into crushing gap 104. An upper end region of a shaft 113 comprises an axial taper to define an upper conical section. The cone 113 tapers inwardly in the bottom to top direction away from head 103. A very uppermost end 117 of shaft 107 is maintained in an axially rotatable position by a top bearing assembly 112. Similarly, a bottom end 118 of shaft 107 is supported by a bottom bearing assembly 119.

Ex. 2003, 6:3-5

RMTA (Paper 23), 6

Mr. Smith on Freely Rotatable



Page 1

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD
Patent No. 9,827,568
Inter Partes Review No. IPR2024-01380

CMS CEPCOR LTD., and CMS CEPCOR AMERICAS LLC,
Petitioner,
vs.
SANDVIK INTELLECTUAL PROPERTY AB,
Patent Owner.

DEPOSITION of HARRI K. KYTOMAA, Ph.D.
Boston, Massachusetts

Reporter: Michael D. O'Connor, RMR, CRR, CRC
Job No. 7809555

Veritext Legal Solutions
800-726-7007 305-376-8800

Sandvik EX2025 Page 1
CMS Cepcor v. Sandvik IPR2024-01380

Q. As you noted, there is description in the '568 patent that the conical region 113 of the shaft rotates eccentrically about longitudinal axis 115; is that correct?

A. That's correct.

Q. And you've also testified that a person of ordinary skill in the art looking at Figure 2 of the '568 patent would also understand that conical region 113 of the shaft also rotates about itself?

A. Yes, I would agree to that.

Q. Okay. What I'm trying to ask is, would a person of ordinary skill in the art looking at Figure 2 of the '568 patent understand that conical region 113 of the shaft rotates about itself freely with respect to bearing assembly 112?

A. Yes, I think that's correct, that 113 will rotate within bearing 112.

Ex. 2018, 36:13-37:4

RMTA (Paper 23), 8-9

Freely Rotatable

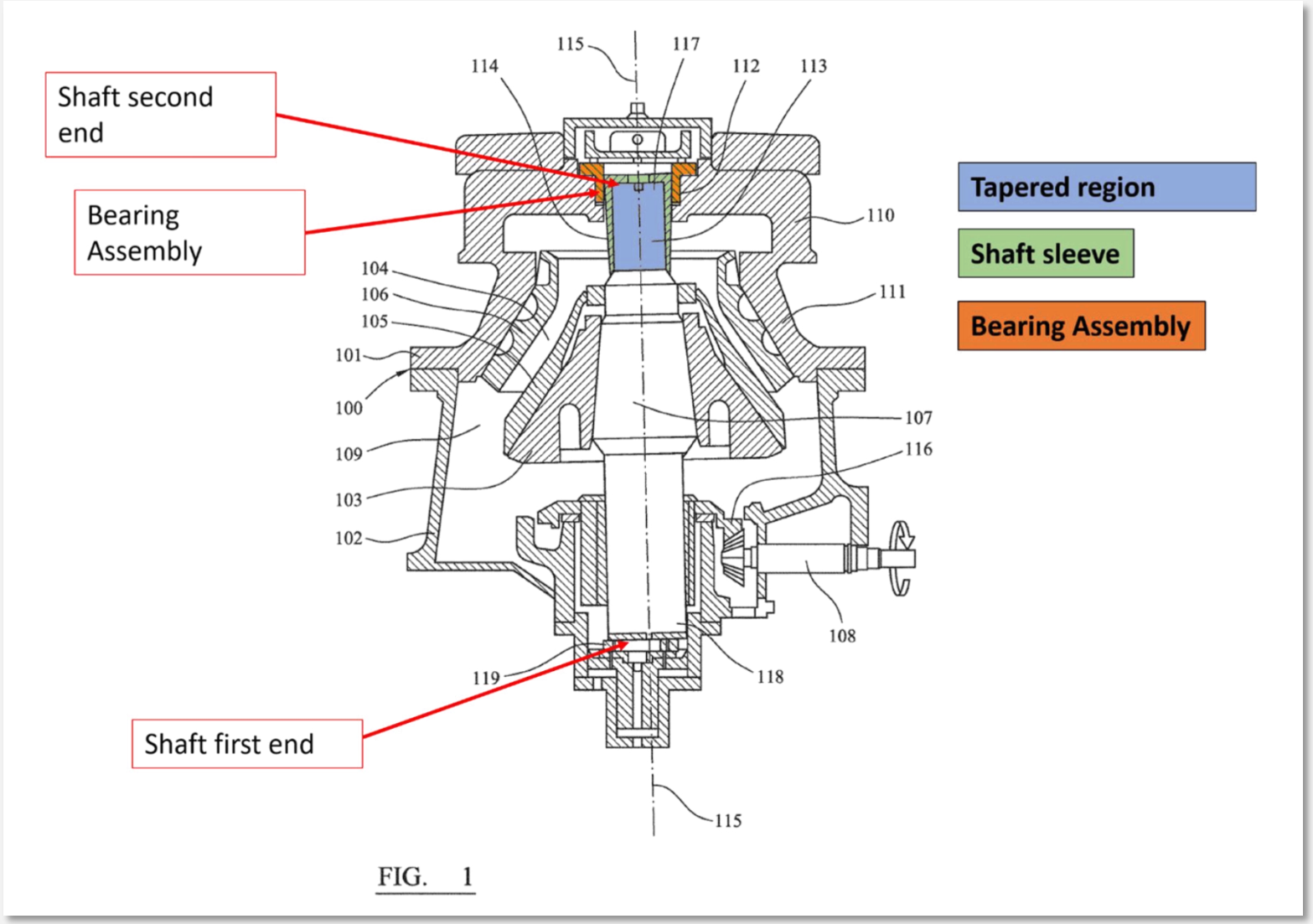
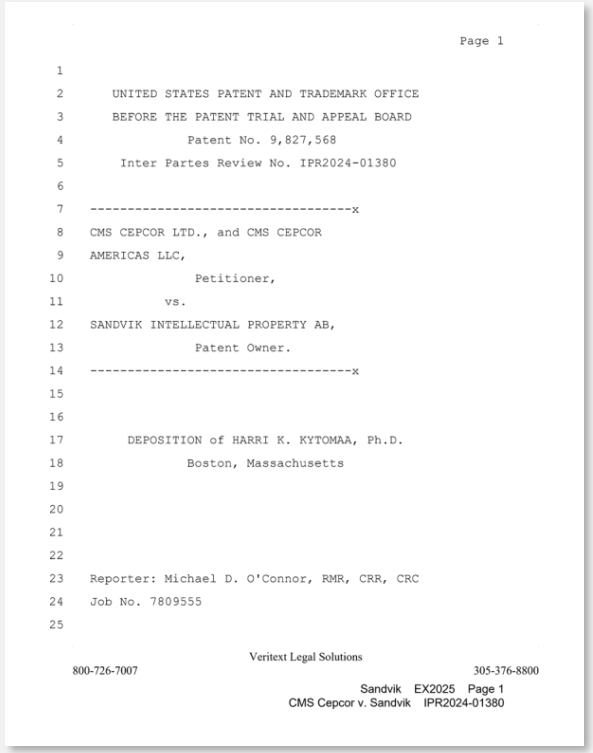


FIG. 1

RMTA (Paper 23), 6-9

Ex. 2020, 10-11

Dr. Kytömaa on Freely Rotatable



Page 1

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD
Patent No. 9,827,568
Inter Partes Review No. IPR2024-01380

CMS CEPCOR LTD., and CMS CEPCOR AMERICAS LLC,
Petitioner,
vs.
SANDVIK INTELLECTUAL PROPERTY AB,
Patent Owner.

DEPOSITION of HARRI K. KYTOMAA, Ph.D.
Boston, Massachusetts

Reporter: Michael D. O'Connor, RMR, CRR, CRC
Job No. 7809555

Veritext Legal Solutions
800-726-7007 305-376-8800

Sandvik EX2025 Page 1
CMS Cepcor v. Sandvik IPR2024-01380

Q. Could you point out to me in Aberg where it teaches that the second end of the shaft is freely rotatable about a longitudinal axis of the shaft within the bearing assembly?

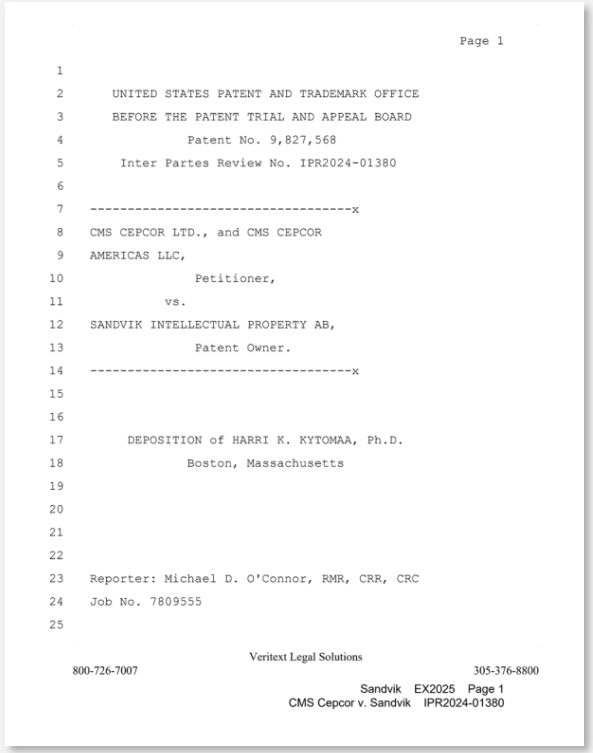
A. The first appearance of -- let me make sure that I've got the papers here. In Aberg, if you look at -- the very end of Column 3 in the '568 patent, it says, "A very uppermost end 117 of shaft 107 is maintained in an axially rotatable position by a top bearing assembly 112."

So those geometries to a person of ordinary skill in the art are such that you would understand that it is a freely rotatable connection, and that is also the case for the bottom drive of the shaft, which only imposes the eccentric trajectory of the shaft, but allows it to freely rotate.

Ex. 2025, 31:5-22

RMTA (Paper 23), 6-9

Dr. Kytömaa on Freely Rotatable



Page 1

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD
Patent No. 9,827,568
Inter Partes Review No. IPR2024-01380

CMS CEPCOR LTD., and CMS CEPCOR AMERICAS LLC,
Petitioner,
vs.
SANDVIK INTELLECTUAL PROPERTY AB,
Patent Owner.

DEPOSITION of HARRI K. KYTOMAA, Ph.D.
Boston, Massachusetts

Reporter: Michael D. O'Connor, RMR, CRR, CRC
Job No. 7809555

Veritext Legal Solutions
800-726-7007 305-376-8800

Sandvik EX2025 Page 1
CMS Cepcor v. Sandvik IPR2024-01380

A. So a person of ordinary skill in the art would understand that by virtue of the descriptions, one of which I just provided to you, in the '568 patent, as well as the figures of the '568 patent, which is the Aberg patent, a person of ordinary skill in the art would understand that the shaft is freely rotatable.

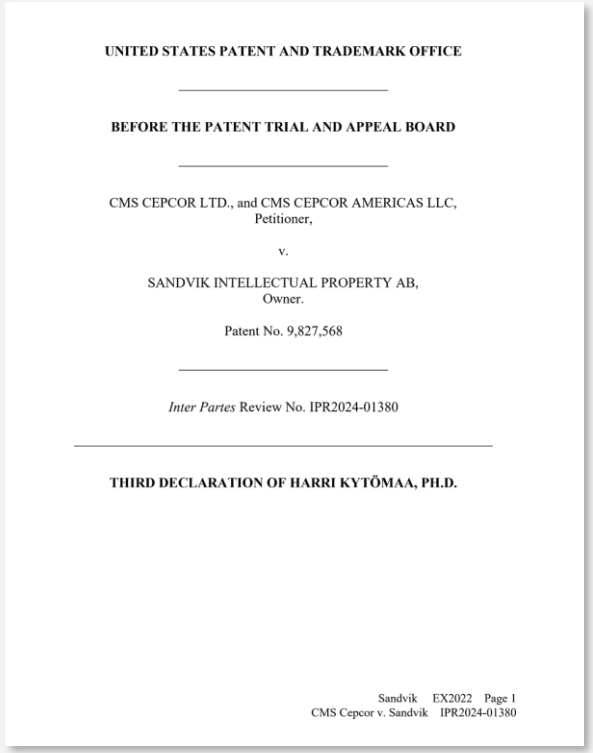
Ex. 2025, 31:23-32:4

RMTA (Paper 23), 6-9

Opposition to Motion to Exclude

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

"Ideal"



UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

SANDVIK INTELLECTUAL PROPERTY AB,
Owner.

Patent No. 9,827,568

Inter Partes Review No. IPR2024-01380

THIRD DECLARATION OF HARRI KYTÖMAA, PH.D.

Sandvik EX2022 Page 1
CMS Cepcor v. Sandvik IPR2024-01380

17. A coal pulverizer and a gyratory crusher are very different machines. The embodiments, functions, and structure of the coal pulverizer described in Piepho are not analogous to the embodiments, functions and structure of the gyratory crusher as described in the '568 patent. For example, the size of the coal supplied to a B&W Type EL coal pulverizer, the type described in Piepho, should ideally be 0.75 to 1 inch and the output pulverized coal particle sizes should be 0.003-0.012 inches. (*See* Ex. 2024.)

Ex. 2022, ¶ 17

Opposition to MTE (Paper 41), 1-2

“Ideal”



2367 LAKESIDE DRIVE, SUITE A-1 BIRMINGHAM, AL 35244
PHONE (205) 453-0236 FACSIMILE (205) 453-0239
www.innovativecombustion.com

Optimum Operation and Maintenance of EL Pulverizers

Figure 1 - B&W EL Pulverizer

The EL pulverizer is a medium speed ball-and-race mill working on the ball bearing principle. EL pulverizers are manufactured in 18 sizes ranging from EL-17 to EL-76. The numeric specification on EL pulverizers indicates the pitch circle of the balls in inches. EL pulverizers operate at capacities between 1½ *(EL-17)* to 20 *(EL-76)* tons per hour based on 50 H.G.I. coal. Most electric utility installations utilize the EL-50, EL-64, EL-70 or EL-76. The Babcock and Wilcox EL pulverizers can provide outstanding pulverizer performance when optimum operational and maintenance practices are adhered to. Optimum operation of the EL pulverizer requires the following:

- Coal fineness of 75% passing 200 Mesh and ≤0.1% remaining on 50 Mesh. EL pulverizers that utilize ball bearing type grinding achieve very high 50 Mesh fineness much easier than other types of pulverizers.
- A maximum imbalance of ±5% deviation from the mean dirty airflow between each pulverizer's separate fuel lines.
- A maximum imbalance ±10% deviation from the mean fuel flow between each pulverizer's separate fuel lines.
- Pipe to pipe clean air balance within ±2% of the mean pipe velocity.
- Air to fuel ratio of 1.75 to 1.8 pounds of air per pound of fuel.
- Pulverizer to pulverizer mass air and fuel balance within ±5%.
- Pulverizer outlet temperature of 160°F or higher.
- Minimum fuel line velocity of 3,300 Fpm.

Operation within these parameters is critical to the following items:

- Ensuring stable burner flames
- Prevention of fuel line stoppages, pulsation or slugging.
- Ensuring full design pulverizer capacity is achieved.
- Obtaining acceptable levels on unburned Carbon in Flyash.
- Uniform release and absorption of heat across of the furnace.
- Reduction in furnace slagging and fouling propensities.
- Maintaining furnace and boiler exit gas temperatures within design tolerances.
- Prevention of water-wall wastage and tube metal overheating.
- Maintaining design or better unit heat rate

Numerous variables influence distribution of air and fuel between a pulverizer's separate fuel lines. These variables are as follows:

- Size of pulverizer coal particles leaving the pulverizer *(Fineness)*.
- System resistance of each individual fuel conduit.
- Total airflow through the pulverizer which is controlled on a ratio of weight of air to fuel.
- Velocity of air/coal mixture passing through each burner line.
- Maintenance of critical components such as the classifier, classifier cone, grinding rings, balls, cabbage cutter, orifices and burner components.

Coal Fineness and Fuel Balance

Utilization of Pre-NSPS burners required 70% passing 200 Mesh and ≤1% remaining on 50 Mesh. Many operators today are forced to utilize Low NOx burners. Low NOx burners require a higher degree of precision in delivery of fuel and air to the furnace. To compensate for fuel and air imbalances and lower exposure time of fuel carbon to free Oxygen at temperatures above ignition points, coal fineness standards required reevaluation. Low NOx burner firing configurations require ≥75% passing 200 Mesh

Sandvik EX2023 Page 1
CMS Cepcor v. Sandvik IPR2024-01380
Page 1 of 5

Rev. 2/10

Raw Coal Size

Maintaining optimum sizing of raw coal to the pulverizer is mandatory in achieving capacity and fineness. Optimum raw coal feed size for EL pulverizers is ¾” to 1”. Raw coal feed should never exceed 1¼”, raw coal this size can plug throats and cause vibration. Raw coal that is too fine can plug the pulverizer or delivery components upstream of the pulverizer. Regular yard crusher inspection and maintenance is required to maintain optimum raw coal sizing.

Ex. 2023, 2

Opposition to MTE (Paper 41), 1-2

“Ideal”



2367 LAKESIDE DRIVE, SUITE A-1 BIRMINGHAM, AL 35244
PHONE (205) 453-0236 FACSIMILE (205) 453-0239
www.innovativecombustion.com

Optimum Operation and Maintenance of EL Pulverizers

Figure 1 - B&W EL Pulverizer

The EL pulverizer is a medium speed ball-and-race mill working on the ball bearing principle. EL pulverizers are manufactured in 18 sizes ranging from EL-17 to EL-76. The numeric specification on EL pulverizers indicates the pitch circle of the balls in inches. EL pulverizers operate at capacities between 1½ *(EL-17)* to 20 *(EL-76)* tons per hour based on 50 H.G.I. coal. Most electric utility installations utilize the EL-50, EL-64, EL-70 or EL-76. The Babcock and Wilcox EL pulverizers can provide outstanding pulverizer performance when optimum operational and maintenance practices are adhered to. Optimum operation of the EL pulverizer requires the following:

- Coal fineness of 75% passing 200 Mesh and ≤0.1% remaining on 50 Mesh. EL pulverizers that utilize ball bearing type grinding achieve very high 50 Mesh fineness much easier than other types of pulverizers.
- A maximum imbalance of ±5% deviation from the mean dirty airflow between each pulverizer's separate fuel lines.
- A maximum imbalance ±10% deviation from the mean fuel flow between each pulverizer's separate fuel lines.
- Pipe to pipe clean air balance within ±2% of the mean pipe velocity.
- Air to fuel ratio of 1.75 to 1.8 pounds of air per pound of fuel.
- Pulverizer to pulverizer mass air and fuel balance within ±5%.
- Pulverizer outlet temperature of 160°F or higher.
- Minimum fuel line velocity of 3,300 Fpm.

Operation within these parameters is critical to the following items:

- Ensuring stable burner flames
- Prevention of fuel line stoppages, pulsation or slugging.
- Ensuring full design pulverizer capacity is achieved.
- Obtaining acceptable levels on unburned Carbon in Flyash.
- Uniform release and absorption of heat across of the furnace.
- Reduction in furnace slagging and fouling propensities.
- Maintaining furnace and boiler exit gas temperatures within design tolerances.
- Prevention of water-wall wastage and tube metal overheating.
- Maintaining design or better unit heat rate

Numerous variables influence distribution of air and fuel between a pulverizer's separate fuel lines. These variables are as follows:

- Size of pulverizer coal particles leaving the pulverizer *(Fineness)*.
- System resistance of each individual fuel conduit.
- Total airflow through the pulverizer which is controlled on a ratio of weight of air to fuel.
- Velocity of air/coal mixture passing through each burner line.
- Maintenance of critical components such as the classifier, classifier cone, grinding rings, balls, cabbage cutter, orifices and burner components.

Coal Fineness and Fuel Balance

Utilization of Pre-NSPS burners required 70% passing 200 Mesh and ≤1% remaining on 50 Mesh. Many operators today are forced to utilize Low NOx burners. Low NOx burners require a higher degree of precision in delivery of fuel and air to the furnace. To compensate for fuel and air imbalances and lower exposure time of fuel carbon to free Oxygen at temperatures above ignition points, coal fineness standards required reevaluation. Low NOx burner firing configurations require ≥75% passing 200 Mesh

Rev. 2/10

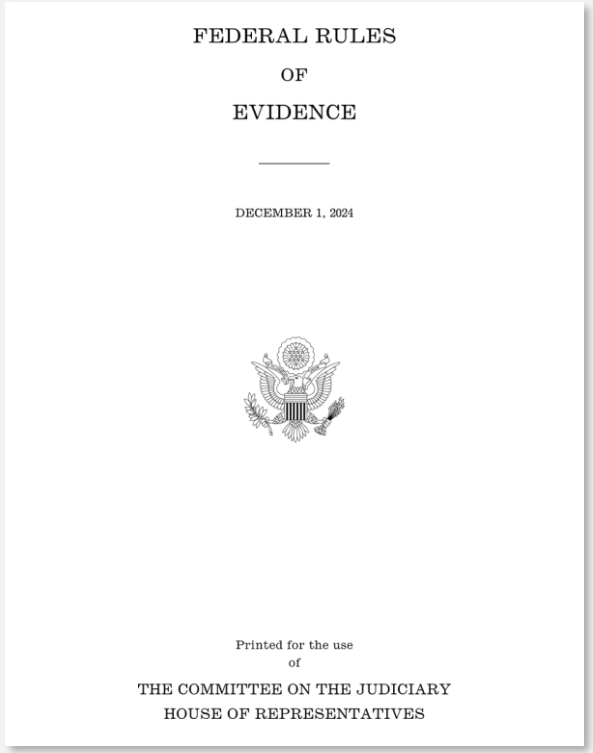
- Coal fineness of 75% passing 200 Mesh and ≤0.1% remaining on 50 Mesh. EL pulverizers that utilize ball bearing type grinding achieve very high 50 Mesh fineness much easier than other types of pulverizers.

Ex. 2023, 1

Opposition to MTE (Paper 41), 1-2

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

FRE 602



FEDERAL RULES

OF

EVIDENCE

DECEMBER 1, 2024

Printed for the use
of
THE COMMITTEE ON THE JUDICIARY
HOUSE OF REPRESENTATIVES

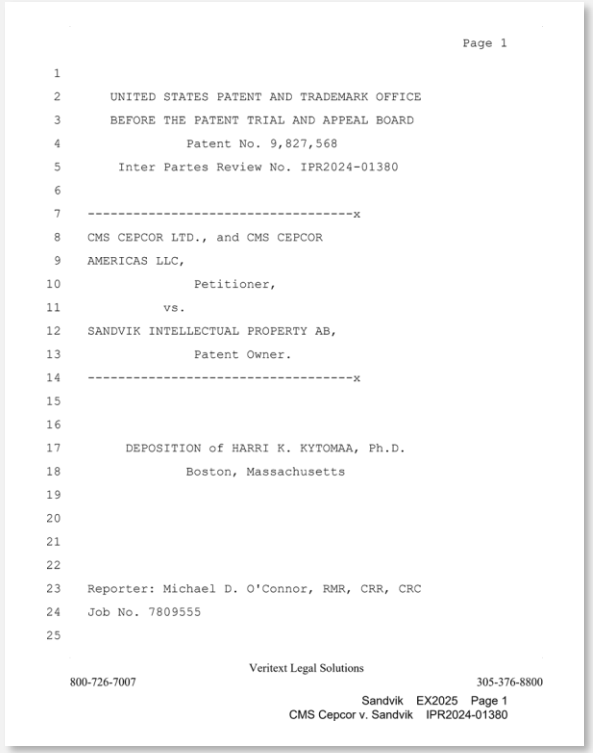
Rule 602. Need for Personal Knowledge

A witness may testify to a matter only if evidence is introduced sufficient to support a finding that the witness has personal knowledge of the matter. Evidence to prove personal knowledge may consist of the witness's own testimony. This rule does not apply to a witness's expert testimony under Rule 703.

(As amended Mar. 2, 1987, eff. Oct. 1, 1987; Apr. 25, 1988, eff. Nov. 1, 1988; Apr. 26, 2011, eff. Dec. 1, 2011.)

Opposition to MTE (Paper 41), 1-2

Dr. Kytömaa's Personal Knowledge



Page 1

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD
Patent No. 9,827,568
Inter Partes Review No. IPR2024-01380

----------x
CMS CEPCOR LTD., and CMS CEPCOR AMERICAS LLC,
Petitioner,
vs.
SANDVIK INTELLECTUAL PROPERTY AB,
Patent Owner.
----------x

DEPOSITION of HARRI K. KYTOMAA, Ph.D.
Boston, Massachusetts

Reporter: Michael D. O'Connor, RMR, CRR, CRC
Job No. 7809555

Veritext Legal Solutions
800-726-7007 305-376-8800

Sandvik EX2025 Page 1
CMS Cepcor v. Sandvik IPR2024-01380

Q. Prior to being involved with this case, did you have any experience working with or opining on coal pulverizers?

A. Yes.

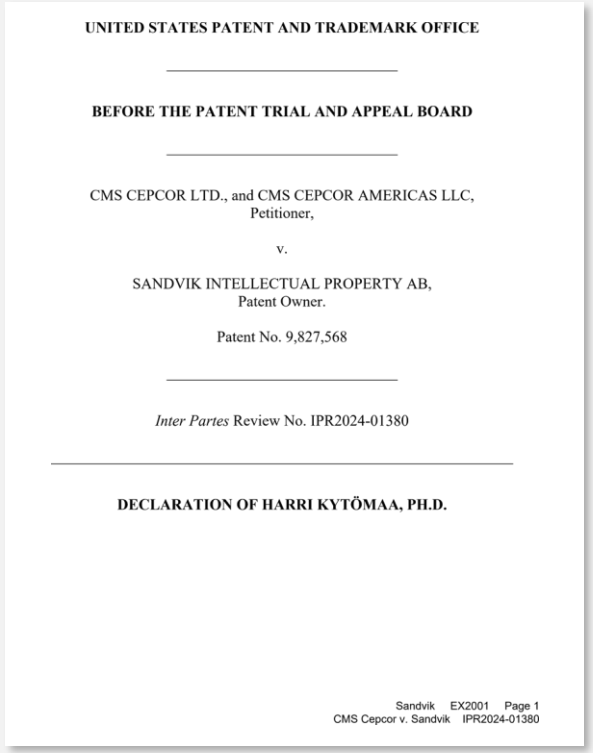
Q. Could you elaborate on your experience?

A. Yeah. My involvement with coal pulverizers is really in the context of coal-fired power plants. The most recent project that I've worked of that kind was in Brazil, where there were issues associated with the pulverizer, but generally there were issues with the power plant. That was just one of the issues.

Ex. 2025, 8:23-9:11

Opposition to MTE (Paper 41), 3-4.

Dr. Kytömaa's Personal Knowledge



UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

SANDVIK INTELLECTUAL PROPERTY AB,
Patent Owner.

Patent No. 9,827,568

Inter Partes Review No. IPR2024-01380

DECLARATION OF HARRI KYTÖMAA, PH.D.

Sandvik EX2001 Page 1
CMS Cepcor v. Sandvik IPR2024-01380

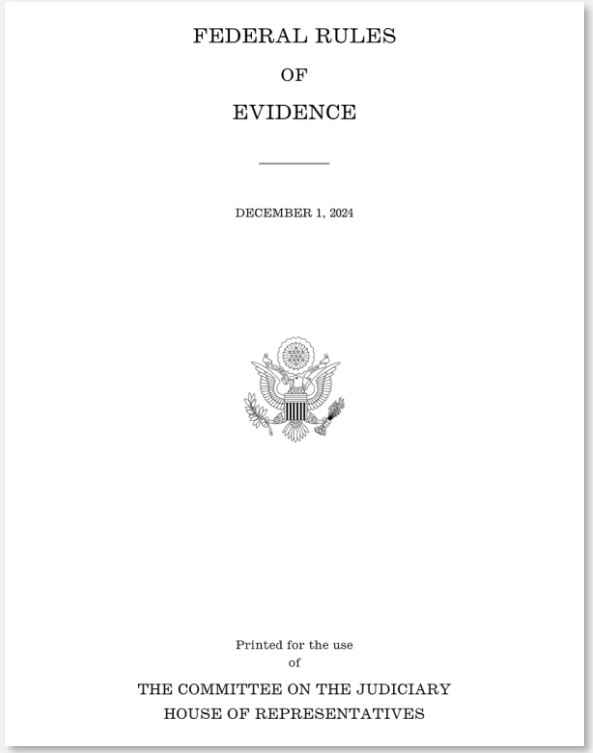
oscillatory stresses. I have also worked on coal handling equipment such as ball mills and crushers associated with coal mining and coal fired power plants.

32. Indeed, while Mr. Smith has testified that he does not have two years of experience with rock crushers (Ex. 2011, 39:8–10), I do have experience with rock crushers and I have published in the field of comminution. (Ex. 2002, 3–14.)

Ex. 2001, ¶¶ 31-32

Opposition to MTE (Paper 41), 3-4

FRE 703



FEDERAL RULES

OF

EVIDENCE

DECEMBER 1, 2024

Printed for the use
of
THE COMMITTEE ON THE JUDICIARY
HOUSE OF REPRESENTATIVES

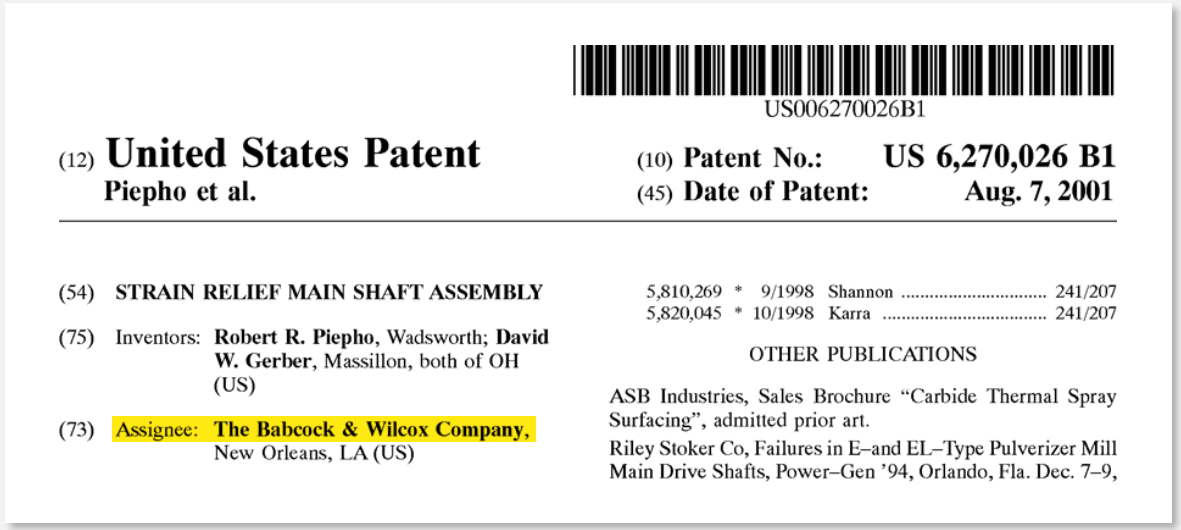
Rule 703. Bases of an Expert's Opinion Testimony

An expert may base an opinion on facts or data in the case that the expert has been made aware of or personally observed. If experts in the particular field would reasonably rely on those kinds of facts or data in forming an opinion on the subject, they need not be admissible for the opinion to be admitted. But if the facts or data would otherwise be inadmissible, the proponent of the opinion may disclose them to the jury only if their probative value in helping the jury evaluate the opinion substantially outweighs their prejudicial effect.

(As amended Mar. 2, 1987, eff. Oct. 1, 1987; Apr. 17, 2000, eff. Dec. 1, 2000; Apr. 26, 2011, eff. Dec. 1, 2011.)

Opposition to MTE (Paper 41), 6-8

Piepho: B&W Type E and EL Pulverizer



US006270026B1

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

(10) **Patent No.: US 6,270,026 B1**
(45) **Date of Patent: Aug. 7, 2001**

(54) **STRAIN RELIEF MAIN SHAFT ASSEMBLY**

(75) Inventors: **Robert R. Piepho**, Wadsworth; **David W. Gerber**, Massillon, both of OH (US)

(73) Assignee: **The Babcock & Wilcox Company**, New Orleans, LA (US)

5,810,269 * 9/1998 Shannon 241/207
5,820,045 * 10/1998 Karra 241/207

OTHER PUBLICATIONS

ASB Industries, Sales Brochure "Carbide Thermal Spray Surfacing", admitted prior art.

Riley Stoker Co, Failures in E–and EL–Type Pulverizer Mill Main Drive Shafts, Power–Gen '94, Orlando, Fla. Dec. 7–9,

STRAIN RELIEF MAIN SHAFT ASSEMBLY

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates in general to an improved main shaft for a coal pulverizer, and more particularly to an improved main shaft for use in B&W Type E and EL pulverizers

2. Description of the Related Art

Coal pulverizers are widely used in the electric utility industry for the preparation of crushed coal for efficient combustion. A dominant type of pulverizer for this service is the vertical spindle type. For many years this type featured an integral speed reducer. The output shaft for the speed reducer has a closely fitted mechanical joint with the grinding table and this joint is subjected to severe stresses from driving forces and from impact, shock, and eccentric loading from the grinding process.

FIG. 1 shows a cross section of a B&W type EL pulverizer generally depicted as numeral **2**. These devices are used to crush coal for burning in a furnace or boiler. This type of pulverizer has a stationary top ring **4**, one rotating bottom

Ex. 1016, 1:1-22

Opposition to MTE (Paper 41), 6-8

Ex. 2023



2367 LAKESIDE DRIVE, SUITE A-1 BIRMINGHAM, AL 35244
PHONE (205) 453-0236 FACSIMILE (205) 453-0239
www.innovativecombustion.com

Optimum Operation and Maintenance of EL Pulverizers

Figure 1 - B&W EL Pulverizer

The EL pulverizer is a medium speed ball-and-race mill working on the ball bearing principle. EL pulverizers are manufactured in 18 sizes ranging from EL-17 to EL-76. The numeric specification on EL pulverizers indicates the pitch circle of the balls in inches. EL pulverizers operate at capacities between 1½ *(EL-17)* to 20 *(EL-76)* tons per hour based on 50 H.G.I. coal. Most electric utility installations utilize the EL-50, EL-64, EL-70 or EL-76. The Babcock and Wilcox EL pulverizers can provide outstanding pulverizer performance when optimum operational and maintenance practices are adhered to. Optimum operation of the EL pulverizer requires the following:

- Coal fineness of 75% passing 200 Mesh and ≤0.1% remaining on 50 Mesh. EL pulverizers that utilize ball bearing type grinding achieve very high 50 Mesh fineness much easier than other types of pulverizers.
- A maximum imbalance of ±5% deviation from the mean dirty airflow between each pulverizer's separate fuel lines.
- A maximum imbalance ±10% deviation from the mean fuel flow between each pulverizer's separate fuel lines.
- Pipe to pipe clean air balance within ±2% of the mean pipe velocity.
- Air to fuel ratio of 1.75 to 1.8 pounds of air per pound of fuel.
- Pulverizer to pulverizer mass air and fuel balance within ±5%.
- Pulverizer outlet temperature of 160°F or higher.
- Minimum fuel line velocity of 3,300 Fpm.

Operation within these parameters is critical to the following items:

- Ensuring stable burner flames
- Prevention of fuel line stoppages, pulsation or slugging.
- Ensuring full design pulverizer capacity is achieved.
- Obtaining acceptable levels on unburned Carbon in Flyash.
- Uniform release and absorption of heat across of the furnace.
- Reduction in furnace slagging and fouling propensities.
- Maintaining furnace and boiler exit gas temperatures within design tolerances.
- Prevention of water-wall wastage and tube metal overheating.
- Maintaining design or better unit heat rate

Numerous variables influence distribution of air and fuel between a pulverizer's separate fuel lines. These variables are as follows:

- Size of pulverizer coal particles leaving the pulverizer *(Fineness)*.
- System resistance of each individual fuel conduit.
- Total airflow through the pulverizer which is controlled on a ratio of weight of air to fuel.
- Velocity of air/coal mixture passing through each burner line.
- Maintenance of critical components such as the classifier, classifier cone, grinding rings, balls, cabbage cutter, orifices and burner components.

Coal Fineness and Fuel Balance

Utilization of Pre-NSPS burners required 70% passing 200 Mesh and ≤1% remaining on 50 Mesh. Many operators today are forced to utilize Low NOx burners. Low NOx burners require a higher degree of precision in delivery of fuel and air to the furnace. To compensate for fuel and air imbalances and lower exposure time of fuel carbon to free Oxygen at temperatures above ignition points, coal fineness standards required reevaluation. Low NOx burner firing configurations require ≥75% passing 200 Mesh

Rev. 2/10

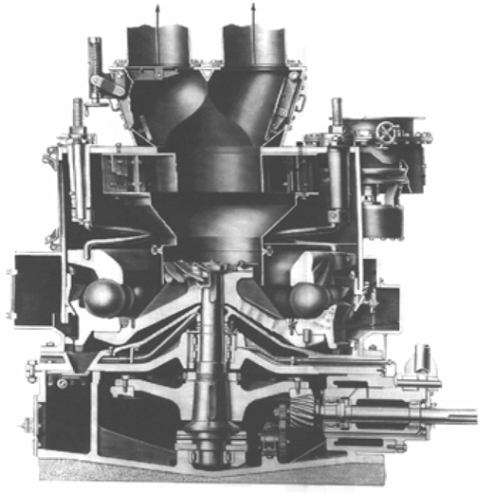


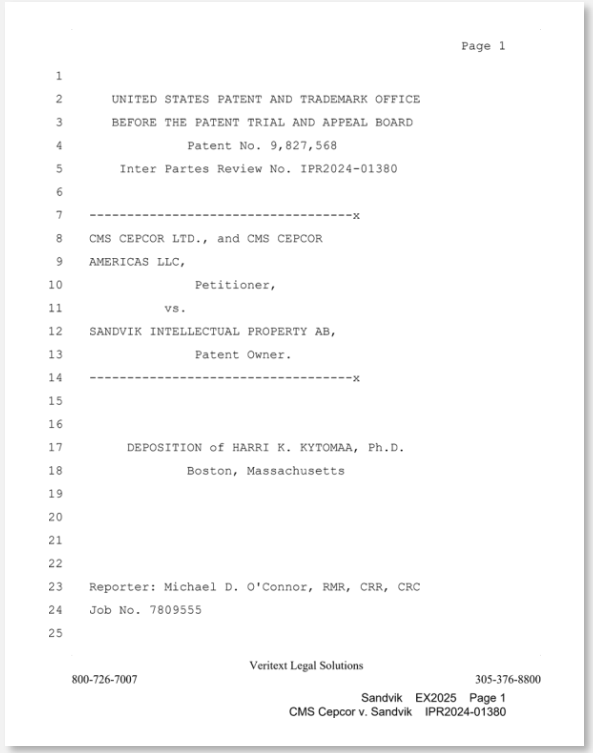
Figure 1 - B&W EL Pulverizer

The EL pulverizer is a medium speed ball-and-race mill working on the ball bearing principle. EL pulverizers are manufactured in 18 sizes ranging from EL-17 to EL-76. The numeric specification on EL pulverizers indicates the pitch circle of the balls in inches. EL pulverizers operate at capacities between 1½ *(EL-17)* to 20 *(EL-76)* tons per hour based on 50 H.G.I. coal. Most electric utility installations utilize the EL-50, EL-64, EL-70 or EL-76. The Babcock and Wilcox EL pulverizers can provide outstanding pulverizer performance when optimum operational and maintenance practices are adhered to. Optimum operation of the EL pulverizer requires the following:

Ex. 2023, 1

Opposition to MTE (Paper 41), 6-8

Dr. Kytömaa on Piepho and Ex. 2023



Page 1

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD
Patent No. 9,827,568
Inter Partes Review No. IPR2024-01380

CMS CEPCOR LTD., and CMS CEPCOR AMERICAS LLC,
Petitioner,
vs.
SANDVIK INTELLECTUAL PROPERTY AB,
Patent Owner.

DEPOSITION of HARRI K. KYTOMAA, Ph.D.
Boston, Massachusetts

Reporter: Michael D. O'Connor, RMR, CRR, CRC
Job No. 7809555

Veritext Legal Solutions
800-726-7007 305-376-8800

Sandvik EX2025 Page 1
CMS Cepcor v. Sandvik IPR2024-01380

Q. What I've handed you is Exhibit 1018, which is the Piepho reference that we've talked about before. In this reference, does it teach the intended input size of coal?

* * *

A. So this is the Piepho -- Piepho -- I'll call it Piepho if that's okay with you.

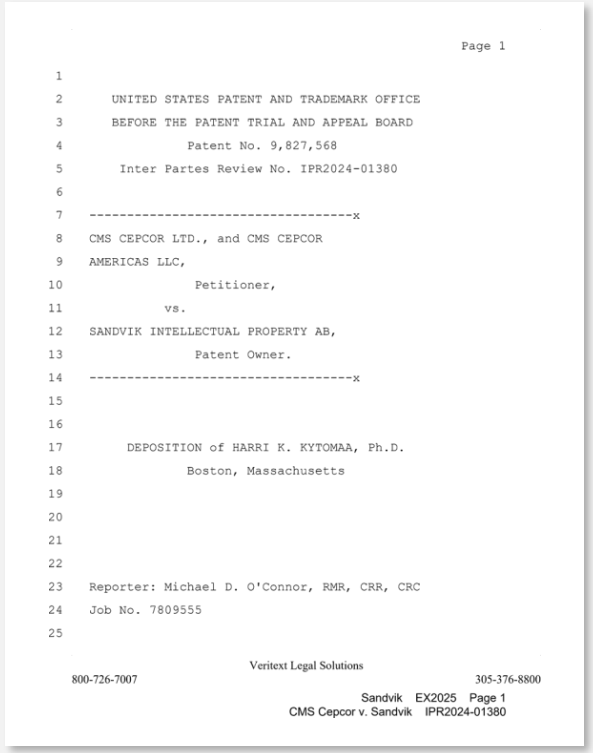
Q. That's fine.

A. I'm not quite sure what the correct pronunciation is. '026 patent assigned to the Babcock & Wilcox Company. So this invention is in the context of Babcock & Wilcox pulverizers, specifically Type E and Type EL pulverizers.

Ex. 2025, 9:12-25 (objection omitted)

Opposition to MTE (Paper 41), 6-8

Dr. Kytömaa on Piepho and Ex. 2023



Page 1

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD
Patent No. 9,827,568
Inter Partes Review No. IPR2024-01380

----------x
CMS CEPCOR LTD., and CMS CEPCOR AMERICAS LLC,
Petitioner,
vs.
SANDVIK INTELLECTUAL PROPERTY AB,
Patent Owner.
----------x

DEPOSITION of HARRI K. KYTOMAA, Ph.D.
Boston, Massachusetts

Reporter: Michael D. O'Connor, RMR, CRR, CRC
Job No. 7809555

Veritext Legal Solutions
800-726-7007 305-376-8800

Sandvik EX2025 Page 1
CMS Cepcor v. Sandvik IPR2024-01380

A. I've specifically looked into the specifications associated with these pulverizers, and the answer to your question is, yes, there is a specific size range that is relevant to these types of pulverizers.

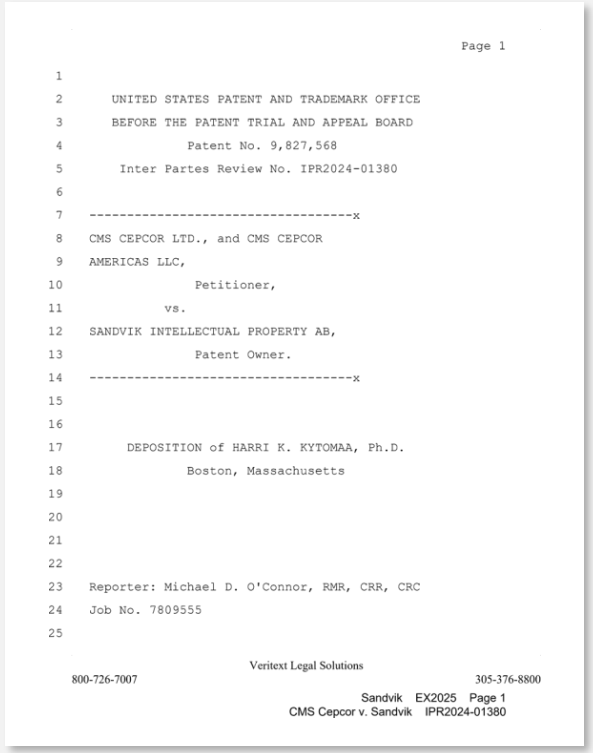
Q. Just so I'm clear, there's the specific size relevant to the B&W Type EL pulverizer?

A. That's correct. And I cite to that in my declaration.

Ex. 2025, 10:1-10

Opposition to MTE (Paper 41), 6-8

Dr. Kytömaa on Piepho and Ex. 2023



Page 1

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD
Patent No. 9,827,568
Inter Partes Review No. IPR2024-01380

CMS CEPCOR LTD., and CMS CEPCOR AMERICAS LLC,
Petitioner,
vs.
SANDVIK INTELLECTUAL PROPERTY AB,
Patent Owner.

DEPOSITION of HARRI K. KYTOMAA, Ph.D.
Boston, Massachusetts

Reporter: Michael D. O'Connor, RMR, CRR, CRC
Job No. 7809555

Veritext Legal Solutions
800-726-7007 305-376-8800

Sandvik EX2025 Page 1
CMS Cepcor v. Sandvik IPR2024-01380

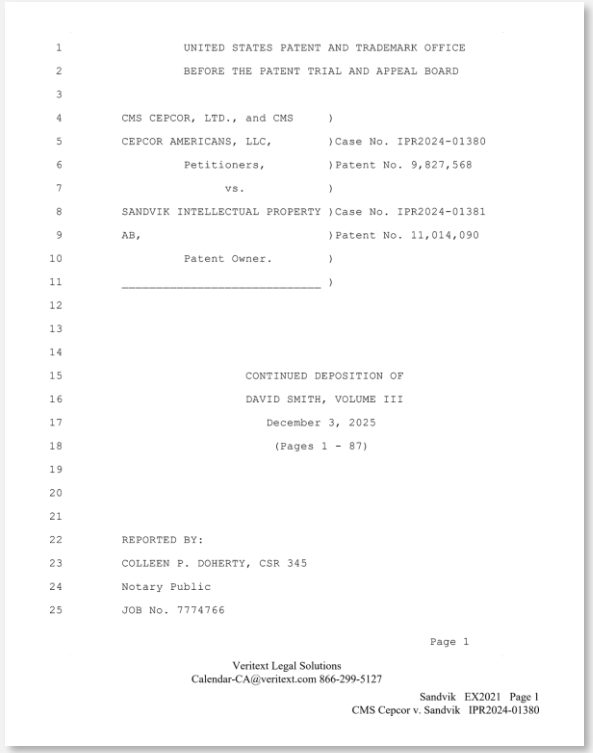
Q. …If I read from it, the question would have sounded better.

A. So the field of invention of Piepho relates to an improved main shaft for a coal pulverizer, and more particularly, to an improved main shaft for use in the Babcock & Wilcox Type E and EL pulverizers. So it's very specific to what this invention is intended for. And so, that defines, that is Babcock & Wilcox Type E and EL, defines the intended use of the product, and it is a coal pulverizer.

Ex. 2025, 11:1-12

Opposition to MTE (Paper 41), 6-8

Mr. Smith: Website and Videos



UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

CMS CEPCOR, LTD., and CMS CEPCOR AMERICANS, LLC, Petitioners, vs. SANDVIK INTELLECTUAL PROPERTY AB, Patent Owner.

Case No. IPR2024-01380
Patent No. 9,827,568
Case No. IPR2024-01381
Patent No. 11,014,090

CONTINUED DEPOSITION OF
DAVID SMITH, VOLUME III
December 3, 2025
(Pages 1 - 87)

REPORTED BY:
COLLEEN P. DOHERTY, CSR 345
Notary Public
JOB No. 7774766

Page 1

Veritext Legal Solutions
Calendar-CA@veritext.com 866-299-5127

Sandvik EX2021 Page 1
CMS Cepcor v. Sandvik IPR2024-01380

Q. What do you recall reviewing Mr. Smith?

A. I remember going to the website, and looking at different pulverizers that they have, and locating -- trying to locate the one referenced here. And I believe there were some videos, or the like, on that. But it's been several months.

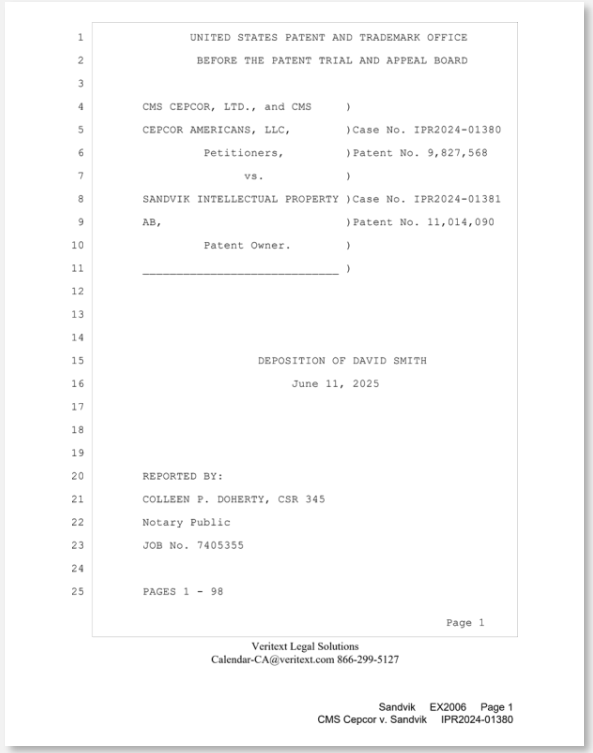
Q. So were you looking at coal pulverizers that were made by the assignee of the Piepho patent, the Babcock & Wilcox Company?

A. I believe so.

Ex. 2021, 74:2-11

Opposition to MTE (Paper 41), 7-8

Mr. Smith: Website and Videos



UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

CMS CEPCOR, LTD., and CMS CEPCOR AMERICANS, LLC, Petitioners, vs. SANDVIK INTELLECTUAL PROPERTY AB, Patent Owner.

Case No. IPR2024-01380
Patent No. 9,827,568
Case No. IPR2024-01381
Patent No. 11,014,090

DEPOSITION OF DAVID SMITH
June 11, 2025

REPORTED BY:
COLLEEN P. DOHERTY, CSR 345
Notary Public
JOB No. 7405355

PAGES 1 - 98

Page 1

Veritext Legal Solutions
Calendar-CA@veritext.com 866-299-5127

Sandvik EX2006 Page 1
CMS Cepcor v. Sandvik IPR2024-01380

Q. … explained on Piepho, if that's easier for you?

A. So the Piepho reference to my recollection doesn't specifically describe the inner workings of the coal pulverizer. It does talk about cyclic motion, but maybe focuses on the main shaft. So I recall going and looking at the website for BMW coal crushers, but I don't recall specifically at this point how it works.

Ex. 2006, 58:1-7

Opposition to MTE (Paper 41), 7-8

Ex. 2024

SANDVIK

← Back to Stationary cone crushers

CH440 Request a quote



Stationary cone crushers 400-600 series

CH440

Nominal capacity
58 - 336 mtph (64 - 370 stph)

Max. feed size
250.0 mm (9.8 in.)

Motor power
220 kW (295 hp)

Product data

Nominal capacity	58 - 336 mtph (64 - 370 stph)
Max. feed size	250.0 mm (9.8 in.)
Motor power	220 kW (295 hp)
Closed side setting (CSS) range	8.0 - 48.0 mm (0.3 - 1.8 in.)
Eccentric throw range	16.0 - 44.0 mm (0.6 - 1.7 in.)

Ex. 2024, 1-2

Opposition to MTE (Paper 41), 6-8

Authentication

"Authentication is a low bar, requiring only a rational basis that the exhibits are what they are asserted to be."

Costar Reality Info., Inc. v. Clantech, Inc., IPR2022-00799, Paper 77 at 54 (P.T.A.B Nov. 21, 2023) (citation omitted)

Opposition to MTE (Paper 41), 9

FRE 901(b)(4)

Rule 901. Authenticating or Identifying Evidence

(a) IN GENERAL. To satisfy the requirement of authenticating or identifying an item of evidence, the proponent must produce evidence sufficient to support a finding that the item is what the proponent claims it is.

(b) EXAMPLES. The following are examples only—not a complete list—of evidence that satisfies the requirement:

(1) *Testimony of a Witness with Knowledge*. Testimony that an item is what it is claimed to be.

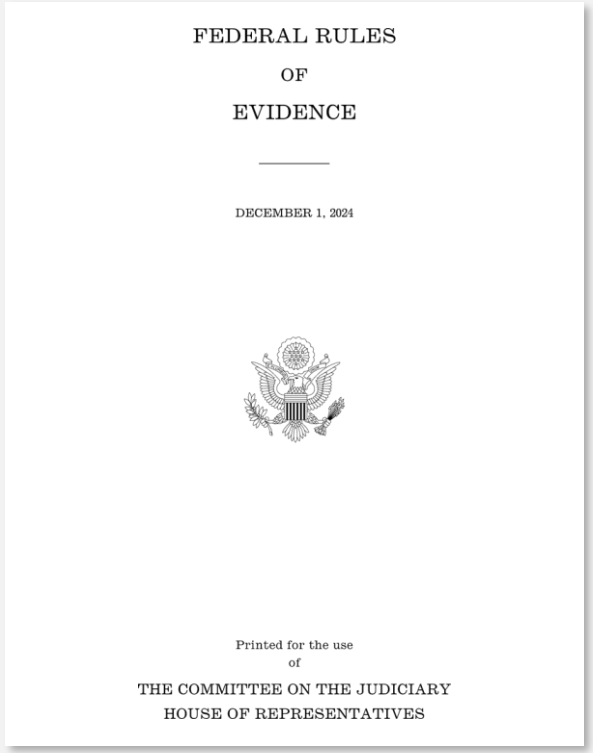
(2) *Nonexpert Opinion About Handwriting*. A nonexpert's opinion that handwriting is genuine, based on a familiarity with it that was not acquired for the current litigation.

(3) *Comparison by an Expert Witness or the Trier of Fact*. A comparison with an authenticated specimen by an expert witness or the trier of fact.

(4) *Distinctive Characteristics and the Like*. The appearance, contents, substance, internal patterns, or other distinctive characteristics of the item, taken together with all the circumstances.

Opposition to MTE (Paper 41), 10-11

FRE 902(7)



FEDERAL RULES
OF
EVIDENCE

DECEMBER 1, 2024

Printed for the use
of
THE COMMITTEE ON THE JUDICIARY
HOUSE OF REPRESENTATIVES

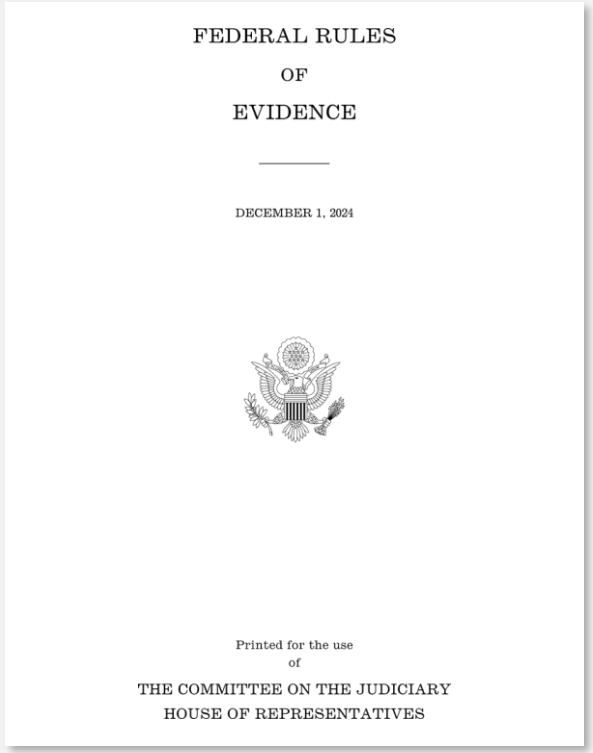
Rule 902. Evidence That Is Self-Authenticating

The following items of evidence are self-authenticating; they require no extrinsic evidence of authenticity in order to be admitted:

(7) *Trade Inscriptions and the Like.* An inscription, sign, tag, or label purporting to have been affixed in the course of business and indicating origin, ownership, or control.

Opposition to MTE (Paper 41), 10-11

FRE 803(17)



FEDERAL RULES

OF

EVIDENCE

DECEMBER 1, 2024

Printed for the use
of
THE COMMITTEE ON THE JUDICIARY
HOUSE OF REPRESENTATIVES

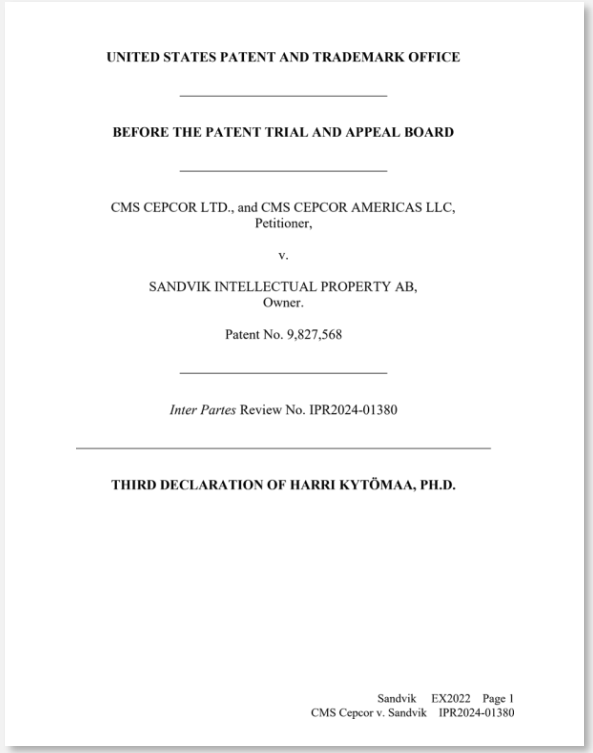
Rule 803. Exceptions to the Rule Against Hearsay—Regardless of Whether the Declarant Is Available as a Witness

The following are not excluded by the rule against hearsay, regardless of whether the declarant is available as a witness:

(17) *Market Reports and Similar Commercial Publications.* Market quotations, lists, directories, or other compilations that are generally relied on by the public or by persons in particular occupations.

Opposition to MTE (Paper 41), 13

Dr. Kytömaa



UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

SANDVIK INTELLECTUAL PROPERTY AB,
Owner.

Patent No. 9,827,568

Inter Partes Review No. IPR2024-01380

THIRD DECLARATION OF HARRI KYTÖMAA, PH.D.

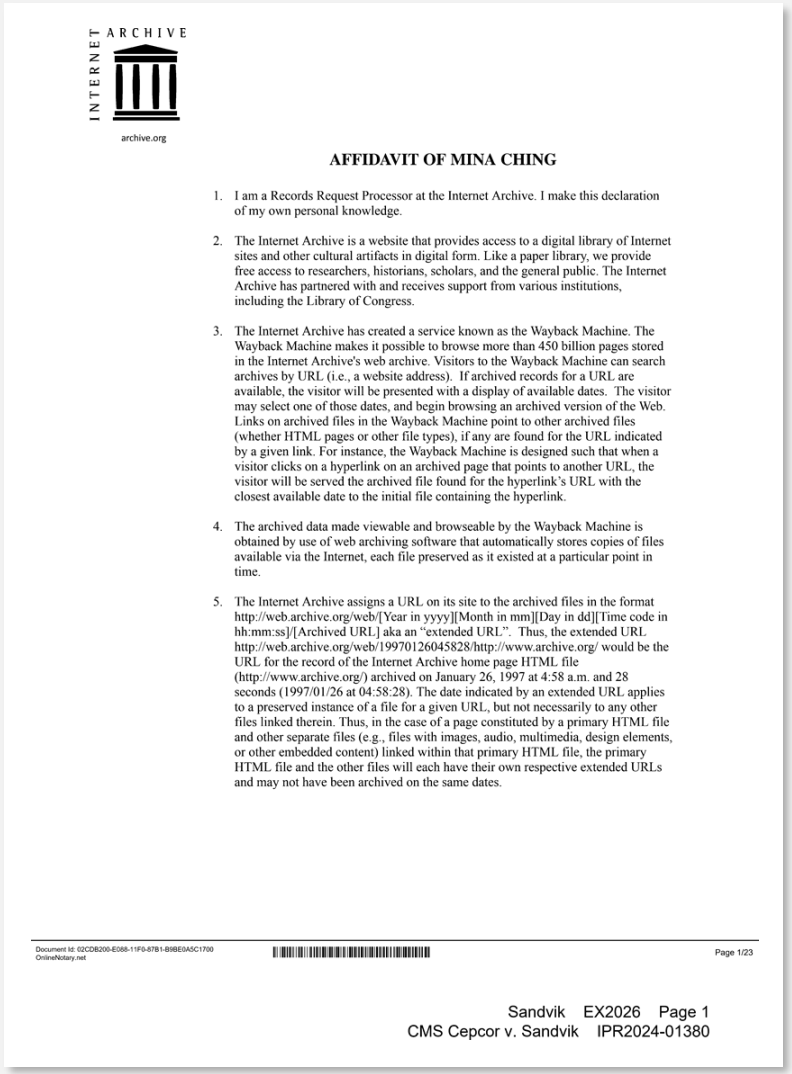
Sandvik EX2022 Page 1
CMS Cepcor v. Sandvik IPR2024-01380

18. Ex. 2023 is a technical specification published by Innovative Combustion Technologies, Inc., which describes features of the Babcock & Wilcox Company coal pulverizer of a type EL. I understand that Piepho is assigned to Babcock & Wilcox Company, and Piepho also references a type EL coal pulverizer. I note that Ex. 2023 has what appears to be a date at the bottom left of 2/10, that is, February 2010. In my experience, such technical specifications are usually dated in this manner, and I have no reason to believe that this was not published in February 2010.

Ex. 2022, ¶ 18

Opposition to MTE (Paper 41), 9

Affidavit of Mina Ching



INTERNET ARCHIVE
archive.org

AFFIDAVIT OF MINA CHING

1. I am a Records Request Processor at the Internet Archive. I make this declaration of my own personal knowledge.

2. The Internet Archive is a website that provides access to a digital library of Internet sites and other cultural artifacts in digital form. Like a paper library, we provide free access to researchers, historians, scholars, and the general public. The Internet Archive has partnered with and receives support from various institutions, including the Library of Congress.

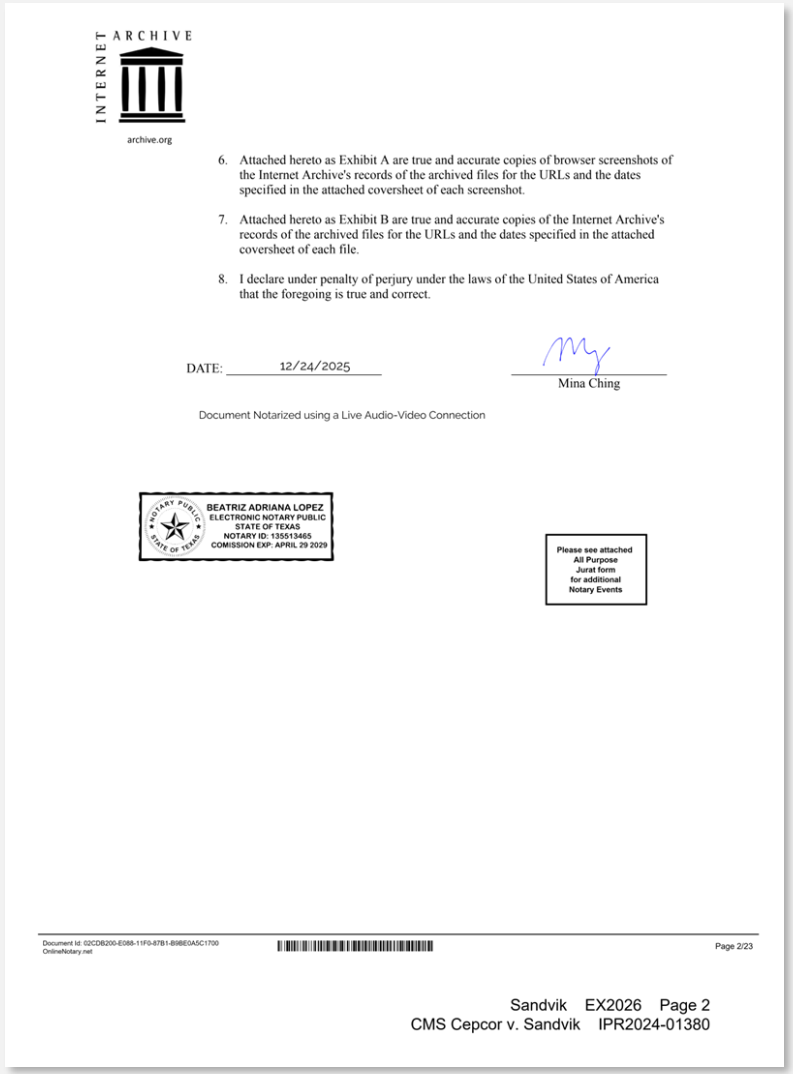
3. The Internet Archive has created a service known as the Wayback Machine. The Wayback Machine makes it possible to browse more than 450 billion pages stored in the Internet Archive's web archive. Visitors to the Wayback Machine can search archives by URL (i.e., a website address). If archived records for a URL are available, the visitor will be presented with a display of available dates. The visitor may select one of those dates, and begin browsing an archived version of the Web. Links on archived files in the Wayback Machine point to other archived files (whether HTML pages or other file types), if any are found for the URL indicated by a given link. For instance, the Wayback Machine is designed such that when a visitor clicks on a hyperlink on an archived page that points to another URL, the visitor will be served the archived file found for the hyperlink's URL with the closest available date to the initial file containing the hyperlink.

4. The archived data made viewable and browseable by the Wayback Machine is obtained by use of web archiving software that automatically stores copies of files available via the Internet, each file preserved as it existed at a particular point in time.

5. The Internet Archive assigns a URL on its site to the archived files in the format http://web.archive.org/web/[Year in yyyy][Month in mm][Day in dd][Time code in hh:mm:ss]/[Archived URL] aka an "extended URL". Thus, the extended URL http://web.archive.org/web/19970126045828/http://www.archive.org/ would be the URL for the record of the Internet Archive home page HTML file (http://www.archive.org/) archived on January 26, 1997 at 4:58 a.m. and 28 seconds (1997/01/26 at 04:58:28). The date indicated by an extended URL applies to a preserved instance of a file for a given URL, but not necessarily to any other files linked therein. Thus, in the case of a page constituted by a primary HTML file and other separate files (e.g., files with images, audio, multimedia, design elements, or other embedded content) linked within that primary HTML file, the primary HTML file and the other files will each have their own respective extended URLs and may not have been archived on the same dates.

Document Id: 02CDB200-E088-11F0-87B1-B9BE0A5C1700
OnlineNotary.net
Page 1/23

Sandvik EX2026 Page 1
CMS Cepcor v. Sandvik IPR2024-01380



INTERNET ARCHIVE
archive.org

6. Attached hereto as Exhibit A are true and accurate copies of browser screenshots of the Internet Archive's records of the archived files for the URLs and the dates specified in the attached coversheet of each screenshot.

7. Attached hereto as Exhibit B are true and accurate copies of the Internet Archive's records of the archived files for the URLs and the dates specified in the attached coversheet of each file.

8. I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

DATE: 12/24/2025

Mina Ching

Document Notarized using a Live Audio-Video Connection

NOTARY PUBLIC STATE OF TEXAS
BEATRIZ ADRIANA LOPEZ
ELECTRONIC NOTARY PUBLIC
STATE OF TEXAS
NOTARY ID: 135513465
COMISSION EXP: APRIL 29 2029

Please see attached
All Purpose
Jurat form
for additional
Notary Events

Document Id: 02CDB200-E088-11F0-87B1-B9BE0A5C1700
OnlineNotary.net
Page 2/23

Sandvik EX2026 Page 2
CMS Cepcor v. Sandvik IPR2024-01380

Opposition to MTE (Paper 41), 9

Ex. 2026, 1-2

Affidavit of Mina Ching

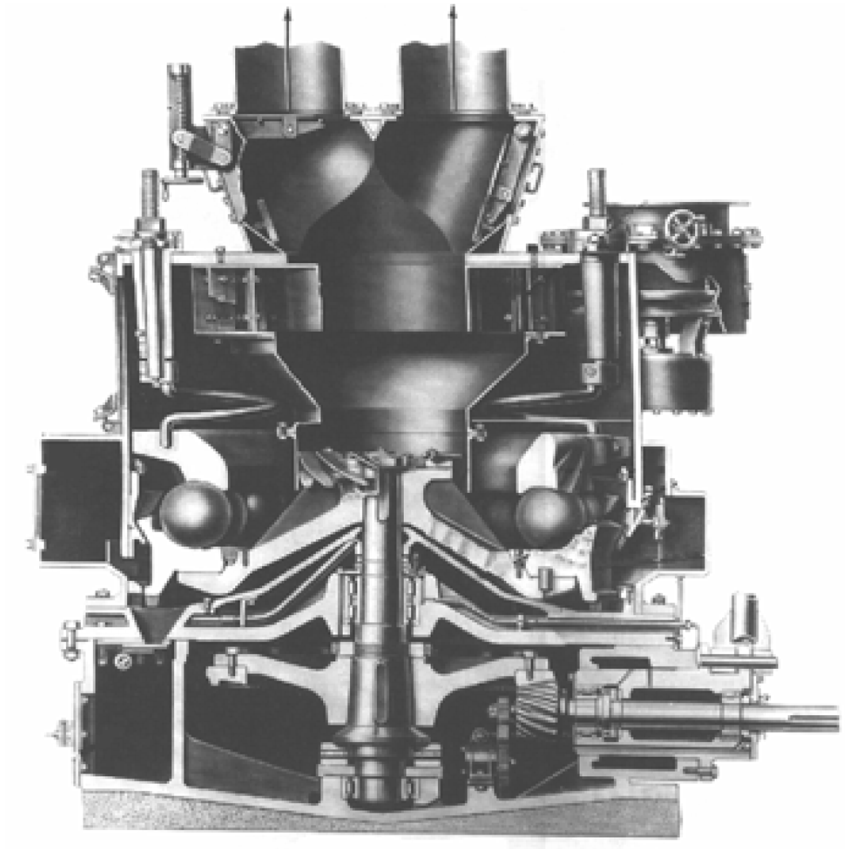
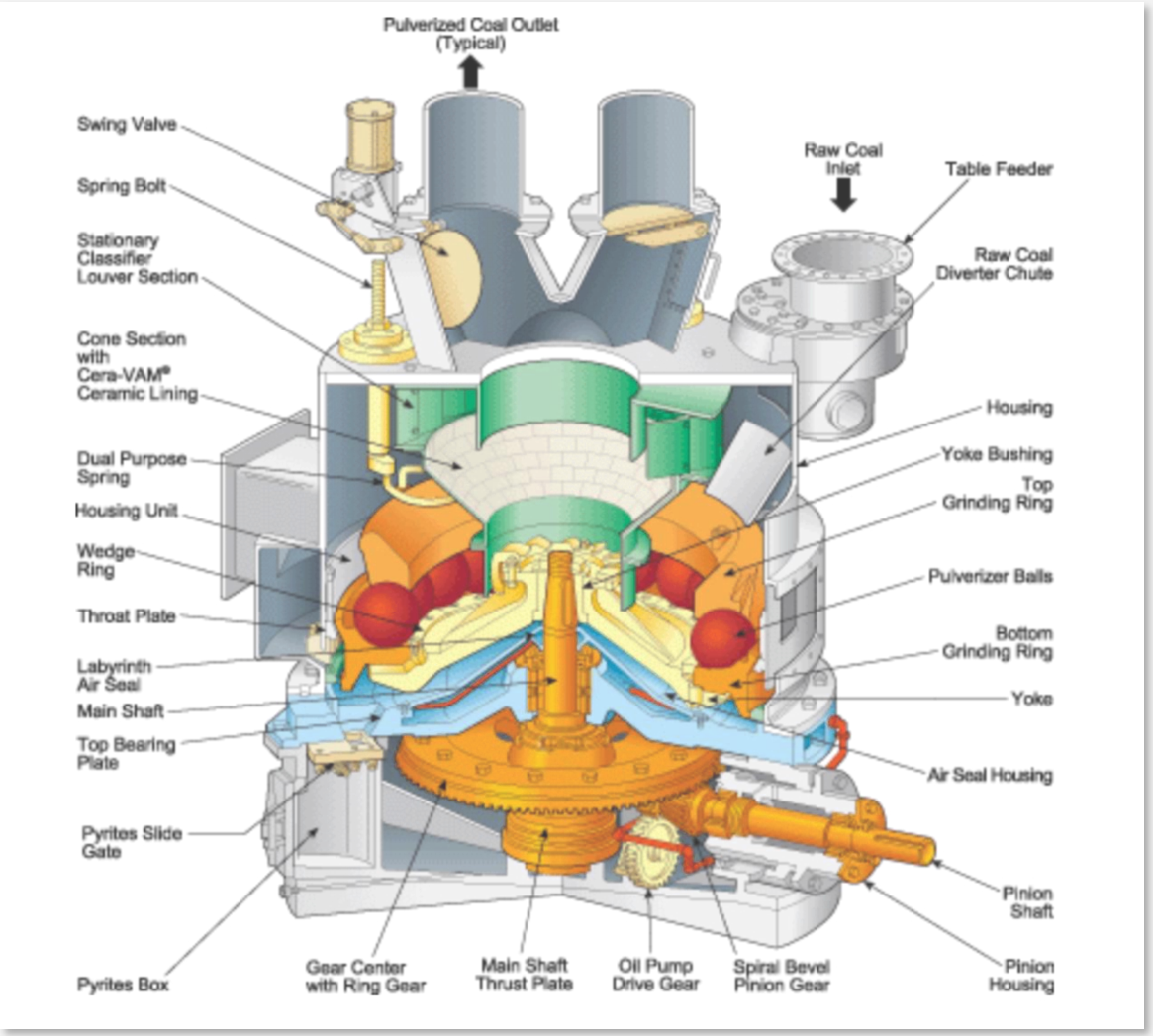


Figure 1 - B&W EL Pulverizer

Ex. 2023, 1



Ex. 2026, 5

Opposition to MTE (Paper 41), 9

Affidavit of Mina Ching

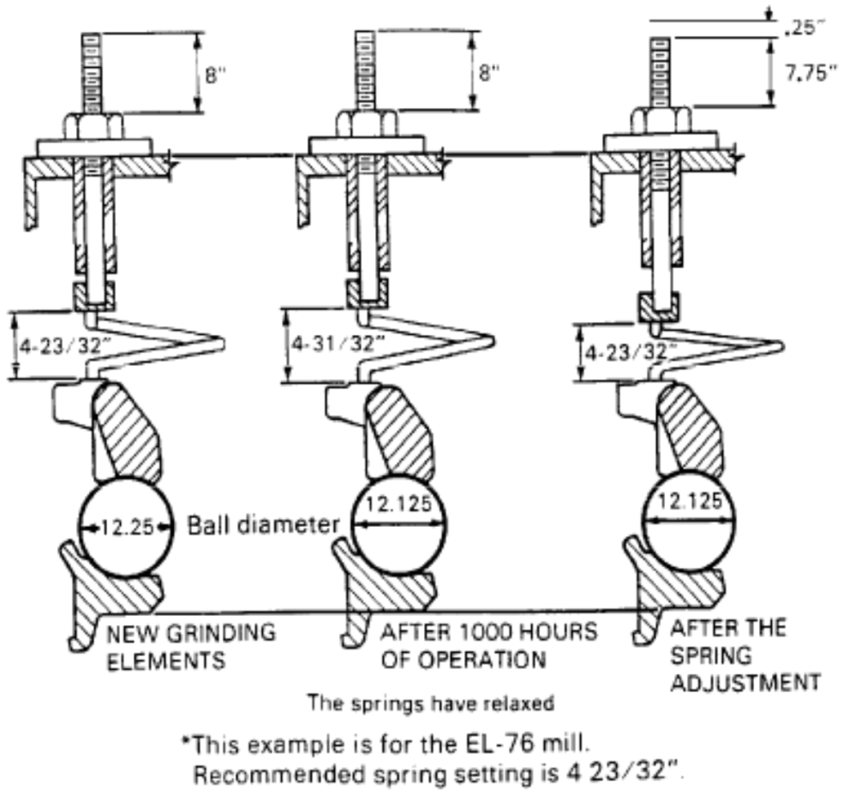
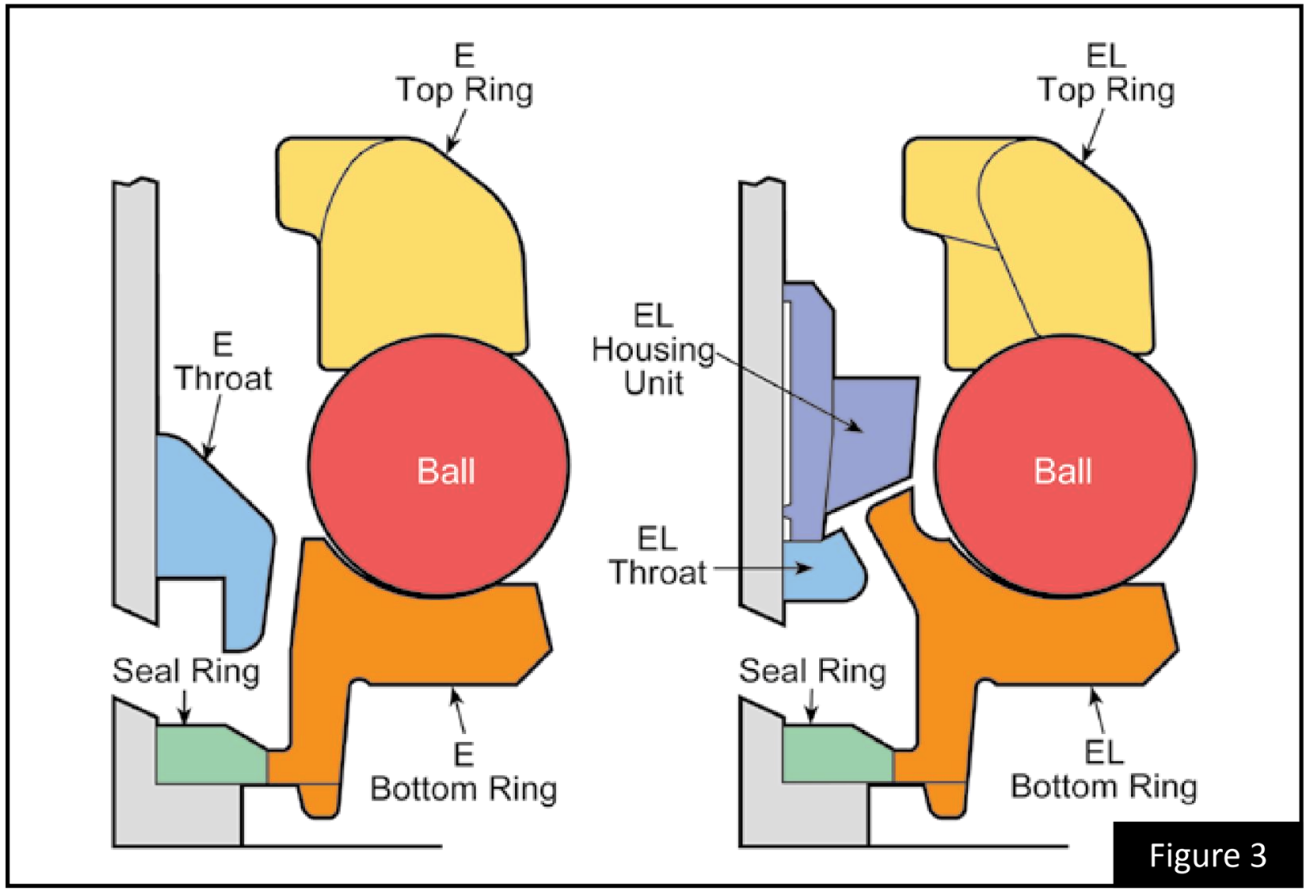


Figure 5 - Spring Adjustment by External Measurement

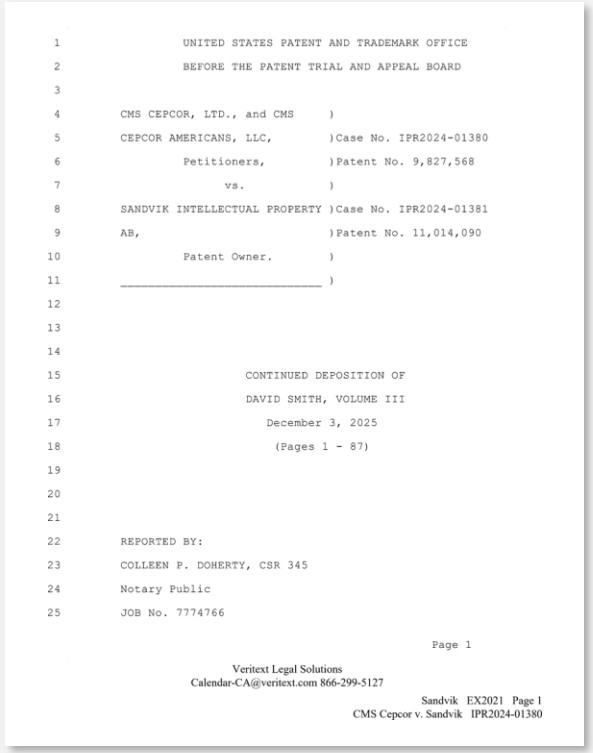
Ex. 2023, 3, FIG. 5



Ex. 2026, 15, FIG. 3

Opposition to MTE (Paper 41), 9

Mr. Smith: Knowledge of a POSITA



UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

CMS CEPCOR, LTD., and CMS CEPCOR AMERICANS, LLC, Petitioners, vs. SANDVIK INTELLECTUAL PROPERTY AB, Patent Owner.

Case No. IPR2024-01380
Patent No. 9,827,568
Case No. IPR2024-01381
Patent No. 11,014,090

CONTINUED DEPOSITION OF
DAVID SMITH, VOLUME III
December 3, 2025
(Pages 1 - 87)

REPORTED BY:
COLLEEN P. DOHERTY, CSR 345
Notary Public
JOB No. 7774766

Page 1

Veritext Legal Solutions
Calendar-CA@veritext.com 866-299-5127

Sandvik EX2021 Page 1
CMS Cepcor v. Sandvik IPR2024-01380

Q. So were you looking at coal pulverizers that were made by the assignee of the Piepho patent, the Babcock & Wilcox Company?

A. I believe so.

Q. And did you provide, in your earlier reports, what you found with regard to your search of the prior art that's mentioned in Piepho?

A. I would have to go back and look. I don't recall.

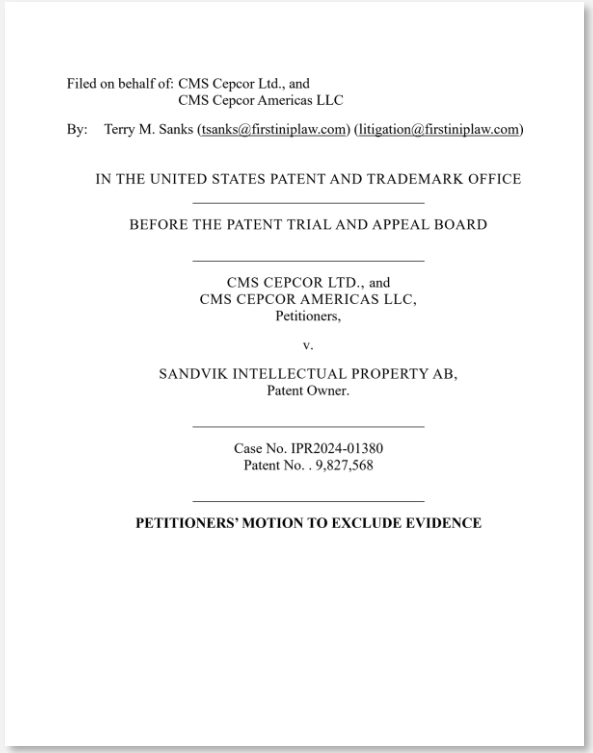
Q. So is it your understanding, that the prior art that's mentioned in Piepho is available to a person of ordinary skill in the art?

A. I would imagine that there is at least some information on it.

Opposition to MTE (Paper 41), 12

Ex. 2021, 74:8-21

Petitioner on Misquoting



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' MOTION TO EXCLUDE EVIDENCE

example, Mr. Kytömaa's declaration quotes Mr. Smith in conjunction with the assertion that the '568 patent resolves the "problem" of assembling and disassembling a "wear sleeve from a main shaft of a gyratory crusher"; however, Mr. Smith's testimony was actually limited to his assessment of the'568 patent's disclosures. (Ex. 2022, ¶ 32); (Ex. 2006, p. 21:9-22:1). There was no discussion of the success or ability to actually resolve any "problems" through the use of the '568 patent. Similarly, Mr. Kytömaa's declaration claims that "Mr. Smith testified that he did not consider Piepho beyond is disclosure of a tapered shaft," yet Mr. Kytömaa fails to quote the section featuring the testimony. (Ex. 2022, ¶ 37); (Ex. 2011, p. 65:5-16). That is because it is nonexistent. A similar pattern is featured throughout Mr. Kytömaa's declaration through paragraphs 13 - 18, 29, 22, 24 - 25, 27 – 28, and 30 – 38.

Opposition to MTE (Paper 41), 14

Petitioner's MTE (Paper 40), 10-11

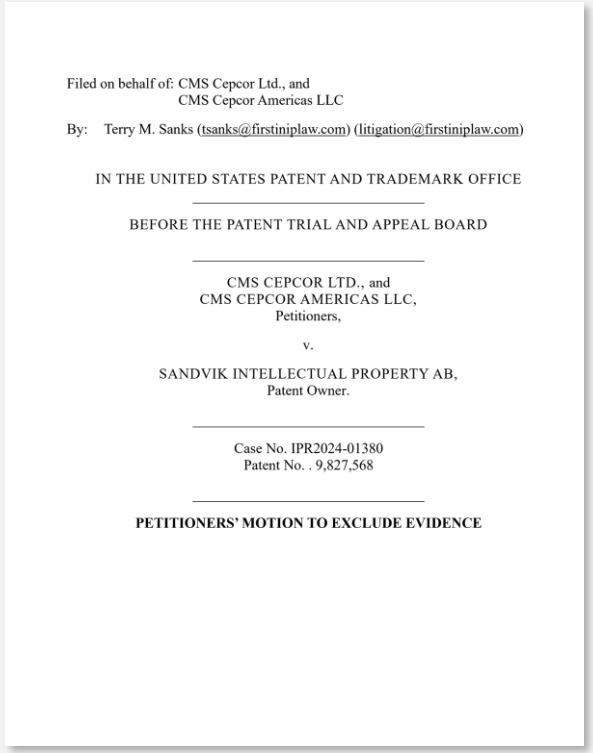
Misquoting: Dr. Kytömaa's Statements

32. A POSITA would not view Piepho as reasonably pertinent to the problem solved by the '568 patent. The '568 patent and Piepho are directed to different problems. The '568 patent concerns the problem of assembling and disassembling a wear sleeve from a main shaft of a gyratory crusher. (Ex. 1001, 1:66–2:2 *see also* Ex. 2006, 21:9–22:1 (Mr. Smith stating that the problem addressed by the '568 Patent are "the best ways for seating or assembling of the sleeve over the conical section of the main shaft.").)

Ex. 2022, ¶ 32

Opposition to MTE (Paper 41), 14

Petitioner on Misquoting



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' MOTION TO EXCLUDE EVIDENCE

Smith's testimony was actually limited to his assessment of the'568 patent's disclosures. (Ex. 2022, ¶ 32); (Ex. 2006, p. 21:9-22:1). There was no discussion of the success or ability to actually resolve any "problems" through the use of the '568 patent. Similarly, Mr. Kytömaa's declaration claims that "Mr. Smith testified that he did not consider Piepho beyond is disclosure of a tapered shaft," yet Mr. Kytömaa fails to quote the section featuring the testimony. (Ex. 2022, ¶ 37); (Ex. 2011, p. 65:5-16). That is because it is nonexistent. A similar pattern is featured throughout Mr. Kytömaa's declaration through paragraphs 13 - 18, 29, 22, 24 - 25, 27 – 28, and 30 – 38.

Petitioner's MTE (Paper 40), 10-11

Opposition to MTE (Paper 41), 14

Misquoting: Dr. Kytömaa's Statements

37. Mr. Smith plucks isolated snippets from Piepho and applies them to Torrence. Mr. Smith testified that he did not consider Piepho beyond its disclosure of a tapered shaft. (Ex. 2021, 65:5–16.) His approach suggests to me that he improperly used the tapered shaft claim language of the '568 patent as a blueprint to select Piepho—a non-analogous reference—through hindsight. Only by ignoring Piepho's field and focus—in other words, everything other than Piepho's disclosure of a tapered shaft—could Petitioner and Mr. Smith conclude obviousness. When Piepho is considered for all that it teaches, there would be no motivation to combine Piepho with Torrence.

Ex. 2022, ¶ 37

Opposition to MTE (Paper 41), 14

IPR2024-01380
Patent No. 9,827,568

Certificate of Service (37 C.F.R. § 42.6(e)(4))

I hereby certify that the attached PATENT OWNER'S DEMONSTRATIVES was served on the below date via email (by consent) to the following counsel of record for Petitioner:

Terry M. Sanks
tsanks@firstiniplaw.com

Dated: January 9, 2026

/Mehran Arjomand/
Mehran Arjomand