

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

American Axle & Manufacturing, Inc.

Petitioner

v.

Neapco Components, LLC,
Patent Owner

Case IPR2025-00091

U.S. Patent No. 11,598,376

PETITION FOR IPR OF U.S. PATENT NO. 11,598,376

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PETITIONER’S EXHIBIT LIST

Exhibit	Description
1001	Certified U.S. Patent No. 11,434,958 (“’958 patent”)
1002	Certified U.S. Patent No. 11,598,376 (“’376 patent”)
1003	Certified prosecution history of U.S. Application 62/500,821 (“’821 application”) (filed May 3, 2017) (“’821 Application PH”)
1004	Certified prosecution history of U.S. Application 15/966,085 (“’085 application”) (filed April 30, 2018) (“’085 Application PH”)
1005	Certified prosecution history of U.S. Application 17/815,833 (“’833 application”) (filed July 28, 2022) (“’833 Application PH”)
1006	U.S. Publication No. 2009/0233723 (“Kofuji”)
1007	U.S. Publication No. 2018/0003240 (“Sugiyama”)
1008	U.S. Patent No. 6,739,422 (“Krude ’422”)
1009	U.S. Patent No. 7,722,089 (“Nauer”)
1010	U.S. Patent Publication No. 2002/0070506 (“Krude ’506”)
1011	U.S. Patent No. 7,896,750 (“Brunetti”)
1012	Wagner, E.R., et al., Advances in Engineering Series No. 7 (Society of Automotive Engineers, Inc.) (1979) (“SAE Manual”)
1013	2016 Jeep® Renegade Service Manual (“Renegade Manual”)
1014	U.S. Patent No. 4,280,341 (“Krude”)
1015	FR 2 257 042 (“Minel”) and Certified French-to-English translation
1016	JP S58-152931 (“Yoshida”) and Certified Japanese-to-English translation
1017	EP 1 681 477 (“Matsumoto”)
1018	U.S. Patent No. 5,772,520 (“Nicholas”)
1019	U.S. Patent No. 3,063,266 (“Rabson”)
1020	U.S. Patent No. 5,655,968 (“Burton”)
1021	Declaration of Jamie Pace
1022	Declaration of Tim Kiefer
1023	Declaration of Jodi Gregory
1024	“Manual de Serviço para Jeep Renegade,” https://www.jeeppurenegadeclube.com/t1008-manual-de-servico-para-jeep-renegade#google_vignette and Certified Portuguese-to-English translation
1025	Affidavit of Nathaniel E Frank-White
1026	U.S. Patent No. 9,221,225 (“Idies”)
1027	U.S. Patent No. 9,863,464 (“Hosen”)

Exhibit	Description
1028	U.S. Publication No. 2009/0209353A1 (“Abels”)
1029	https://web.archive.org/web/20150405104200/http://www.fst.com/Products/Special-Sealing-Products/Boots (“Freudenberg”)
1030	Email from K. Tellez (Nov. 15, 2023), agreeing to accept service of Complaint alleging infringement of ’376 patent on Nov. 17, 2023
1031	<i>Neapco Components, LLC v. American Axle & Manufacturing, Inc.</i> , Case No. 2:23-cv-12470-LVP-EAS, ECF No. 8 (E.D. Mich.) (Nov. 11, 2023) – Waiver of Service of Summons
1032	Declaration of Gregory W. Davis, Ph.D., P.E.
1033	https://web.archive.org/web/20150617070918/https://www.autocarpro.in/news-international/gkn-tier-supplier-develop-integrated-awd-8187 (“Autocar Pro”)
1034	https://web.archive.org/web/20150911145858/https://www.greencongress.com/2014/10/20141007-gkn.html (“Green Car Congress”)
1035	Japanese Application No. JP2016-129514 (June 30, 2016) Certified Portuguese-to-English translation (“Sugiyama Priority Application”)
1036	Prosecution history of U.S. Application 15/630,295 (filed June 22, 2017) (“Sugiyama PH”)

CLAIM LISTING

Claim 1

[1P] A joint assembly comprising:

[1a] a first member having a first engagement means and an interior surface recess;

[1b] a second member having a second engagement means and an exterior surface recess, a portion of the second member disposed within the first member, the second engagement means engaging the first engagement means to provide a coupling of the second member to the first member;

[1c] a window formed within the first member where the portion of the second member is disposed within the first member;

[1d] a retaining means configured to retain the coupling of the second member to the first member,

[1d(i)] wherein distal ends of the retaining means are accessible through the window,

[1d(ii)] wherein the distal ends of the retaining means extend in a direction radially outwardly into the window to a point at or radially inwardly from an outer surface of the first member, and

[1d(iii)] wherein the retaining means is received partially into each of the interior surface recess of the first member and the exterior surface recess of the second member when the retaining means retains the coupling of the second member to the first member; and

[1e] a seal configured to cover the window formed in the first member,

[1e(i)] wherein the seal is coupled to the second member adjacent an end of the first member,

[1e(ii)] wherein the seal is coupled to the first member adjacent the window,

[1e(iii)] wherein the seal includes a cylindrical portion directly

engaging the outer surface of the first member adjacent the window,

[1e(iv)] wherein the seal further includes a corrugated portion disposed adjacent the cylindrical portion.

Claim 2

The joint assembly of claim 1, wherein the first member includes an open end and the first engagement means of the first member is formed within the open end.

Claim 3

The joint assembly of claim 2, wherein the portion of the second member disposed within the first member is disposed within the open end and includes the second engagement means.

Claim 4

The joint assembly of claim 2, wherein the window is continuous with the open end.

Claim 5

The joint assembly of claim 4, wherein the seal is coupled to the first member adjacent an end of the window disposed distally from the open end of the first member.

Claim 6

The joint assembly of claim 1, wherein the first engagement means includes a first plurality of splines and the second engagement means includes a second plurality of splines.

Claim 7

The joint assembly of claim 1, wherein the retaining means is configured as a retaining ring.

Claim 8

The joint assembly of claim 1, wherein at least a portion of the cylindrical portion directly covers the window.

Claim 9

The joint assembly of claim 1, wherein at least a portion of the cylindrical portion is disposed directly radially outwardly of the window.

Claim 10

The joint assembly of claim 1, wherein the cylindrical portion is disposed directly radially outwardly of the retaining means.

Claim 11

The joint assembly of claim 1, wherein the cylindrical portion covers the retaining means.

Claim 12

The joint assembly of claim 1, wherein the corrugated portion is disposed radially outwardly of each of the first member and the second member.

Claim 13

The joint assembly of claim 1, wherein at least a portion of the corrugated portion is disposed radially outwardly of the window.

Claim 14

[14P] A method of servicing a joint assembly comprising:

[14-1] providing a joint assembly, the joint assembly including:

[14-1a] a first member having a first engagement means and an interior surface recess;

[14-1b] a second member having a second engagement means and an exterior surface recess, a portion of the second member disposed within

the first member, the second engagement means engaging the first engagement means to provide a coupling of the second member to the first member;

[14-1c] a window formed within the first member where the portion of the second member is disposed within the first member;

[14-1d] a retaining means configured to retain the coupling of the second member to the first member,

[14-1d(i)] wherein distal ends of the retaining means are accessible through the window,

[14-1d(ii)] wherein the distal ends of the retaining means extend in a direction radially outwardly into the window to a point at or radially inwardly from an outer surface of the first member, and

[14-1d(iii)] wherein the retaining means is received partially into each of the interior surface recess of the first member and the exterior surface recess of the second member when the retaining means retains the coupling of the second member to the first member; and

[14-1e] a seal configured to cover the window formed in the first member,

[14-1e(i)] wherein the seal is coupled to the second member adjacent an end of the first member and

[14-1e(ii)] wherein the seal is coupled to the first member adjacent the window;

[14-2] uncovering the window via adjustment of the seal to provide access to the distal ends of the retaining means;

[14-3] manipulating the retaining means through the window to release the coupling of the second member to the first member; and

[14-4] separating the first member and the second member by disengaging the second engagement means from the first engagement means,

[14-1e(iii)] wherein the seal includes a cylindrical portion and a corrugated portion,

[14-1e(iv)] wherein at least a portion of the window is covered by the cylindrical portion.

Claim 15

The method of claim 14, wherein the first member includes an open end and the window is continuous with the open end.

Claim 16

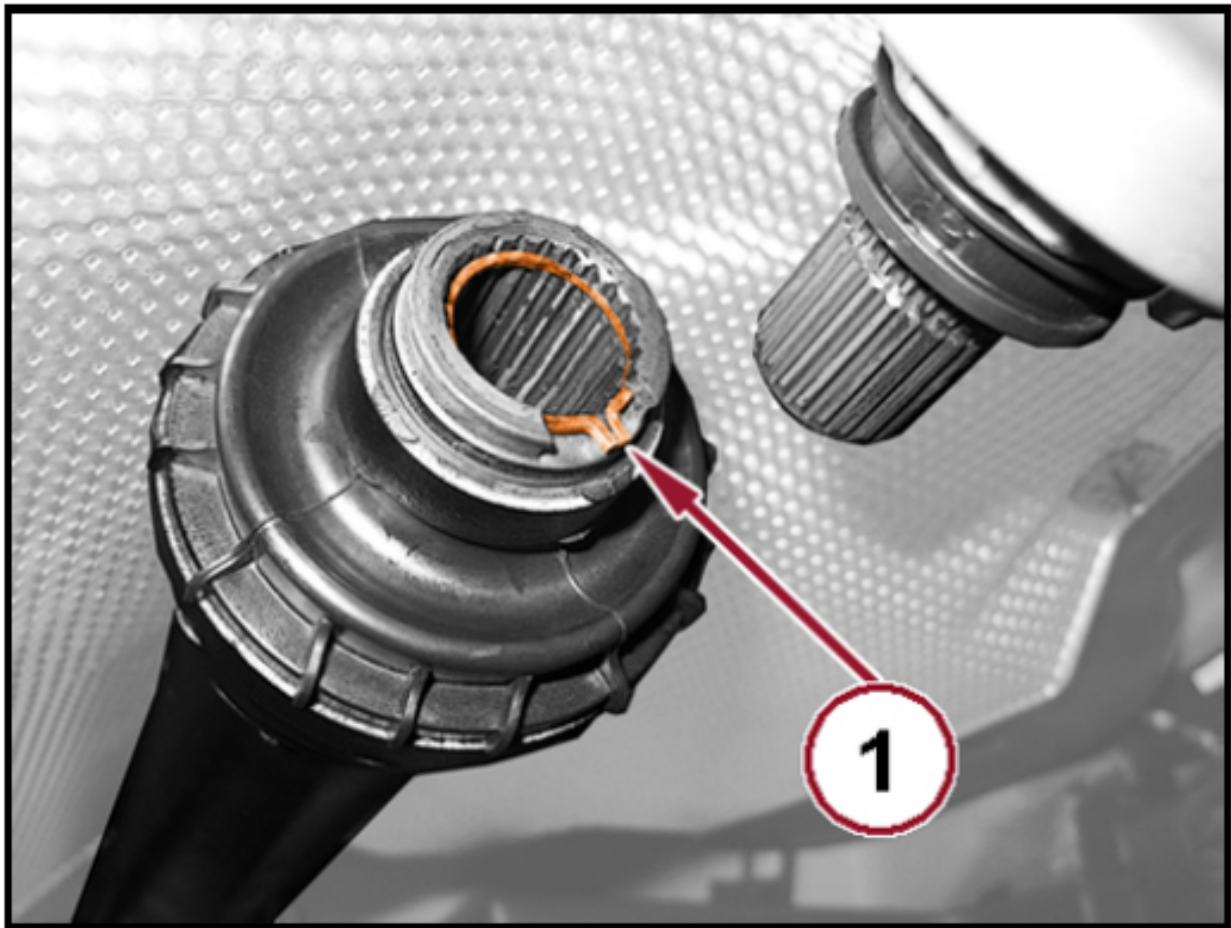
The method of claim 15, wherein uncovering the window includes sliding the seal axially towards the open end of the first member.

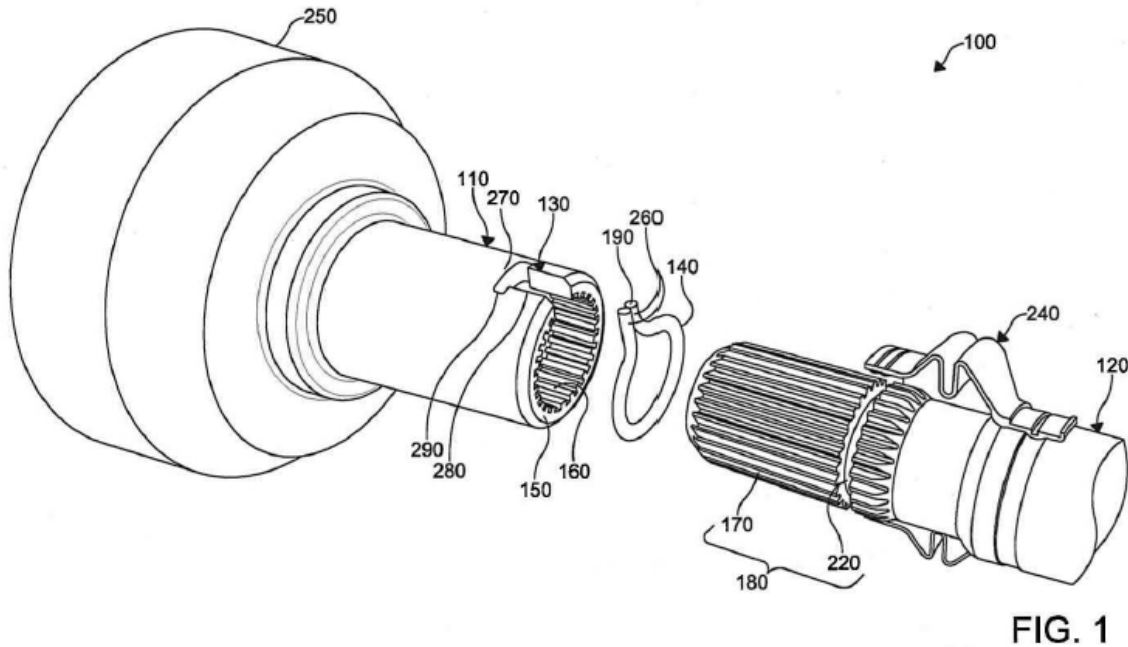
Claim 17

The method of claim 16, wherein the sliding of the seal axially occurs until the retaining means is uncovered.

I. INTRODUCTION

Claims 1-17 of U.S. Patent No. 11,598,376 relate to an unremarkable and well-known joint assembly comprised of a female and male shaft that are fixed by a retaining ring, with an “access window” in the female shaft to access the retaining ring during assembly and disassembly. This “access window” design was well known by the effective filing date, May 3, 2017. For example, as illustrated by the images below, a service information manual for the 2016 Jeep® Renegade discloses a joint assembly having the exact same design as that described and claimed in the ’376 patent.





Compare Ex.1013 at PET_AAM_1013-0202 (8) and Ex.1002 at Fig. 1.

The Renegade Manual was published in 2016 by Mopar Tech Authority, a service division of Stellantis (formerly Fiat Chrysler Automobiles), and it provides detailed information on how to service joint assemblies of the 2016 Jeep® Renegade (which Stellantis released to dealerships in Fall 2015). That is why it surprised Petitioner (American Axle) when, in co-pending litigation, Patent Owner (Neapco) claimed to have “submitted a confidential design proposal to FCA that described in detail many innovative aspects of Neapco’s propshafts that are disclosed in and covered by the ’376 patent,” and alleged that Petitioner “took Neapco’s patented design” and incorporated it into propshafts that Petitioner sold to FCA. *Neapco*

Components, LLC v. American Axle & Manufacturing, Inc., No. 2:23-cv-12470-LVP-EAS, ECF No. 17 at 15, 16 (E.D. Mich. Feb. 20, 2024). As the Renegade Manual shows, there was nothing new or innovative about Patent Owner’s joint assembly design—it was FCA’s design, which FCA had been using all along.

The Board should institute IPR.

II. GROUNDS FOR STANDING

Petitioner certifies that the ’376 patent is available for IPR and that Petitioner is not barred or estopped from requesting IPR on the grounds identified in the Petition.

III. STATEMENT OF PRECISE RELIEF REQUESTED

A. Prior Art Printed Publications and Patents

The earliest effective filing date of the ’376 patent is May 3, 2017. Ex.1002 at (60). Petitioner requests IPR in view of the following references, which are available as prior art as shown below.

Reference	Date	Statutory Basis
Renegade Manual (Ex.1013)	Published and available to the public at least by July 6, 2016, and at least before May 3, 2017	§ 102(a)(1)
Krude ’422 (Ex.1008)	May 25, 2004 (issue date)	§ 102(a)(1)
Sugiyama (Ex.1007)	June 30, 2016 (foreign application priority date); June 22, 2017 (filing date); January 4, 2018 (publication date)	§ 102(a)(2)

1. Renegade Manual is prior art.

a. Background on Renegade Manual

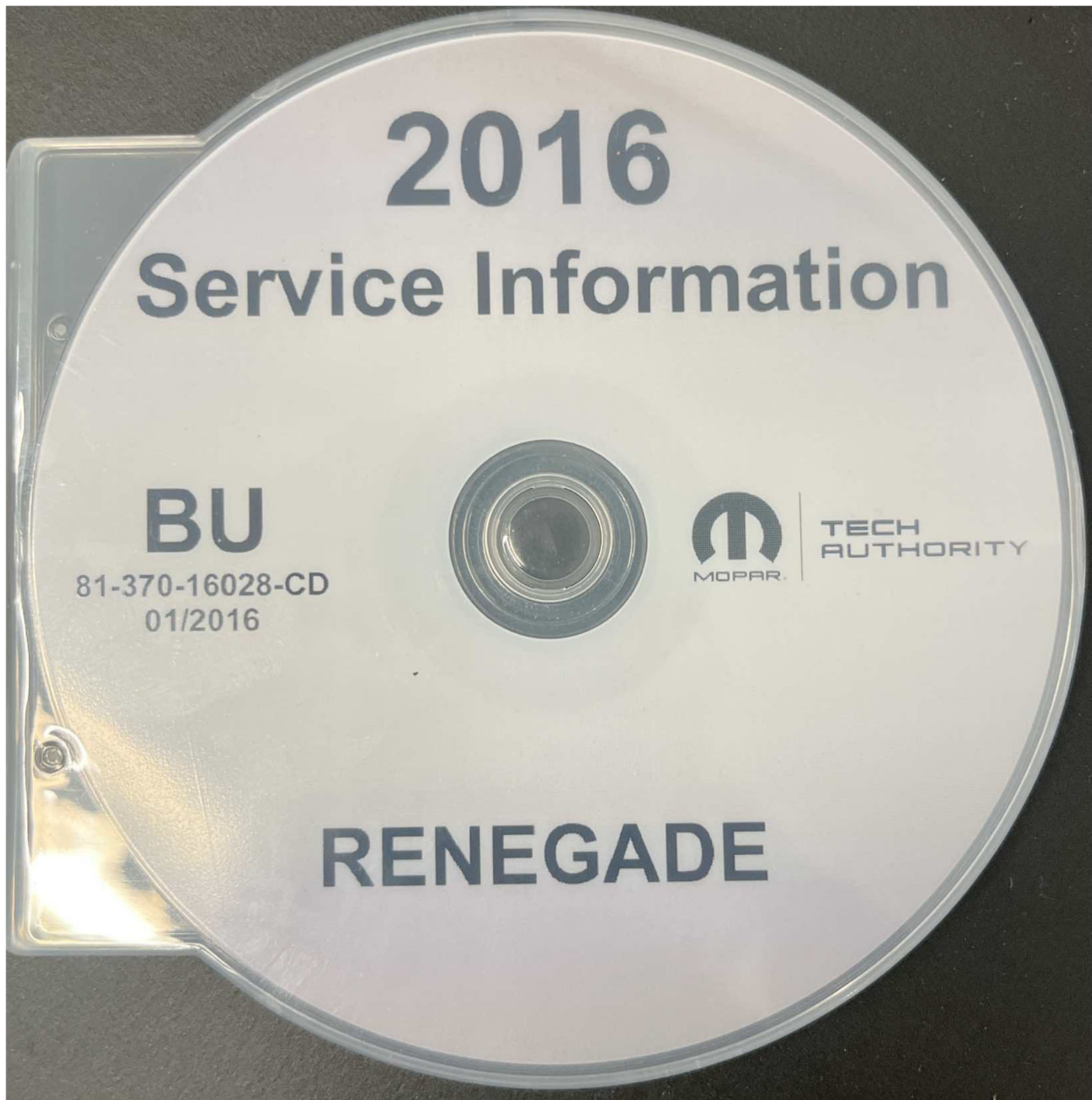
The Jeep® Renegade is a SUV produced by Stellantis, under the Jeep® brand.



https://en.wikipedia.org/wiki/Jeep_Renegade; Ex.1013 at PET_AAM_1013-0002.

Stellantis released the 2016 Jeep® Renegade Fall 2015. Ex.1021 ¶ 3.

Renegade Manual was published in 2016 on compact disc (CD) by Mopar Tech Authority, which, at the time, touted itself as the “OFFICIAL SOURCE FOR MOPAR SERVICE INFORMATION” for Jeep® vehicles. Ex.1023 ¶¶ 46-47, Ex.30; Ex.1025, ¶¶ 1-5, 7. An image of the CD is reproduced below:



Ex.1013 at PET_AAM_1013-0001. Launching the Renegade Manual directs to the following landing page.

2016 Jeep® Renegade - Service Information ManualPage 1 of 1



Welcome to the:
2016 Jeep® Renegade
Service Information Manual

[ENTER Service Information Manual](#)

[Additional information](#)

If you do not have Adobe® Reader installed, you must install it to view the parts catalog.

Click on the link below to do so.

[Install Adobe Reader](#)

If this is the first time you are using this CD/DVD, you must install the Adobe® SVG Viewer plugin if you are using Internet Explorer 9 or below.

Click on the link below to do so. This is only necessary once.

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81-370-16028-CD

file:///D:/common/html/default.htm10/28/2024

Id. at PET_AAM_1013-0002.

Selecting “ENTER Service Information Manual,” and then “all engines,” populates a hyperlinked Table of Contents to access service information for models

of the 2016 Jeep® Renegade of various engine sizes. *Id.* at PET_AAM_1013-0008-0144. Petitioner primarily relies on one sub-section of Chapter 3 at pages -0194-0204 of Exhibit 1013. Ex.1032 ¶ 236. The CD containing the Renegade Manual is available to Patent Owner and the Board for inspection and use.

b. Renegade Manual qualifies as prior art to the '376 patent as a “printed publication” under § 102(a)(1).

Renegade Manual qualifies as prior art to the '376 patent as a “printed publication” under § 102(a)(1). CDs containing service manuals, as here, may qualify as “printed publications.” *See Centripetal Networks, Inc. v. Cisco Sys., Inc.*, 847 F. App'x 869, 876-878 (Fed. Cir. 2021); MPEP § 2128 II.A. Like other forms of publication, the salient question is whether the CD was “publicly accessible.” *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29 at 10 (P.T.A.B. Dec. 30, 2019). “A given reference is ‘publicly accessible’ upon a satisfactory showing that such document has been disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art exercising reasonable diligence, can locate it.” *Id.* at 10-11 (citation omitted). Here, all of “the facts and circumstances surrounding the reference’s disclosure to members of the public,” *id.* at 9 (same), point toward the same conclusion—Renegade Manual was “publicly accessible” before May 3, 2017, and qualifies as prior art.

First, it is customary in the automotive industry for original equipment

manufacturers, like Chrysler and Stellantis, to distribute information on how to service their vehicles. Ex.1021 ¶¶ 3, 4. Stellantis does this through Mopar Tech Authority, which, as both Dr. Gregory and Jamie Pace (one of Petitioner’s Senior Engineering Technicians) confirm, “is well known in the automotive industry as an established organization that publishes and distributes service information, including service manuals, for Chrysler vehicles, including Jeep® brand vehicles.” *Id.* ¶ 5; Ex.1032 ¶ 233; Ex.1023 ¶¶ 46-47, Ex.30. OEMs make service manuals accessible “shortly after releasing the vehicles to dealerships” because, at that time, the vehicles may need to be serviced. Ex.1021 ¶ 6. Based on this customary practice, the service manual for the 2016 Jeep® Renegade would have been accessible to the public “shortly after its release in the Fall of 2015, that is, around the 2016 time frame.” *Id.*

Second, several indicia associated with Renegade Manual (and its CD) confirm that it was publicly accessible before May 3, 2017:

a. The year, “2016,” is on the front of the CD and landing page. Ex.1013, at PET_AAM_1013-0001-0002.

b. The month and year, “01/2016,” is on the front of the CD. That month and year is consistent with Mr. Pace’s testimony that the service manual for the 2016 Jeep® Renegade would have been accessible to the public “shortly after its release in the Fall of 2015.” Ex.1021 ¶ 6.

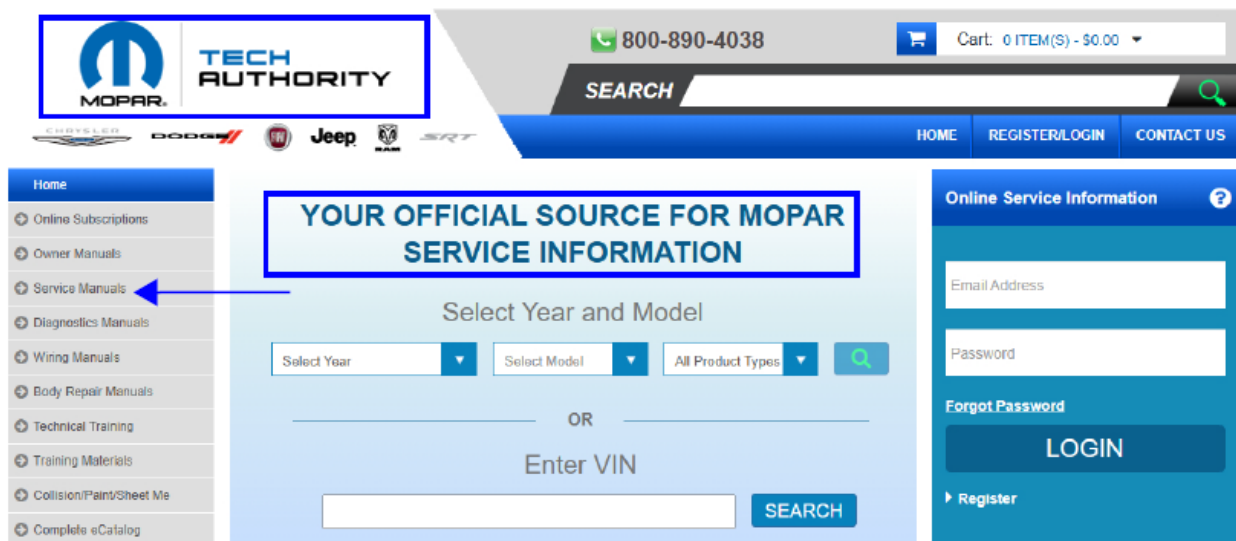
c. Renegade Manual includes a copyright notice dated 2015

(“Copyright® 2015 Chrysler LLC”) on the landing page. Ex.1013 at PET_AAM_1013-0002.

d. The Mopar Tech Authority logos are on both the front of the CD (left) and landing page (right):



Ex.1013 at PET_AAM_1013-0001-0002. In October 2016, the same logos were present on the webpage for Mopar Tech Authority, “www.techauthority.com,” which touted Mopar Tech Authority as “YOUR OFFICIAL SOURCE FOR MOPAR SERVICE INFORMATION,” displayed the Jeep® logo, and included a link to navigate to “Service Manuals.”



Ex.1023 ¶¶ 46-47, Ex.30 (all annotations added unless otherwise noted); Ex.1025

¶¶ 1-5, 7.

e. Tim Kiefer, a Forensics Manager at Innovative Driven and an expert in forensic analysis determined “that the CD was burned (that is, the data was copied onto the CD) on January 7, 2016,” which is consistent with the “01/2016” date printed on the front of the CD and Mr. Pace’s testimony, Ex.1021 ¶ 6. Ex.1022 ¶ 16. Mr. Kiefer also determined that no items on the CD had a “date created” or “date modified” after December 22, 2015. Ex.1022 ¶¶ 7-15, Ex.2.

f. Dr. Davis separately accessed the service manual for the 2016 Jeep® Renegade online in Mopar Tech Authority’s “Service Library,” now available at the URL, “<https://stellantisop.com/iop/app/secure/dashboard>.” Ex.1032 ¶ 234. Dr. Davis confirmed that the Renegade Manual of Exhibit 1013 contains the same information as that currently made available online by Stellantis and Mopar Tech Authority. *Id.*

Third, Jodi Gregory, founder and President of Access Information Services, Inc. and an expert in conducting research regarding the availability of technical and scientific literature, testified that Renegade Manual was publicly accessible “before May 3, 2017, including by as early as July 6, 2016,” and that “interested members of the public could have purchased and accessed the Renegade Manual with reasonable diligence if they so desired.” Ex.1023 ¶¶ 45, 49; *see also id.* ¶¶ 7-49. Ms. Gregory determined that several forum posts directing forum members to

purchase the 2016 Jeep® Renegade Manual online from Mopar Tech Authority were each dated in July or August 2016. *Id.* In particular, each of the 2016 forum posts linked to the URL, “<https://www.techauthority.com/en-us/products/81-370-16028-CD>,” which includes the same Product ID as that shown on the front of the CD and landing page, “*81-370-16028-CD*.” *Id.* (all emphasis added unless otherwise noted); Ex.1013 at PET_AAM_1013-0001-0002. For example:

a. On July 6, 2016, a member of “www.renegadeforum.com” named “Cruiser” replied to a post in a discussion titled, “New Owner, Service Manual, fuel Cut-off, more....”:

I recently found the service manual on disc at techauthority.com. It’s for the 2016 model which is essentially the same as the 2015. Here’s the link:

<https://www.techauthority.com/en-us/products/81-370-16028-CD>

Ex.1023 ¶¶ 13-15, Ex.1; *see also id.* ¶¶ 10-12.

b. On the same day, July 6, 2016, Cruiser also replied to a post in a discussion titled, “Service manual”:

I found the service manual on disc at techauthority.com. It’s for the 2016 model which is essentially the same as the 2015. Here’s the link:

<https://www.techauthority.com/en-us/products/81-370-16028-CD>

Id. ¶¶ 19-21, Ex.7; *see also id.* ¶¶ 16-18.

c. On July 13, 2016, a member of “www.jeeprenegadeforum.com” named “cruiser66” replied to a post in a discussion titled, “Service Manual”:

Here's the service manual for the 2016 Renegade on disc. None for the 2015, but it's essentially the same as the 2016. Found on techauthority:

[https://www.techauthority.com/en-us/products/81-370-16028-CD ...](https://www.techauthority.com/en-us/products/81-370-16028-CD)

Id. ¶¶ 31-33, Ex.18; *see also id.* ¶¶ 28-30.

d. On July 15, 2016, cruiser66 also replied to a post in a discussion titled, “Service Manuals”:

The service manual on disc is available for the 2016 Renegade as well as the 2014 GC. Here's the link for the Renegade:

[https://www.techauthority.com/en-us/products/81-370-16028-CD ...](https://www.techauthority.com/en-us/products/81-370-16028-CD)

Id. ¶¶ 25-27, Ex.12; *see also id.* ¶¶ 22-24.

e. On July 15, 2016, a member of “www.jeeprenegadeclub.com” (a Portuguese-language forum) named “fernandosousa” posted in a discussion titled, “Service Manual for Jeep Renegade”:

I would really like to get my hands on the Renegade service manual, as it is the best way to solve any problems with the car. I searched the internet and found the American Renegade service manual for sale, but it costs \$135.00 and the engine is different. Does anyone know where I can find the Brazilian version?

Here is the link to what I found:

<https://www.techauthority.com/en-us/products/81-370-16028-CD>

Ex.1024; Ex.1023 ¶¶ 40-44, Ex.28.

f. On August 18, 2016, a member of “www.jeeprenegadeforum.com” named “raz-0” replied to a post:

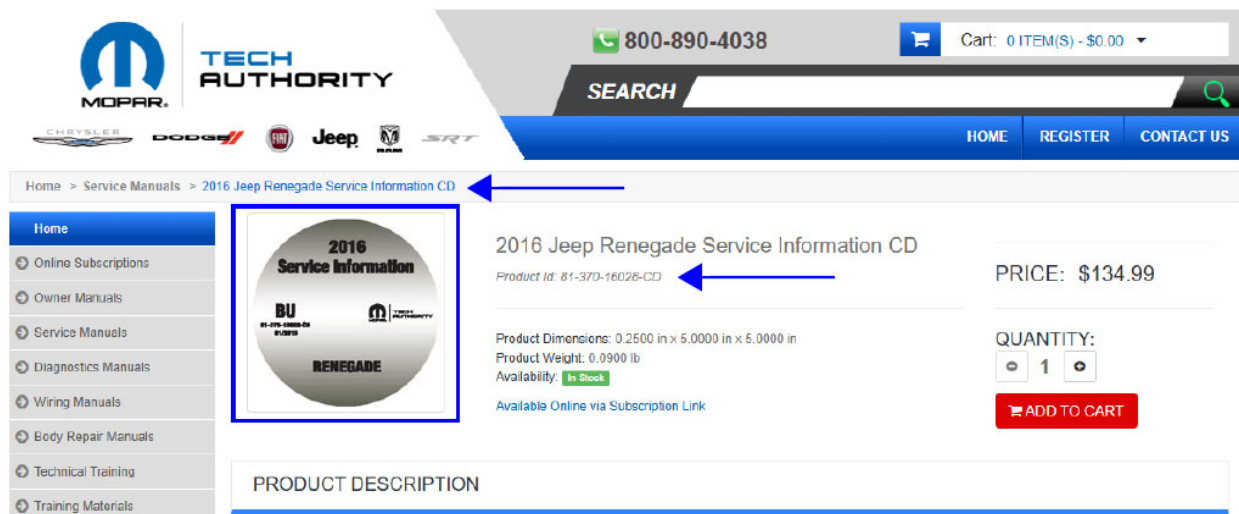
Well a tech manual finally came out:

<https://www.techauthority.com/en-us/products/81-370-16028-CD>

Ex.1023 ¶¶ 37-39, Ex.23; *see also id.* ¶¶ 34-36.

These forum posts and Ms. Gregory’s research demonstrate that the Renegade Manual was published by Mopar Tech Authority at least as early as July 6, 2016, and publicly accessible online through Mopar Tech Authority’s home webpage, “www.techauthority.com.” *Id.* ¶ 45; *see also id.* ¶¶ 7-49. Because Mopar Tech Authority is an established publisher of Jeep® service manuals, there is “a presumption of public accessibility as of the publication date.” *VidStream LLC v. Twitter, Inc.*, 981 F.3d 1060, 1065 (Fed. Cir. 2020).

Moreover, Mopar Tech Authority’s home webpage, “www.techauthority.com,” displayed in 2016 a link for customers to access “Service Manuals” like the Renegade Manual. Ex.1023 ¶¶ 45-47, Ex.30; Ex.1025 ¶¶ 1-5, 7. An archive of the specific URL posted several times in 2016 on various forums further confirms that Renegade Manual was accessible to the public.



Ex.1023 ¶ 48, Ex.31; Ex.1025 ¶¶ 1-5, 7. The URL, which was archived on October 16, 2017, includes several indicia that match indicia identified and described in forum posts dated in July and August 2016 and indicia associated with the Renegade Manual (and CD) itself. For example, the archived URL includes:

- a. the product name, “2016 Jeep Renegade Service Information CD,” which is consistent with the description provided in the 2016 forum posts (e.g., “the service manual for the 2016 Renegade on disc”) and the title of Renegade Manual;
- b. the Product ID, “81-370-16028-CD,” which is in the URL linked by the 2016 forum posts and is shown on the front of the CD and landing page of Renegade Manual;
- c. the price, “\$134.99,” which is the price identified by fernandosousa on July 15, 2016, in a post on “www.jeeprenegadeclub.com” pointing to the same webpage; and
- d. an image of the CD available for purchase (left), which matches the image of the CD containing Renegade Manual.



Ex.1023 ¶ 48, Ex.31 (left); Ex.1013 at PET_AAM_1013-0001 (right).

Taken together, the foregoing demonstrates that Renegade Manual was “publicly accessible” before May 3, 2017, at least through Mopar Tech Authority and online at “www.techauthority.com” and “<https://www.techauthority.com/en-us/products/81-370-16028-CD>,” because persons interested and ordinarily skilled in the art (“POSA”) exercising reasonable diligence could have located it. Renegade Manual is therefore a “printed publication” and is prior art under § 102(a)(1).

2. Sugiyama is prior art.

Sugiyama is a publication of U.S. Application No. 15/630,295, filed on June 22, 2017. Ex.1007 at (21), (22). Sugiyama claims priority to JP2016-129514 (“Sugiyama Priority Application”), filed on June 30, 2016. *Id.* at (30); *see also* Ex.1035; Ex.1036 at PET_AAM_1036-0140-0181. Sugiyama is prior art under §§ 102(a)(2), 102(d)(2) and 119.

First, “for prior-art determinations under AIA § 102, ‘there is no need to evaluate whether any claim of a reference patent document is *actually entitled to priority* or benefit under 35 U.S.C. 119, 120.’” *Penumbra, Inc. v. Rapidpulse, Inc.*, IPR2021-01466, Paper 34 at 32 (P.T.A.B. March 10, 2023) (quoting MPEP § 2154.01(b)). Rather, all that is required is that the Sugiyama Priority Application “describe the subject matter” that Petitioner relies upon in Sugiyama. That requirement is met here. In fact, the disclosures of Sugiyama Priority Application and Sugiyama are nearly identical—there is a 1:1 correspondence between the figures and a nearly a 1:1 correspondence between the remaining disclosures, with immaterial differences in some phrasing. *Compare* Ex.1007 *and* Ex.1035; *see also* Ex.1032 ¶ 249. The table below identifies disclosures of Sugiyama (Ex.1007) that correspond to disclosures of the Sugiyama Priority Application (Ex.1035).¹

Sugiyama (Ex.1007)	Sugiyama Priority Application (Ex.1035)
Abstract	Abstract
Figs. 1-19*	Figs. 1-19*
[0001]	[0001]
[0002]-[0003]	[0002]-[0004]
[0004]	[0005]-[0006]
[0005]-[0007]*	[0007]-[0009]*
[0008]-[0026]	[0010]
[0027]	[0011]
[0028]-[0029]	[0012]

¹ An asterisk (*) indicates that sequential figures, paragraphs, or claims of Sugiyama correspond to sequential figures, paragraphs, or claims of Sugiyama Priority Application.

Sugiyama (Ex.1007)	Sugiyama Priority Application (Ex.1035)
[0030]-[0032]	[0013]
[0033]-[0059]*	[0014]-[0040]*
[0060]-[0061]	[0041]
[0062]-[0099]*	[0042]-[0079]*
[0100]-[0101]	[0080]
[0102]-[0104]*	[0081]-[0083]*
[0105]-[0106]	[0084]
[0107]-[0151]*	[0085]-[0129]*
Claims 1-14*	Claim 1-14*
Claim 15-22*	Claim 16-23*

And, as shown in the table above, for any citation to Sugiyama (Ex.1007) in this Petition or Dr. Davis' Declaration, there is corresponding disclosure in the Sugiyama Priority Application (Ex.1035) that describes the same subject matter. Ex.1032 ¶ 249.

Second, even if *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375 (Fed. Cir. 2015) applied, Sugiyama is entitled to the June 30, 2016, filing date of Sugiyama Priority Application because it provides written description and enabling support for the claims of Sugiyama (which are the same as originally filed, *compare* Ex.1007 at Claims 1-22 *and* Ex.1036 at PET_AAM_1036-0039-0045, Original Claims 1-22). Ex.1032 ¶¶ 250-253. The table below identifies disclosures of Sugiyama Priority Application that provide written description and enabling support for the claims of Sugiyama.

Sugiyama Claims (Ex.1007)	Sugiyama Priority Application (Ex.1035)
1 (Preamble)	Abstract, [0001], [0007]-[0009], [0012]-[0129], Figs. 1-19, Claim 1
1 (“shaft section...”)	Abstract, [0003], [0007], [0052], [0104], [0129], Figs. 1-19, Claim 1
1 (“cylindrical section...”)	Abstract, [0007]-[0010], [0022], [0027], [0028], [0030]-[0032], [0037]-[0039], [0048]-[0056], [0058]-[0061], [0063]-[0065], [0070]-[0075], [0104], [0129], Figs. 1-19, Claim 1
1 (“through hole...”)	Abstract, [0007], [0026]-[0028], [0032]-[0037], [0039]-[0040], [0052]-[0053], [0056], [0058]-[0061], [0063]-[0064], [0074], [0083], [0086]-[0087], [0104], [0107]-[0110], [0126], [0129], Figs. 1-19, Claim 1
1 (“circlip...”)	Abstract, [0003], [0007]-[0010], [0016], [0027], [0032], [0038], [0040]-[0041], [0043]-[0045], [0048], [0050]-[0067], [0076]-[0089], [0112]-[0116], [0129], Figs. 1-19, Claim 1
2	[0027]-[0028], [0032]-[0033], [0035]-[0036], [0040]-[0043], [0056], [0063], [0092]-[0093], [0105], [0113], Figs. 1-19, Claims 1, 2
3	[0003], [0016], [0027], [0032], [0057], [0106], Figs. 1-19, Claims 1-3
4	Abstract, [0027]-[0028], [0032]-[0037], [0049], [0052], [0058]-[0061], [0064], [0112]-[0114], Figs. 1-19, Claims 1, 4
5	Abstract, [0032]-[0037], [0059]-[0060], [0063], [0108]-[0109], Figs. 1-19, Claims 1, 4, 5
6	Abstract, [0034]-[0035], [0060], [0063], [0113], Figs. 1-19, Claims 1, 4-6
7	Abstract, [0059]-[0060], [0108]-[0110], Figs. 1-19, Claims 1, 4-7
8	Abstract, [0005], [0007]-[0009], [0027], [0034], [0038], [0040]-[0041], [0053]-[0060], Figs. 1-19, Claims 1, 4-8
9	Abstract, [0040]-[0043], [0063], Figs. 1-19, Claims 1, 4-9
10	Abstract, [0034]-[0035], [0060], [0063], [0109], [0112]-[0113], Figs. 1-19, Claims 1, 4, 5, 10

Sugiyama Claims (Ex.1007)	Sugiyama Priority Application (Ex.1035)
11	Abstract, [0007]-[0010], [0016], [0026]-[0028], [0032]-[0037], [0039]-[0040], [0050]-[0053], [0056], [0058]-[0061], [0063]-[0064], [0074], [0083], [0086]-[0087], [0104], [0107]-[0110], [0112]-[0116], [0126], [0129], Figs. 1-19, Claims 1, 11
12	Abstract, [0043], [0051], [0064]-[0067], [0082], [0086]-[0087], [0089]-[0090], Figs. 1-19, Claims 1, 11, 12
13	Abstract, [0045]-[0046], [0066], [0084], [0116], Figs. 1-19, Claims 1, 11, 13
14	Abstract, [0043], [0067], [0081], [0084], [0117], Figs. 1-19, Claims 1, 11, 14
15	Abstract, [0003], [0007], [0016], [0018]-[0019], [0027], [0032], [0037]-[0038], [0045]-[0046] [0052], [0104], [0129], Figs. 1-19, Claims 1, 16
16	Abstract, [0018]-[0020], [0068]-[0069], [0087], [0119]-[0120], Figs. 1-19, Claims 1, 16, 17
17	Abstract, [0021], [0022], [0049]-[0050], [0070], [0121], Figs. 1-19, Claims 1, 18
18	Abstract, [0037], [0071], [0122], Figs. 1-19, Claims 1, 19
19	Abstract, [0072]-[0073], [0123], Figs. 1-19, Claims 1, 20
20	Abstract, [0039], [0074], [0124], Figs. 1-19, Claims 1, 21
21	Abstract, [0041], [0075], [0125], Figs. 1-19, Claims 1, 22
22	Abstract, [0040], [0064], [0081], [0086], [0114], [0126]-[0127], Figs. 1-19, Claims 1, 22, 23

Ex.1032 ¶ 253.

B. Grounds for Challenge

Petitioner requests cancellation of Claims 1-17 on the following grounds.

Ground	Claims	Statutory Basis
1	1-17	§ 102: Anticipated by Renegade Manual
2	1-17	§ 103: Obvious over Renegade Manual, Krude '422, Sugiyama, and the knowledge of a POSA

Explanation and support for each ground is set forth below and in the

Declaration of Dr. Davis. Ex.1032 ¶¶ 254-637. Additional references cited and described herein and the Davis Declaration demonstrate the knowledge of a POSA as of the effective filing date.²

IV. BACKGROUND REGARDING STATE OF THE ART

A. Automotive Drivelines and Joint Assemblies

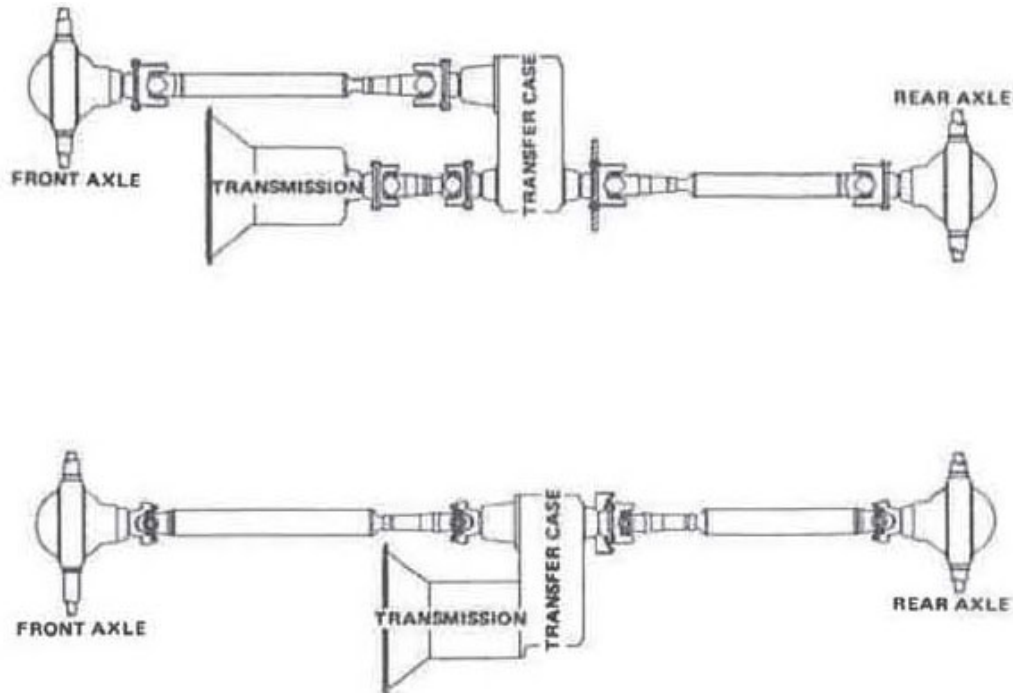
Automotive drivelines comprise a transmission, driveshaft (or propshaft), axles, and wheels, and transmit rotary power from the engine to the wheels. Ex.1032 ¶ 47.

In a more practical sense, the driveline is an assembly of one or more universal jointed solid or tubular driveshafts. It provides for axial movement and transmits torque and rotational motion at a fixed or varying angular relationship from one shaft to another.

Ex.1012 at PET_AAM_1012-0011. Joint assemblies couple shafts of a driveline, and comprise a first, female shaft that receives and couples to a second, male shaft. *Id.*; Ex.1032 ¶ 47.

“[D]riveline constructions can assume numerous design configurations.” Ex.1012 at PET_AAM_1012-0013. The SAE Manual illustrates several, such as those for “typical 4 x 4 driveline arrangements”:

² A POSA relating to the subject matter of the '376 patent would have either (1) a graduate's degree in mechanical or automotive engineering; or (2) a bachelor's degree in mechanical or automotive engineering and experience relating to the design and operation of powertrain components and systems. Ex.1032 ¶¶ 25-27.



Ex.1012 at PET_AAM_1012-0014-0017; Ex.1032 ¶ 48. Drivelines like these may include a power transfer unit (“PTU”) (analogous to the transfer case), used to direct power from the transmission to either the front axle (front wheel drive) or both the front and rear axles (all wheel drive), and a rear drive module (“RDU”) (analogous to the rear differential unit, part of the rear axle), used to disconnect the rear propshaft when the vehicle is in front wheel drive. Ex.1032 ¶ 49.

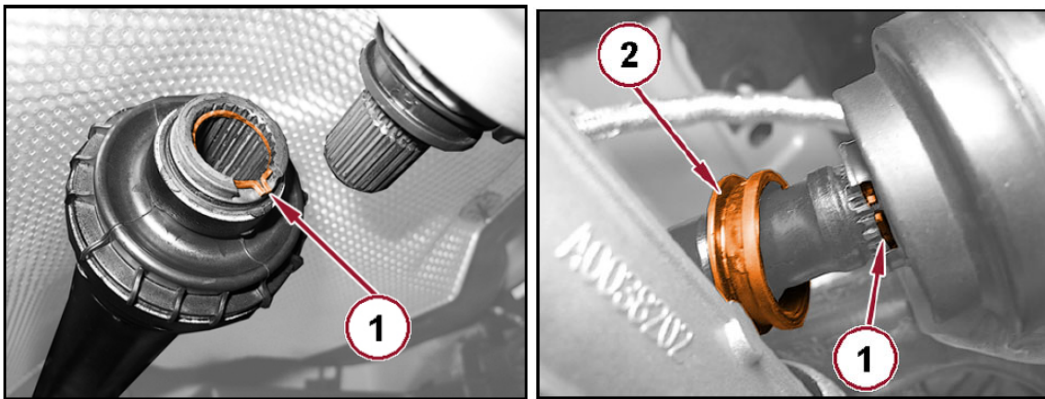
B. Splines and Splined Joint Assemblies

“The primary purpose of the driveshaft in an application is to transmit torque through an angle between the power source and the driven member.” Ex.1012 at PET_AAM_1012-0023. To achieve this purpose, the female and male shafts of a joint assembly often include “splines.” Ex.1012 at PET_AAM_1012-0193, -0331.

Internal splines of the female shaft engage complementary external splines of the male shaft, rotatably fixing the shafts together and allowing the shafts to transmit torque. *Id.*; *see also* Ex.1032 ¶¶ 50-51.

C. Retaining Rings for Joint Assemblies

Joint assemblies may accommodate relative axial motion between the shafts, or they may be fixed. Ex.1003 at PET_AAM_1012-0011, -0194-0195. In a fixed joint assembly, “retaining rings” (“snap rings”) are often used to axially retain the coupling between shafts. For example, Renegade Manual illustrates two fixed joint assemblies—one between the propshaft and RDU (“propshaft-RDU”) and one between the propshaft and PTU (“propshaft-PTU”).

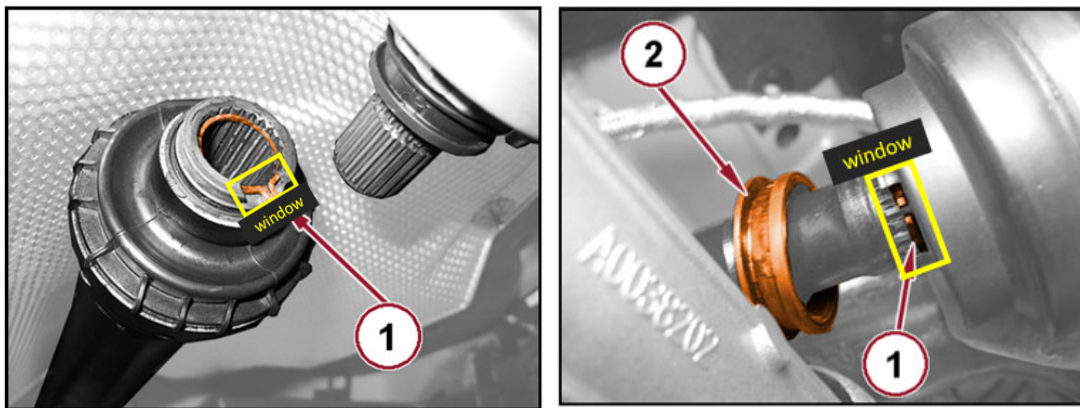


Ex.1013 at PET_AAM_1013-0202 (8 (RDU)), -0203 (11 (PTU)). The joint assemblies are fixed by way of an elastic “snap ring” seated in an internal “groove” of the female shaft and an external “groove” of the male shaft. *Id.*; *see also id.* at PET_AAM_1013-0197-0203 (16, 17, 24, 25, 27 and 3, 4, 8, 11), -0193. The retaining rings retain the coupling of the shafts during operation. *Id.*; Ex.1032 ¶¶ 52-

53,55-57. The use of retaining rings in this manner is well known in the art. *See* Ex.1006 at [0048]-[0050], [0053], [0055], Figs. 4-6; Ex.1008 at Abstract, 5:28-30, 5:66-6:43, 7:6-7, 7:13-15, 7:26-34, 7:60-62, 7:66-8:15, Figs. 1-10; Ex.1007 at [0035], [0059], Figs. 4, 7; Ex.1009 at 3:55-4:4, Figs. 3-5; Ex.1010 at [0021]-[0022], [0025], Figs. 1-3; Ex.1011, Brunetti at 2:23-31, Fig. 6; Ex.1017 at [0004]-[0005], [0010], [0025]-[0026], Figs. 1-6; Ex.1032 ¶¶ 53-57.

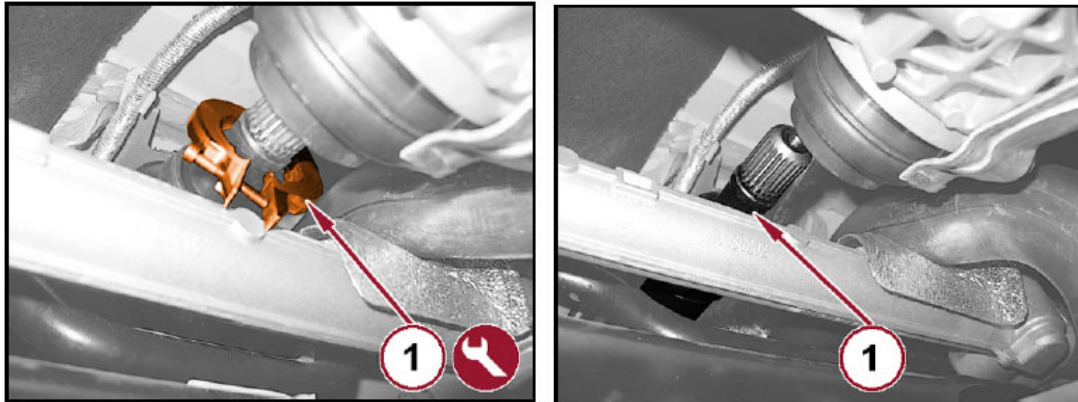
Different techniques are used to disassemble a joint assembly that is fixed by a retaining ring. One technique involves incorporating a window in the female shaft to access the retaining ring and compress or expand it (depending on its spring bias). Ex.1032 ¶¶ 58-59. This technique is also well known.

Renegade Manual, for example, teaches that the female shafts comprise a window used to access the retaining ring.

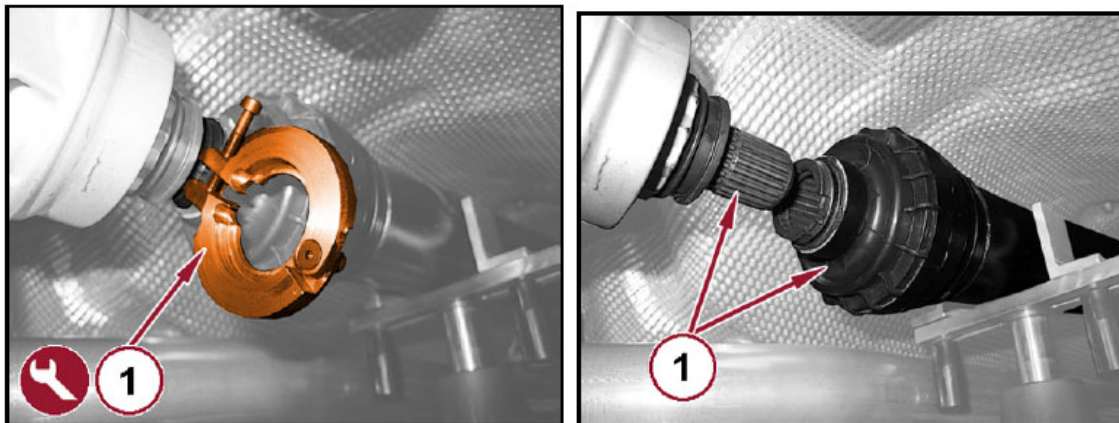


Ex.1013 at PET_AAM_1013-0202-0203 (8, 11); *id.* at PET_AAM_1013-0197-0201 (17, 24, 25, 27 and 3, 4). In regard to the propshaft-PTU joint assembly, Renegade Manual teaches to use an “Elastic Ring Spreader” “to open propeller shaft snap ring

at the PTU” and to “Disconnect the propeller shaft (1) from the PTU.”



Ex.1013 at PET_AAM_1013-0197-0198 (17-19). Renegade Manual teaches doing the same for the propshaft-RDU joint assembly.



Id. at PET_AAM_1013-0199 (24 and 25); Ex.1032 ¶ 58.

Numerous other references also teach incorporating a window in the female shaft to access a retaining ring:

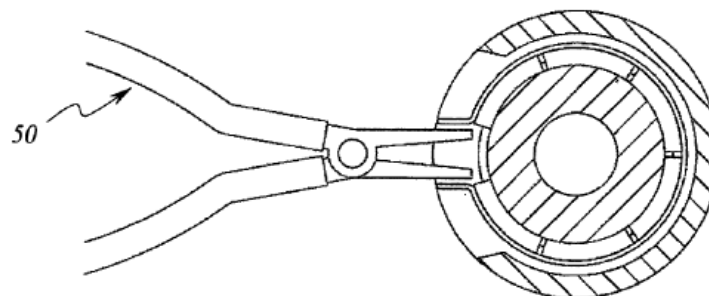
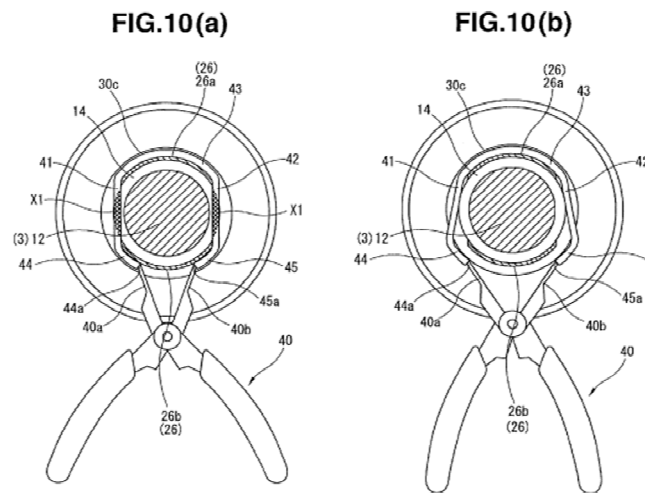
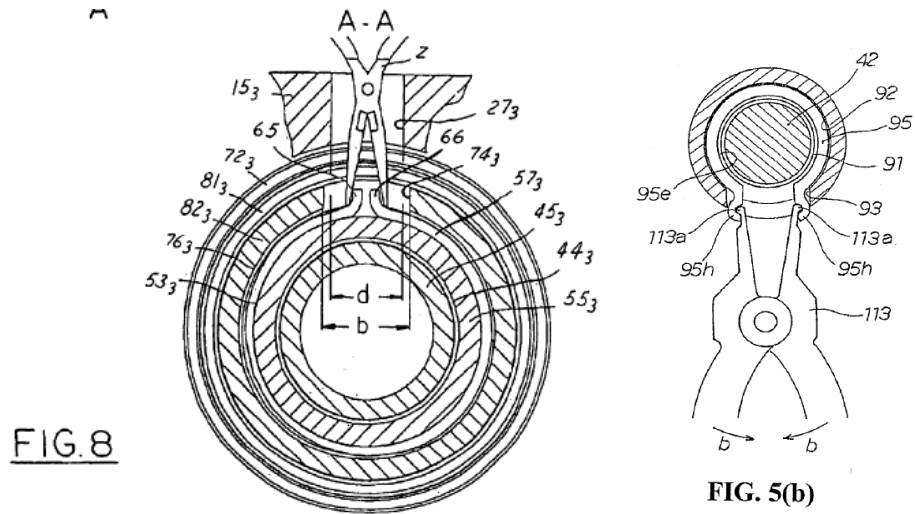


Fig. 5

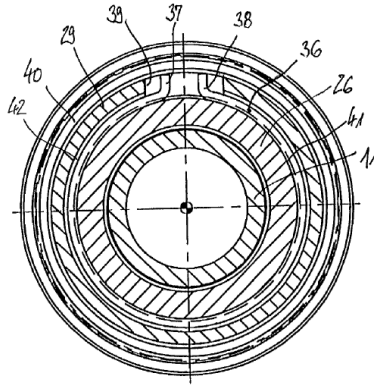


FIG. 1

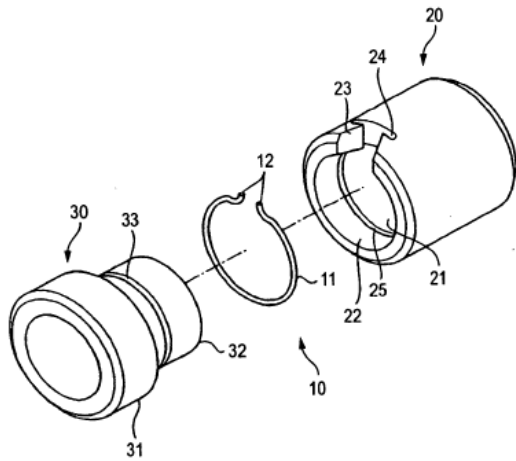


FIG. 3B

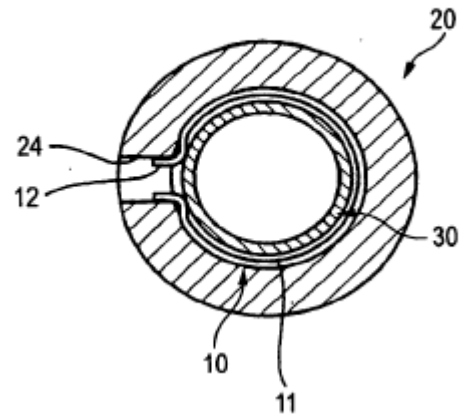


FIG. 4

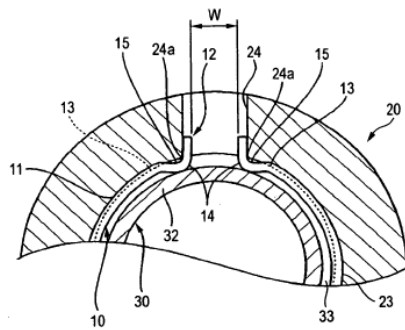


FIG. 6A

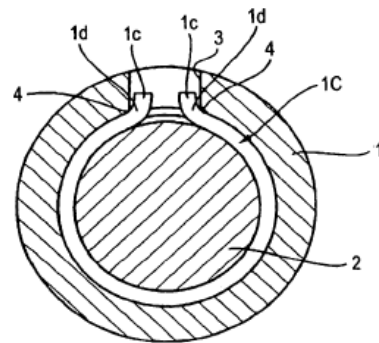
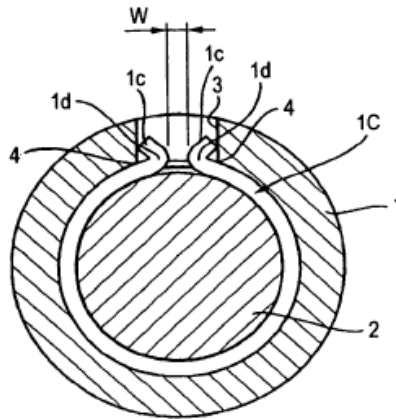


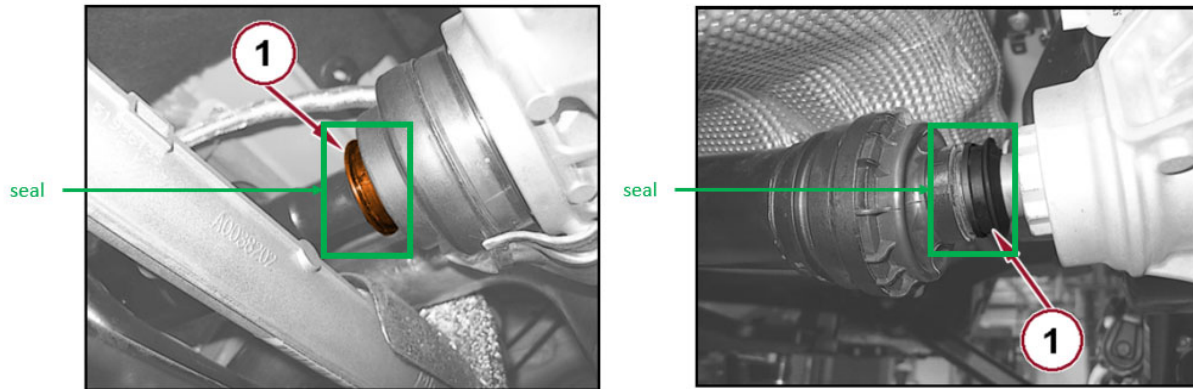
FIG. 6B

Ex.1008 at 7:19-25, 7:66-8:32, Figs. 7-9; Ex.1006 at [0053], [0055], [0057]-[0060], [0064] [0067]-[0071], Figs. 4-6; Ex.1007 at Abstract, [0046], [0047], [0051]-[0056], [0059], [0064]-[0066], Figs. 4, 7, 10(a)-(b); Ex.1009 at 4:56-60, 5:22-48, 5:65-6:3, Figs. 3, 5; Ex.1010 at [0021]-[0022], [0025], Figs. 1-3; Ex.1017 at [0004]-[0005], [0010], [0025]-[0026], Figs. 1-6; Ex.1032 ¶ 59.

D. Seals for Joint Assemblies

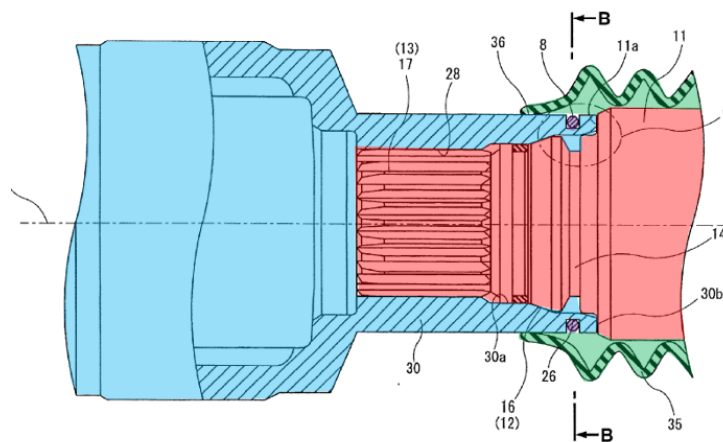
Joint assemblies are usually sealed to protect the splined connection from “the invasion of water or dust” or other contaminants. Ex.1007 at [0058]; *see also id.* at [0048], Figs. 3, 7; Ex.1011 at 1:30-36; Ex.1014 at 3:12-16, Figs. 1, 3; Ex.1015 at 1:4-6; Ex.1016 at 151-52. There are countless different designs, shapes, and sizes of seals, all known in the art. Ex.1032 ¶¶ 60-61.

Renegade Manual, as one example, discloses the use of seals (referred to as a “dust covers” or “dust seals”), to cover the window formed in the female shafts and protect the splined connection:



Ex.1013 at PET_AAM_1013-0197-0198 (16, 23); *id.* at PET_AAM_1013-0199-0203 (25, 27 and 1, 2, 8, 9, 12). Sugiyama discloses the use of a “water-proof boot 35” (green) to seal another fixed joint assembly and “prevent an invasion of water or dust from first and second through holes 31, 32.”

FIG.7



Ex.1007 at [0058], Fig. 7; Ex.1032 ¶ 61.

Seals may be formed with single or multiple corrugations, which serve many different purposes.

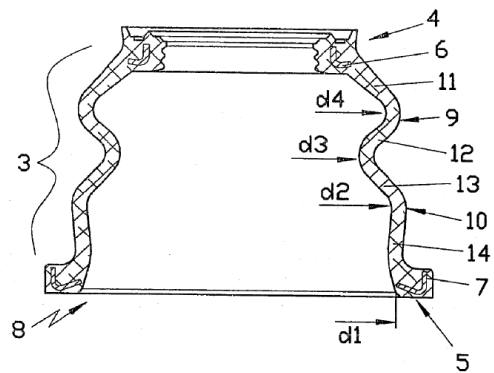
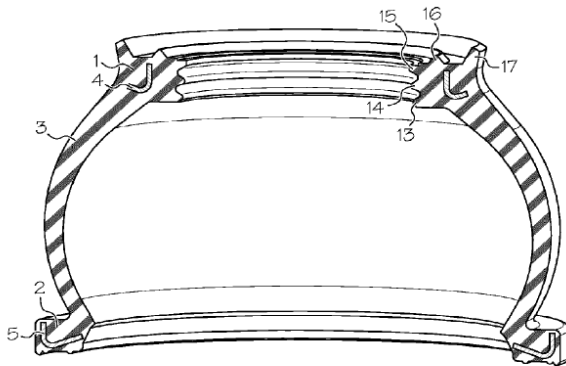
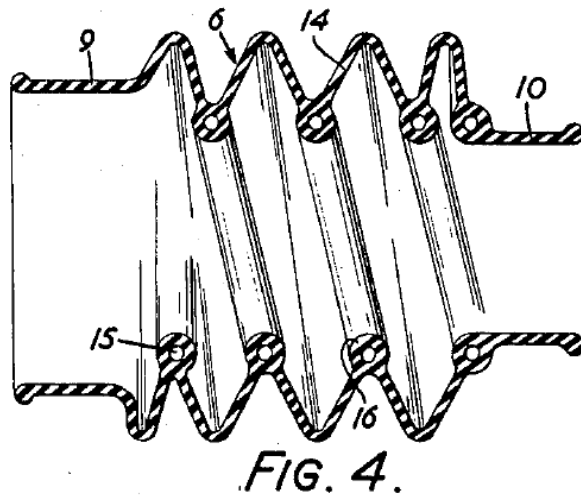
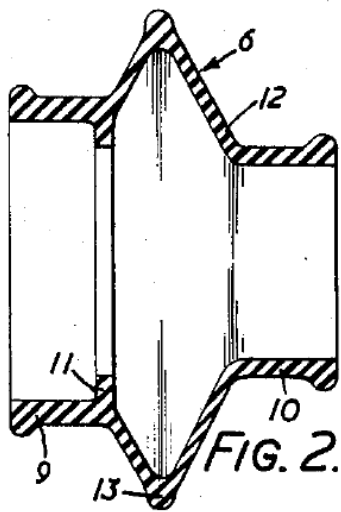


FIG. 1

Fig. 1

See Ex.1029 at PET_AAM_1029-0001 (“single- and multiple-convolution boots,” including “dust covers,” “for a broad range of applications in the auto industry”); Ex.1023 ¶ 50; Ex.1025 ¶¶ 1-5, 7; Ex.1019 at Figs. 2, 4; Ex.1026 at Figs. 1-4; Ex.1027 at Figs. 2, 7; Ex.1028 at 1, 4, 5; Ex.1032 ¶ 62. In joint assemblies that accommodate slip or articulation between shaft members, corrugations allow the seal to expand, contract, and articulate during operation. Ex.1012 at PET_AAM_1012-0199, -0201; Ex.1014 at 3:12-16, Figs. 1, 3; Ex.1015 at 1:4-6; Ex.1016 at 151-152; Ex.1007 at [0048], Figs. 1 and 3; Ex.1018 at 2:28-38, Fig. 1; Ex.1019 at 1:45-71, 2:43-65, Figs. 1-5; Ex.1032 ¶ 62. In fixed joint assemblies, like those of Renegade Manual and Sugiyama, corrugations may similarly “enable expansion and contraction (telescopically) in the axial direction” to help with assembly and disassembly of the fixed joint assembly. Ex.1007 at [0058], Fig. 7; Ex.1032 ¶ 62. Corrugations on the exterior of a seal may also provide a useful gripping feature to, again, help with assembly and disassembly, and corrugations on the interior of a seal may function as sealing surfaces to create a tighter seal. Ex.1026 at Figs. 1-4; Ex.1027 at Figs. 2, 7; Ex.1028 at 1, 4, 5; Ex.1032 ¶ 62. Ultimately, whether to use a corrugated seal, and the number and dimensions of the corrugations, would have been a simple and obvious design choice to a POSA. Ex.1032 ¶ 62.

Seals may also optionally be attached to the shaft members, for example, by way of a clamp or band. Sugiyama teaches that seals, like “water-proof boot 35”

(which is “attached and fixed to a cylindrical section 30 via a boot attachment section 36”), may be fixed “in a tight binding manner via a well-known boot band.” Ex.1007 at [0048], [0058], Figs. 3, 7; Ex.1015 at Fig. 1; Ex.1016 at 151, Figs. 1 and 3; Ex.1014 at Fig. 1; Ex.1018 at 2:28-38, Fig. 1; Ex.1019 at 2:43-65, Figs. 1-5. Clamped seals typically provide better protection than seals that are unclamped, and, again, whether and how to attach seals, including whether to use clamps, would have been a simple and obvious design choice. Ex.1032 ¶ 63.

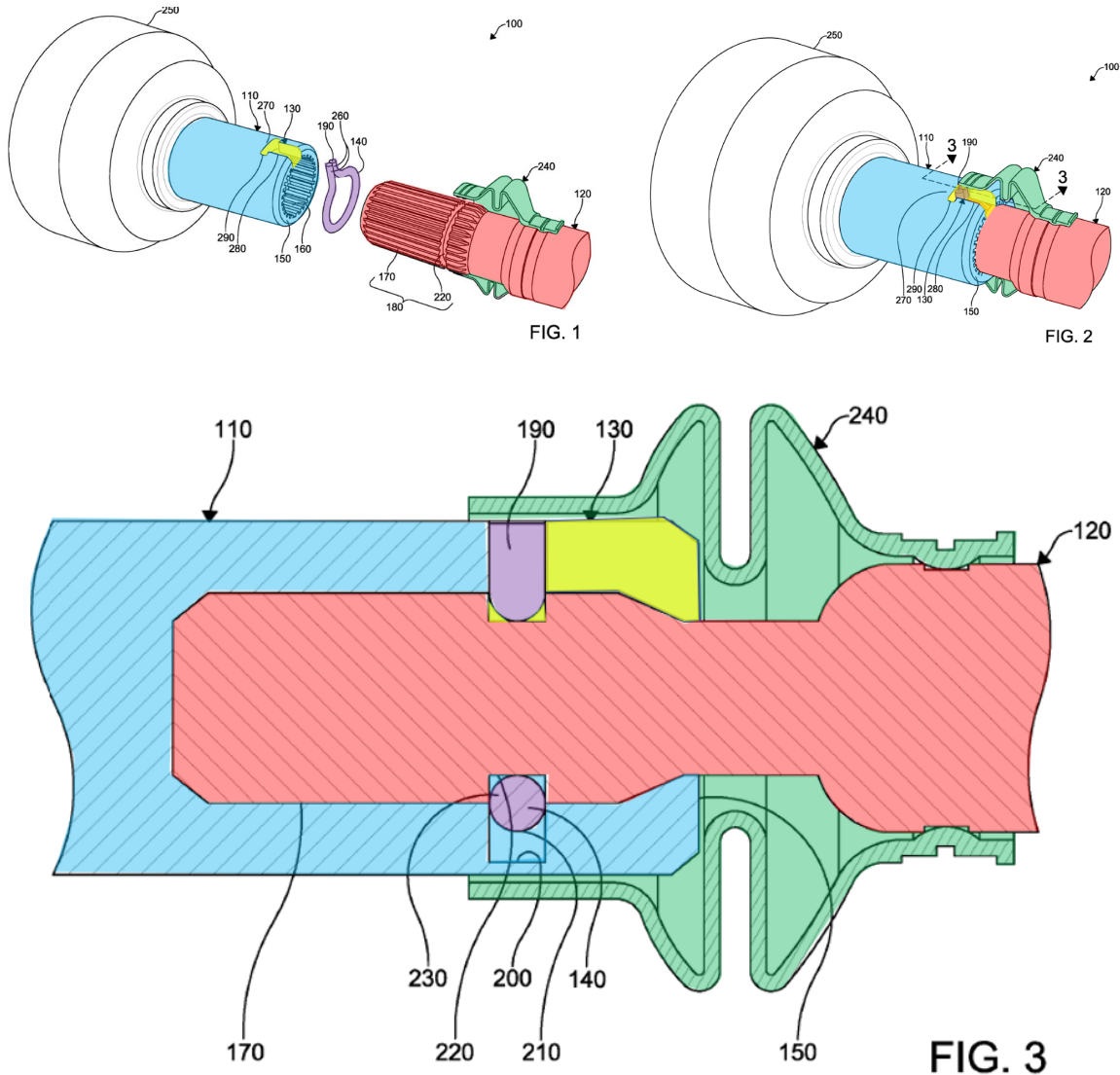
V. THE '376 PATENT

A. Background and Description of the '376 Patent

The '376 patent purports to improve splined joint assemblies that are axially fixed by a retaining ring, referred to as “plug-on” joint assemblies. Ex.1002 at 1:17-20, 1:36-49, 4:63-5:9. According to the '376 patent, a disadvantage of conventional plug-on joint assemblies was that their retaining rings were “entirely covered and ... not easily accessible for disassembly or disengagement with tools during maintenance” and, as a result, the retaining rings (and corresponding grooves) were “configured to permit forced disassembly with pry tools employing relatively minimal axial loads.” *Id.* at 1:54-67. Conventional plug-on joint assemblies, in other words, were “unable to withstand higher thrust loads applied to the driveline.” *Id.*; Ex.1032 ¶¶ 64-66.

The '376 patent purports to solve this problem. Ex.1001 at 2:9-62. It does so

by describing a joint assembly having an “access window” to access the retaining ring to service the joint assembly. *See id.* at 2:1-4, 2:9-62, Figs. 1-3. Figures 1-3 of the '376 patent depict one embodiment of the joint assembly:



Id. at 3:7-12, Figs. 1-3; Ex.1032 ¶¶ 67-68.

“Joint assembly 100 includes a first member 110” (female shaft, blue), “a second member 120” (male shaft, red), “a window 130” (yellow), “and a retaining

ring 140” (purple). Ex.1001 at 6:10-12. The first member and second member are coupled by a way of a “first plurality of splines 160” and “second plurality of splines 170.” *Id.* at 6:12-19, 6:41-44. Retaining ring 140, which is seated in annular recesses of the first and second shaft members, is “configured to retain the coupling.” *Id.* at 6:22-23, 6:47-54, 8:19-25. “[W]indow 130 is formed within the first member 110” (*id.* at 6:19-22; *see also id.* at 6:55-64), and provides access to “portion 190” of retaining ring 140 that is formed by “ends 260.” *Id.* at 6:24-29, 6:44-47. According to the ’376 patent, because retaining ring 140 is accessible through window 130, the joint assembly can be “more robust than other configurations, while being easily accessible and ergonomically configured for maintenance purposes.” *Id.* at 7:54-57; *see also id.* at 5:56-63, 7:57-8:11; Ex.1032 ¶¶ 69-71.

The joint assembly may optionally “include a seal configured to cover the window” to “prevent unwanted material, such as dust or debris, from entering the window.” Ex.1001 at 4:58-62; *see also id.* at 5:34-35, 7:1-12. In the embodiments of Figures 1-3, “seal 240” (green) is “configured as a boot.” *Id.* at 7:5-7. Seal 240 has corrugations, but the ’376 patent does not otherwise mention or describe corrugations or corrugated seals, and explains that other types of seals may be used. *Id.* at 7:7-12; *see also* Ex.1032 ¶ 72.

The ’376 patent also describes assembling (*id.* at 7:13-42, 8:12-19) and servicing and maintaining (*id.* at 7:43-8:11) the joint assembly. It explains that

“during servicing or maintenance of the joint assembly 100, the window 130 permits easy access to the retaining ring 140, where a tool can be employed to expand the retaining ring 140 for ease of separation of the first member 110 and the second member 120.” *Id.* at 7:43-47; *see also id.* at 6:64-7:4; Ex.1032 ¶ 73.

B. Prosecution History of the '376 Patent and Related '958 Patent

During prosecution of the parent to the '376 patent, U.S. Application No. 15/966,085 (which issued as the '958 patent), the original Examiner issued five Office Actions. Ex.1004 at PET_AAM_1004-0052-0061, -0174-0190, -0237-0239, -0264-0278, -0317-0333. Each time, the Examiner rejected all pending claims over Kofuji (Ex.1006), Krude '422 (Ex.1008), and Sugiyama (Ex.1007), which disclose splined joint assemblies that are axially fixed by a retaining ring accessible through a window. *Id.*; *see also* Ex.1032 ¶¶ 74-149, 169-184 (summarizing prosecution of the '958 and '376 patents).

The Examiner relied on the retaining ring of Krude '422 (right, purple) to modify the retaining ring of Kofuji (left, purple) to have distal ends “that extend in a direction radially outwardly into the window to a point at or radially inwardly from an outer wall of the first member,” as recited by the challenged claims.

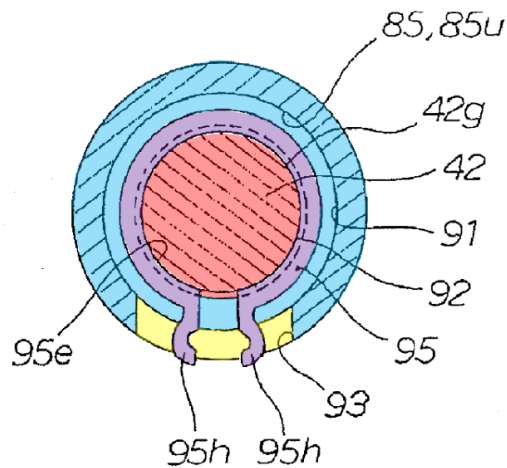


FIG. 5(a)

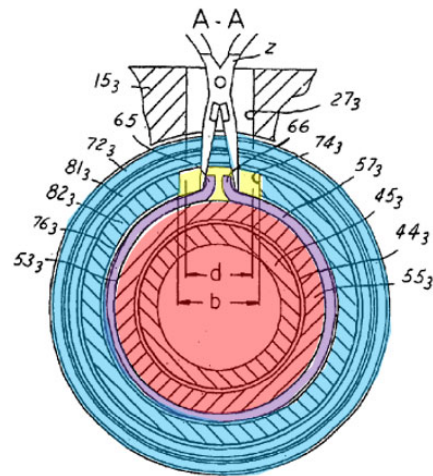
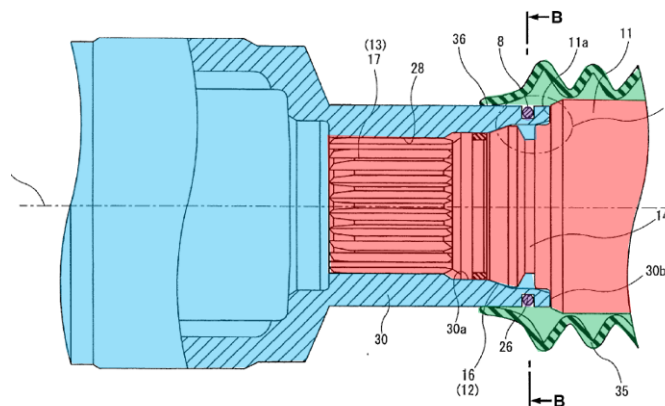


FIG. 8

See Ex.1004 at PET_AAM_1004-0176, -0237-0239, -0264-0278, -0317-0333; Ex.1006 at Fig. 5(a); Ex.1008 at Fig. 8. And the Examiner relied on the seal of Sugiyama, “water-proof boot 35” (green), which “enclose[s] first and second through holes 31, 32” “to prevent an invasion of water or dust,” to modify the joint assembly of Kofuji to include a seal.

FIG.7



Ex.1004 at PET AAM 1004-0052-0061, -0174-0190, -0237-0239, -0264-0278, -

0317-0333; Ex.1007 at [0058], Fig. 7.

Patent Owner appealed. Ex.1004 at PET_AAM_1004-0292-0310, -0348-0371. Patent Owner did not refute the Examiner's conclusion that using a retaining ring like that of Krude '422 would have been obvious. *Id.* Nor did Patent Owner dispute that using a seal having corrugations, like the seal of Sugiyama, would have been obvious. *Id.* Rather, Patent Owner argued that Sugiyama's "water-proof boot 35" does not have a "cylindrical portion" that covers "at least a portion of a perimeter of the window" of Sugiyama. Ex.1004 at PET_AAM_1004-0292-0310, -0348-0371. And, even though Sugiyama expressly teaches that boot seals may be clamped to shafts "via a well-known boot band" to form cylindrical portions of the seal (Ex.1007 at [0048], Fig. 3), Patent Owner argued that it would not have been obvious to do so for "water-proof boot 35." *Id.*

Patent Owner's appeal did not reach the Board. Rather, without further explanation, a new Examiner took over the examination, stated that Patent Owner's arguments were "persuasive," and issued a Notice of Allowance. Ex.1004 at PET_AAM_1004-0386.

The same, new Examiner examined the application that issued as the '376 patent. Ex.1005 at PET_AAM_1005-0135-0149. The Examiner did not cite Krude '422 or Sugiyama, and allowed the challenged claims with limited prosecution. *Compare id. and* PET_AAM_1005-0186-0193, 0186-0193, -0219-0222.

C. Claim Construction

1. “engagement means” (Claims 1, 2, 3, 6, 14)

“engagement means” is a means-plus-function limitation that means “fasteners, keys and keyways, male-female couplings, interlocking features, splines, and equivalents thereof.” *See* Ex.1032 ¶¶ 203-212.

means-plus-function: “engagement means” is a means-plus-function limitation. The use of “means” “creates a presumption that section 112, paragraph 6 has been invoked.” *Kemco Sales, Inc. v. Control Papers Co., Inc.*, 208 F.3d 1352, 1361 (Fed. Cir. 2000). That presumption cannot be rebutted because the word “engagement” is functional, not structural, and a POSA would not understand “engagement means” to provide sufficiently definite structure to perform the claimed function. *See* Ex.1032 ¶ 204.

function: The function is “coupling the first member to the second member.” Claims 1 and 14 recite that the first and second “engagement means” “provide a coupling of the second member to the first member.” Ex.1002 at Claims 1 and 14. The specification repeats that stated function. Ex.1002 at Abstract, 2:23-28, 2:39-49, 4:18-26, 4:40-42, 6:12-19; Ex.1032 ¶¶ 205-209.

corresponding structure: The corresponding structure set forth in the specification are “fasteners, keys and keyways, male-female couplings, interlocking

features, and splines.” Ex.1002 at 6:41-44; *id.* at 4:40-50; Ex.1032 ¶¶ 210-212.³

2. “retaining means” (Claims 1, 7, 10, 11, 14, 17)

“retaining means” is a means-plus-function limitation that means “retaining ring, snap ring, and equivalents thereof.” *See* Ex.1032 ¶¶ 214-224.

means-plus-function: “retaining means” is a means-plus-function limitation. Again, the presumption that § 112 ¶ 6 applies cannot be rebutted because the word “retaining” is functional, not structural, and a POSA would not understand “retaining means” to provide sufficiently definite structure to perform the claimed function. *See id.* ¶¶ 215-215.

function: The function is “retaining the coupling of the first member and the second member.” Claims 1 and 14 recite that the “retaining means” is “configured to retain the coupling of the second member to the first member.” Ex.1002 at Claim 1 and 14. The specification repeats that stated function. *Id.* at Abstract, 2:20-21, 2:30-35, 2:46-48, 2:54-57, 4:18-22, 5:29-33, 6:22-23; Ex.1032 ¶¶ 217-220.

corresponding structure: The corresponding structure set forth in the specification are “retaining rings” or “snap rings.” Ex.1002 at 6:44-46, 7:54-8:25;

³ Petitioner relies on complementary, male and female splines, and a POSA would understand that “engagement means” at least covers these splines, consistent with the preferred embodiment. Ex.1002 at 6:41-43, Figs. 1-3; Ex.1032 ¶ 213.

Ex.1032 ¶¶ 221-223.⁴

3. “cylindrical portion [of the seal]” (Claims 1, 8, 9, 10, 11, 14)

Patent Owner clearly and unmistakably defined “cylindrical portion of the seal” during prosecution of U.S. Application No. 15/966,085 (parent of the ’376 patent):

The term “cylindrical” is defined by the Merriam-Webster Dictionary as “relating to or having the form or properties of a cylinder,” wherein the term “cylinder” is further defined as “the surface traced by a straight line moving parallel to a fixed straight line and intersecting a fixed planar closed curve.” The recited “cylindrical portion of the seal” accordingly refers to a closed annular portion of the seal that is extended in an axial direction thereof, and not to a conical, frustoconical, or otherwise tapered shape that is formed by the seal.

Ex.1004 at PET_AAM_1004-0299. Petitioner applies the definition of “cylindrical portion of the seal” set forth during prosecution: “a closed annular portion of the seal that is extended in an axial direction thereof, and not to a conical, frustoconical, or otherwise tapered shape that is formed by the seal.” *See* Ex.1032 ¶¶ 225-227.

To the extent the Board adopts a different construction, Claims 1-17 are still unpatentable because, as set forth below, the prior art discloses seals having a “cylindrical portion” under any plain and ordinary meaning. *Id.* ¶ 227.

⁴ Petitioner only relies on “retaining rings” or “snap rings,” terms that are interchangeable, along with “securing rings,” “c-clips,” “circlips.” Ex.1032 ¶ 219. A POSA would understand that “retaining means” at least covers retaining rings and snap rings, consistent with the preferred embodiment. Ex.1002 at 6:7-8:25, Figs. 1-3; *see also* Ex.1032 ¶ 224.

4. “corrugated portion [of the seal]” (Claims 1, 12, 13, 14)

During prosecution of the '376 patent, the Examiner defined “corrugated” to mean “having the shape of a series of regular folds that look like waves” and concluded that the cited prior art “does not comprise a series of folds or waves and thus cannot be considered ‘corrugated,’ as claimed.” Ex.1005 at PET_AAM_1005-0147. Petitioner applies the definition of “corrugated portion of the seal” set forth during prosecution: “portion of the seal having the shape of a series of regular folds that look like waves.” See Ex.1032 ¶¶ 228-231.

Corrugated seals may have single corrugations or multiple corrugations, with each having a “corrugated portion” as that term was defined during prosecution and as would be understood by a POSA. For example, Freudenberg Sealing Technologies, which makes “[c]ustomer-specific boots for automotive ... applications,” including “dust covers as part of its boots portfolio,” describes the use of both “[s]ingle- and multiple-convolution boots” for “[p]rotection from external influences.” Ex.1029; Ex.1023 ¶ 50; Ex.1025 ¶¶ 1-5, 7; Ex.1019 at 2:62-3:2, Fig. 1 (boot seal having “single convolution section 12” or “convoluted section 14 comprising a plurality of convolutions”); Ex.1026 at Abstract, 1:13-25, Figs. 1-4; *supra* IV.D; Ex.1032 ¶ 230.

To the extent the Board adopts a different construction for “corrugated portion of the seal,” Claims 1-17 are still unpatentable because, as set forth below, the prior

art discloses seals having a “corrugated portion” under any plain and ordinary meaning. Ex.1032 ¶ 231.

VI. CHALLENGED CLAIMS 1-17 ARE UNPATENTABLE

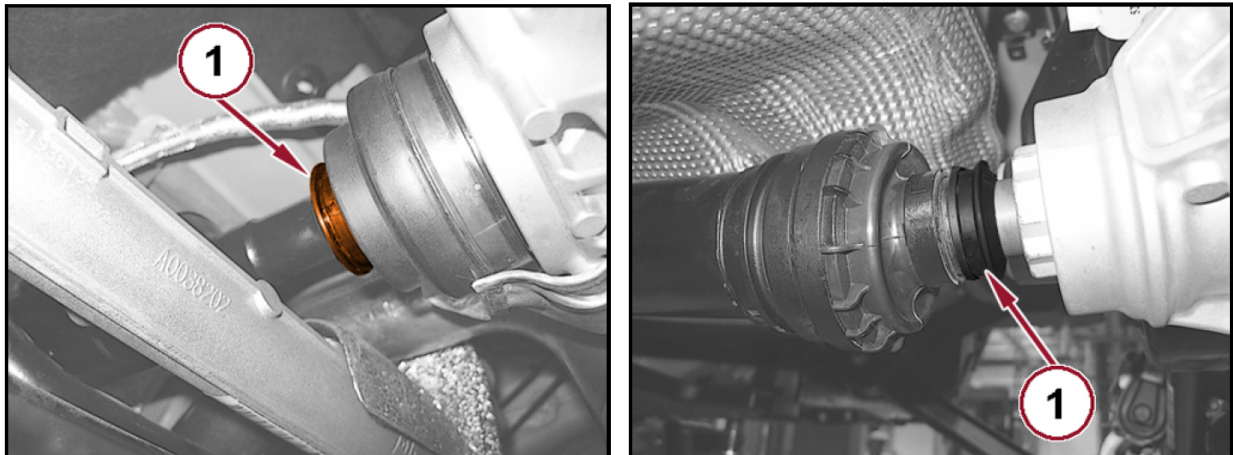
A. Ground 1 – Claims 1-17 are anticipated by Renegade Manual

Renegade Manual discloses every limitation of Claims 1-17 and anticipates those claims. Ex.1032 ¶¶ 232-240, 256-361.

1. Claim 1

[1P]⁵

Renegade Manual discloses a propshaft-PTU “joint assembly” (left) and a propshaft-RDU “joint assembly” (right).

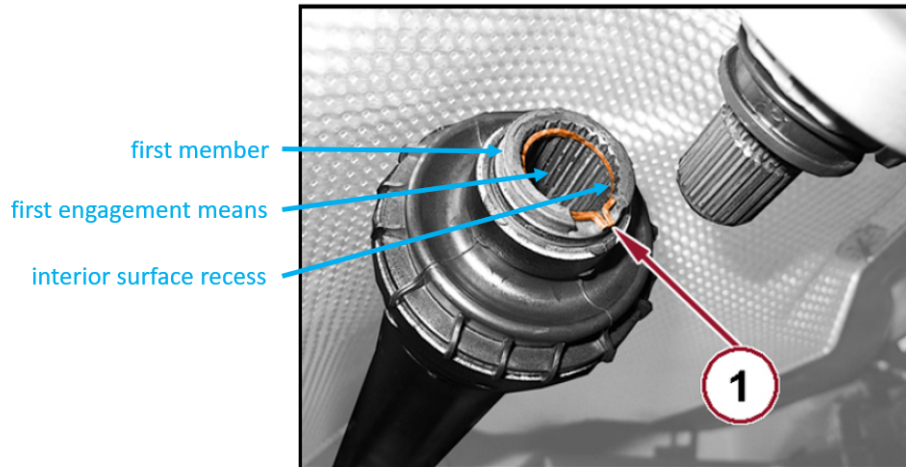


Ex.1013 at PET_AAM_1013-0197 (16 (propshaft-PTU)), -0198 (23 (propshaft-RDU)); Ex.1032 ¶ 258.

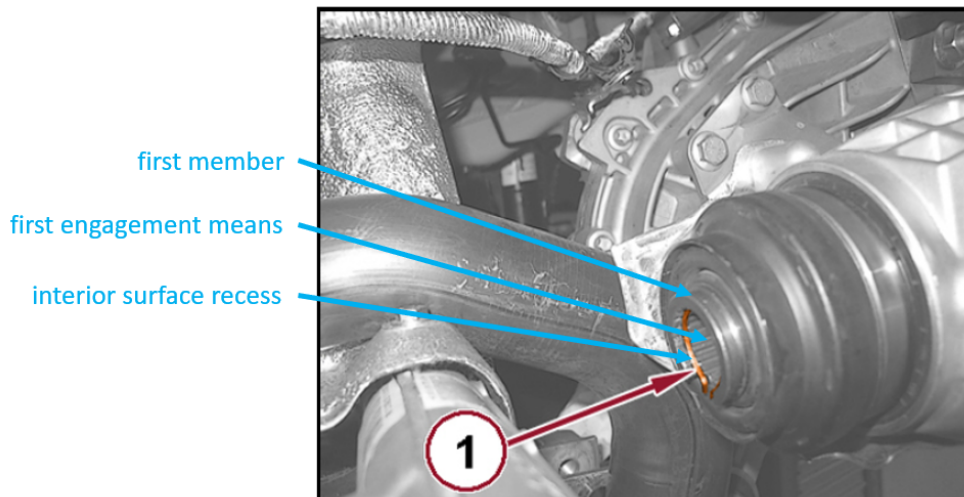
[1a]

⁵ See Claim Listing.

Each joint assembly has “a first member having a first engagement means and an interior surface recess.” Ex.1002 at Claim 1.



Ex.1013 at PET_AAM_1013-0202 (8 (propshaft-RDU)).



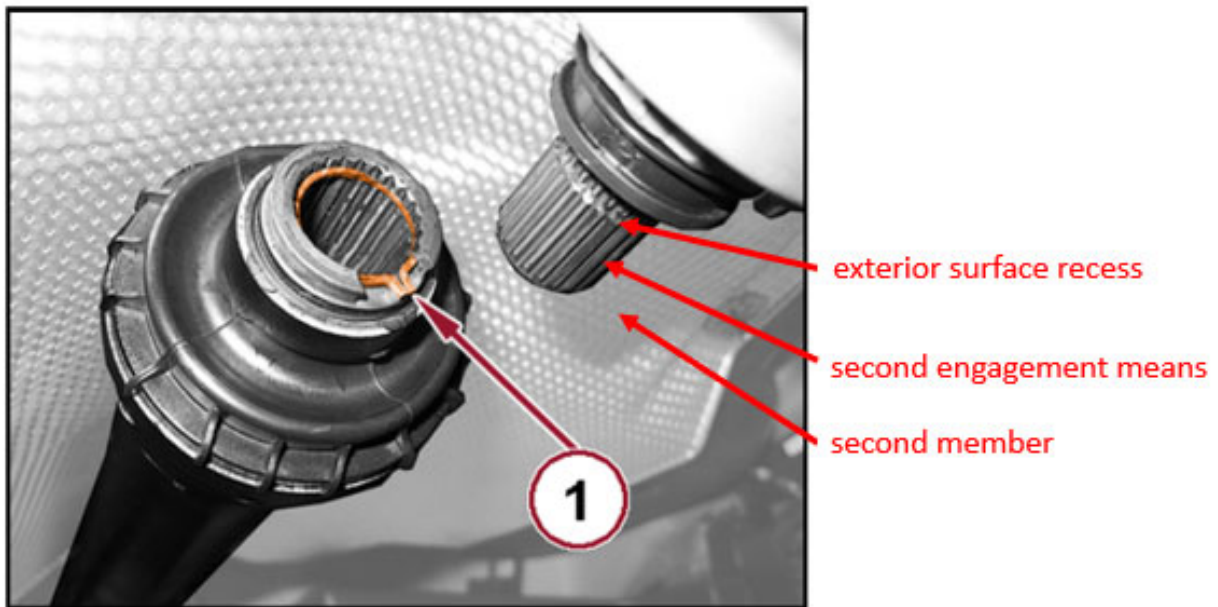
Id. at PET_AAM_1013-0201 (4 (propshaft-PTU)).

In particular, the propshaft of the propshaft-RDU joint assembly includes a female shaft, which is a “first member.” *Id.* at PET_AAM_1013-0199 (24, 25, 27), -0201 (3), -0202 (8); Ex.1032 ¶¶ 259-260. The PTU of the propshaft-PTU joint

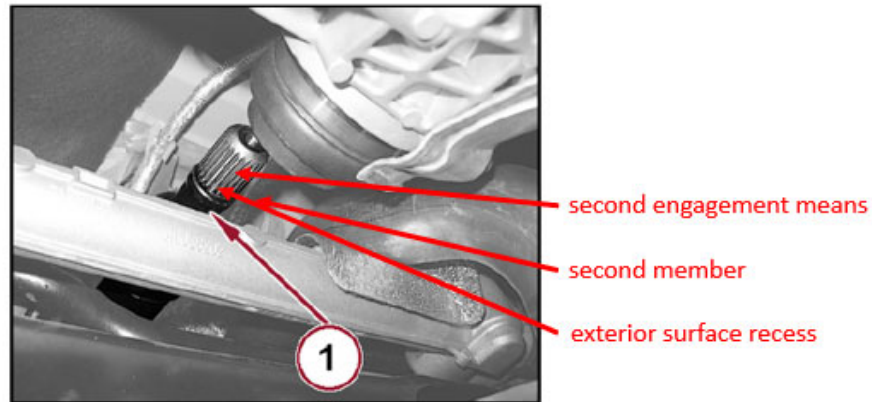
assembly includes a female shaft, which is a “first member.” Ex.1013 at PET_AAM_1013-0197 (17), -0198 (19), -0201 (4), -0203 (11); Ex.1032 ¶¶ 259-260. Each first member has a plurality of internal, female splines, which are “first engagement means,” and a “groove,” which is an “interior surface recess,” for receiving the “snap ring.” Ex.1013 at PET_AAM_1013-0197-0199 (17, 19, 24, 25, 27), -0201-0203 (3, 4, 8, 11); Ex.1032 ¶¶ 259-260.

[1b]

Each joint assembly has “a second member having a second engagement means and an exterior surface recess.” Ex.1002 at Claim 1.



Ex.1013 at PET_AAM_1013-0202 (8 (RDU)).



Id. at PET_AAM_1013-0198 (19 (PTU)).

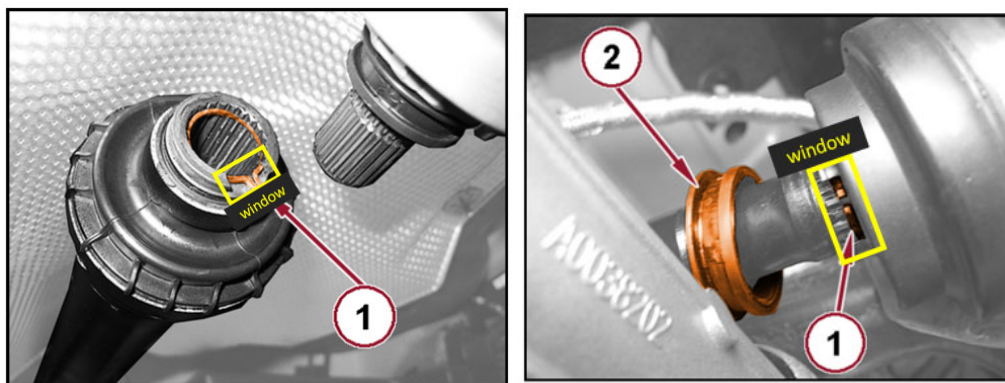
In particular, the pinion shaft of the RDU of the propshaft-RDU joint assembly includes a male shaft, which is a “second member.” *Id.* at PET_AAM_1013-0199-0202 (24, 25, 27 and 1, 8); Ex.1032 ¶¶ 261-262. The propshaft of the propshaft-PTU joint assembly includes a male shaft, which is a “second member.” Ex.1013 at PET_AAM_1013-0197-0198 (17, 19), -0200 (2), -0203 (11); Ex.1032 ¶¶ 261-262. Each of the second members has a plurality of external, male splines, which are “second engagement means,” and a “groove,” which is an “exterior surface recess,” for receiving the “snap ring.” Ex.1013 at PET_AAM_1013-0197-0203 (17, 19, 24, 25, 27 and 1, 2, 8, 11); Ex.1032 ¶¶ 261-262.

Renegade Manual also discloses “a portion of the second member disposed within the first member, the second engagement means engaging the first engagement means to provide a coupling of the second member to the first member.” Ex.1002 at Claim 1. In the propshaft-RDU joint assembly, a portion of the pinion

shaft of the RDU (second member) is disposed within the propshaft (first member), and the plurality of external, male splines (second engagement means) on the pinion shaft engage the plurality of internal, female splines (first engagement means) on the propshaft to provide a coupling of the pinion shaft to the propshaft. Ex.1013 at PET_AAM_1013-0198-0202 (23, 24, 25, 27 and 1, 3, 8, 9). And, for the propshaft-PTU joint assembly, a portion of the propshaft (second member) is disposed within the PTU (first member), and the plurality of external, male splines (second engagement means) on the propshaft engage the plurality of internal, female splines (first engagement means) on the PTU to provide a coupling of the propshaft to the PTU. *Id.* at PET_AAM_1013-0197-0198 (16, 17, 19), -0200-0202 (2, 4, 11); *see also* Ex.1032 ¶ 263.

[1c]

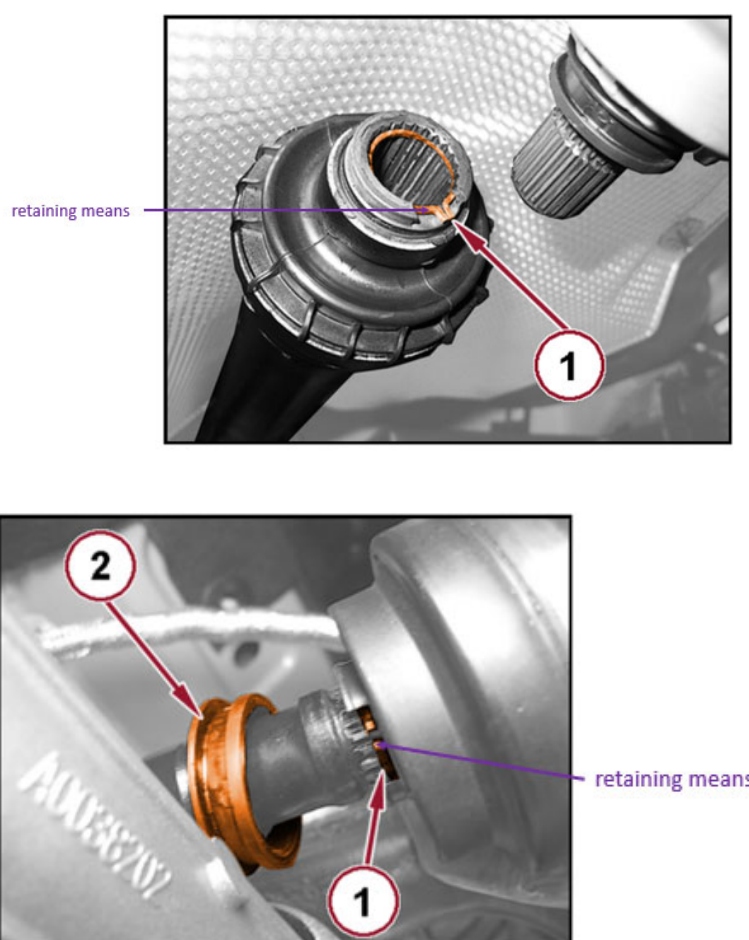
Each joint assembly has “a window formed within the first member where the portion of the second member is disposed within the first member.” Ex.1002 at Claim 1.



See Ex.1013 at PET_AAM_1013-0197-0203 (17, 24, 25, 27 and 3, 4, 8, 11);
Ex.1032 ¶ 264.

[1d]

Each joint assembly comprises “a retaining means configured to retain the coupling of the second member to the first member” (Ex.1002 at Claim 1), namely an elastic “snap ring.”

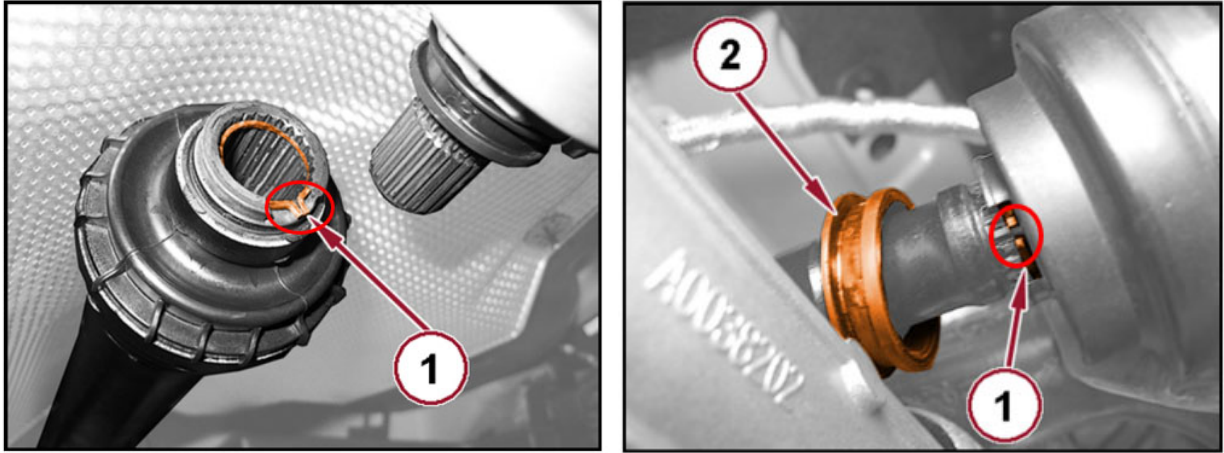


Ex.1013 at PET_AAM_1013-0202-0203 (8, 11); *id.* at PET_AAM_1013-0197-0201
(16, 17, 24-27 and 3, 4); Ex.1032 ¶ 265.

[1d(i)]

“Distal ends of the retaining means are accessible through the window.”

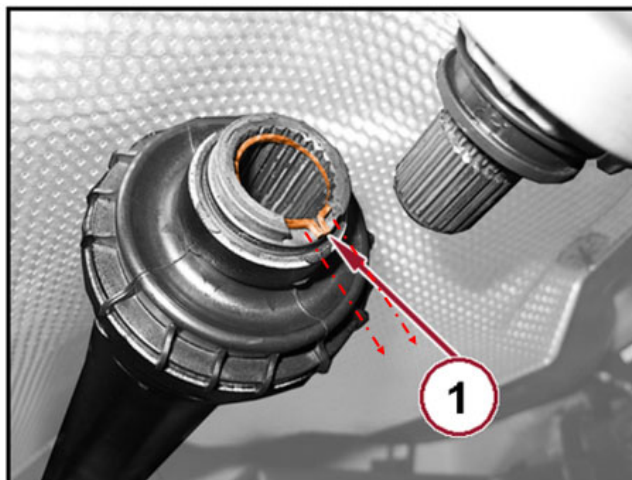
Ex.1002 at Claim 1.

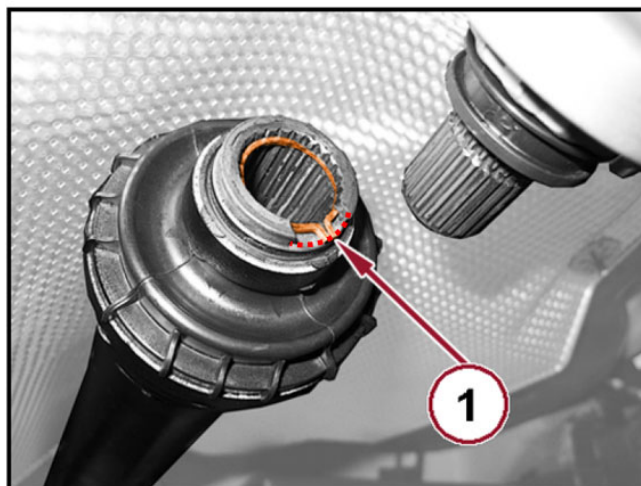


Ex.1013 at PET_AAM_1013-0202-0203 (8, 11); *see also id.* at PET_AAM_1013-0193, -0197-0201 (16, 17, 24-27 and 3, 4); Ex.1032 ¶ 266.

[1d(ii)]

“Distal ends of the retaining means extend in a direction radially outwardly into the window to a point at or radially inwardly from an outer surface of the first member.” Ex.1002 at Claim 1.

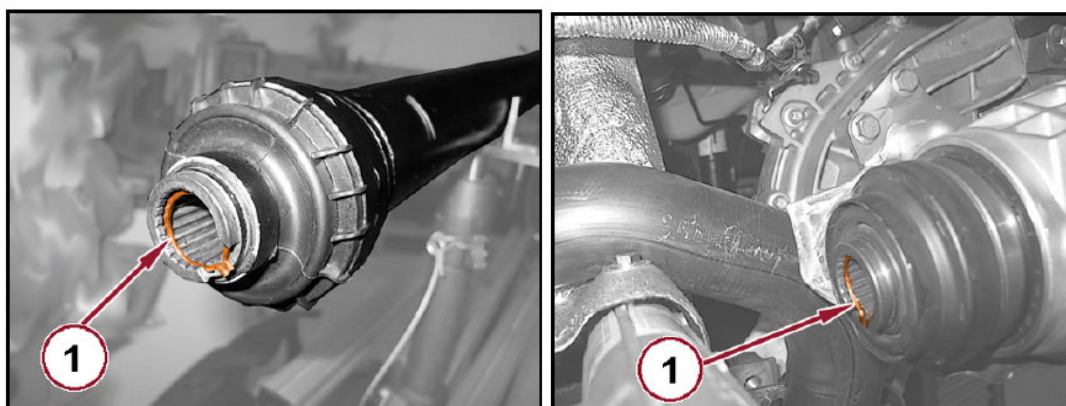


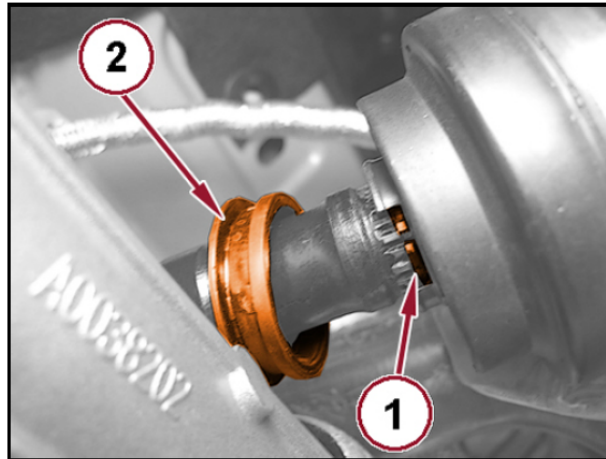


Ex.1013 at PET_AAM_1013-0202 (8); *see also id.* at PET_AAM_1013-0197-0203 (17, 24, 25, 27 and 3, 4, 8, 12); Ex.1032 ¶ 267.

[1d(iii)]

In each joint assembly, “the retaining means is received partially into each of the interior surface recess of the first member and the exterior surface recess of the second member when the retaining means retains the coupling of the second member to the first member.” Ex.1002 at Claim 1.

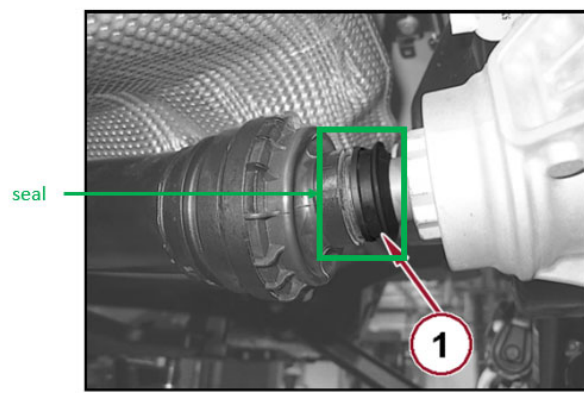
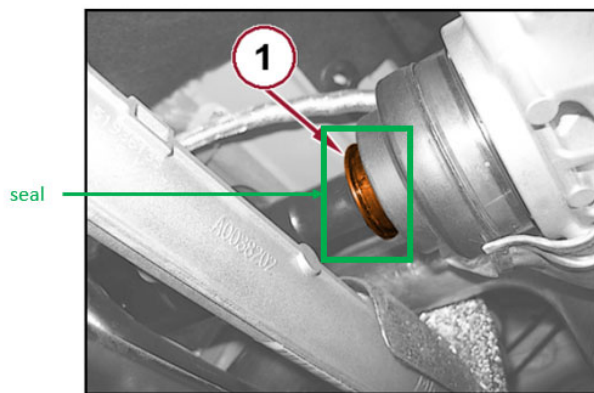




Ex.1013 at PET_AAM_1013-0201 (3, 4), -0202 (8, “verify the snap ring is seated in the groove of the [second, male shaft]”), -0203 (11, same); *see also id.* at PET_AAM_1013-0197-0200 (16-19, 23-27 and 1-2); Ex.1032 ¶ 268.

[1e]

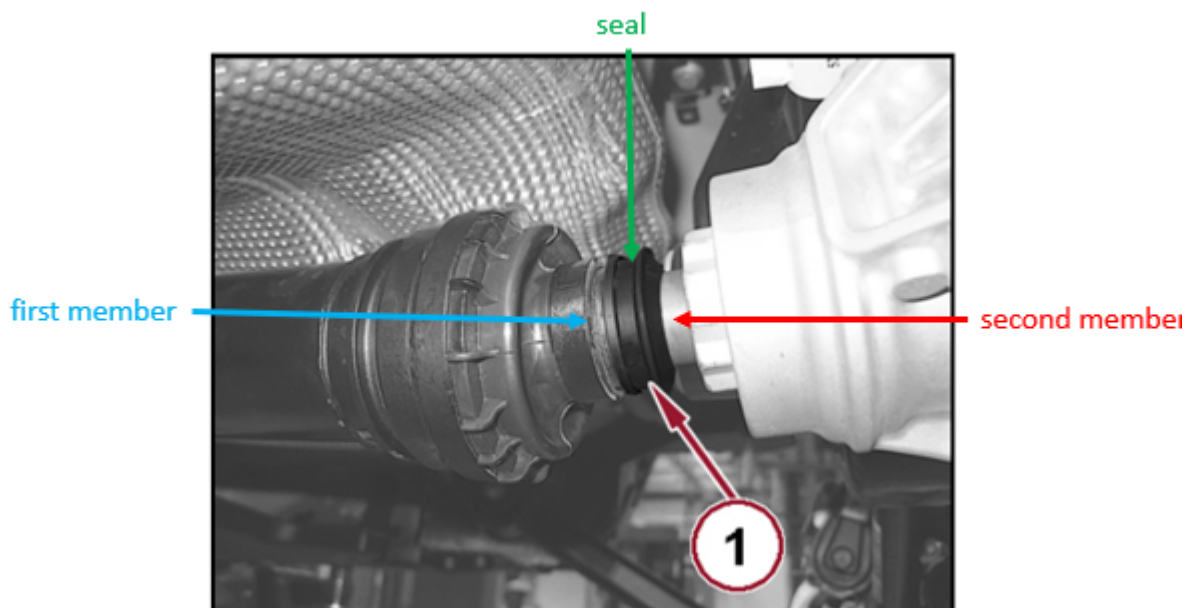
Each joint assembly comprises “a seal configured to cover the window formed in the first member” (Ex.1002 at Claim 1), namely “dust cover” or “dust seal.”



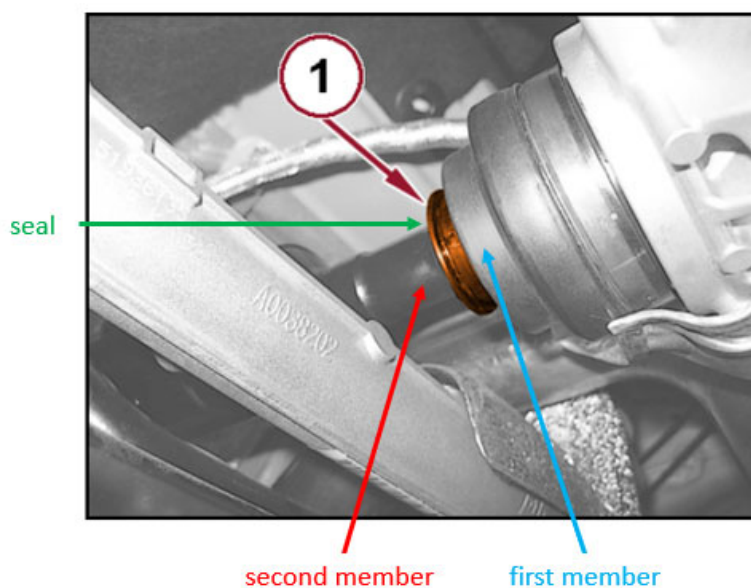
Ex.1013 at PET_AAM_1013-0197-0198 (16, 23); *see also id.* at PET_AAM_1013-0197-203 (16, 23, 25, 27 and 1, 2, 8, 9, 12); Ex.1032 ¶ 269.

[1e(i)]

Each seal is “coupled to the second member adjacent an end of the first member.” Ex.1002 at Claim 1.



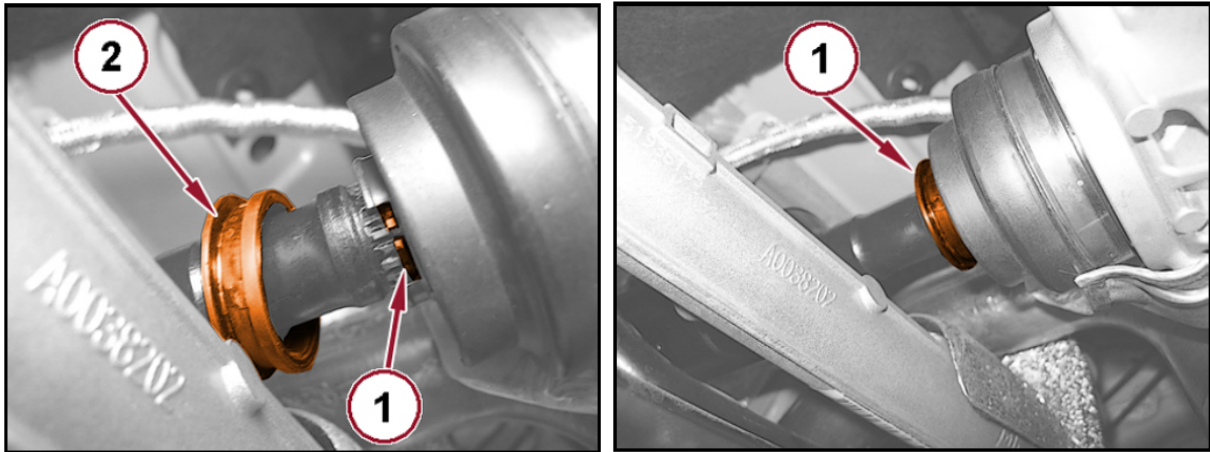
Ex.1013 at PET_AAM_1013-0198 (23), -0202 (9).



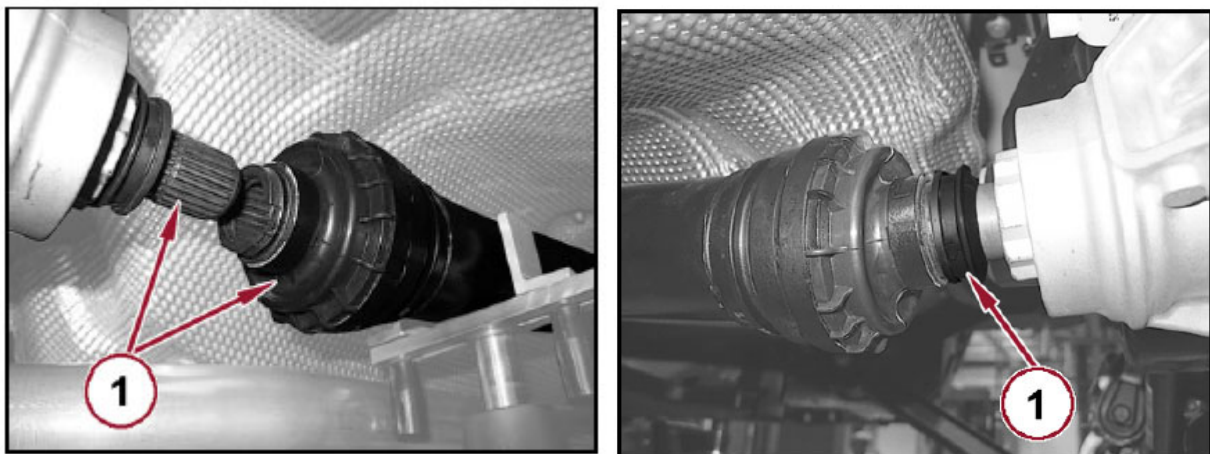
Ex.1013 at PET_AAM_1013-0197 (16), -0203 (12); *see also id.* at Ex.1013 at PET_AAM_1013-0197-0203 (16, 25, 27 and 1, 2, 8, 9, 12); Ex.1032 ¶ 270.

[1e(ii)]

Each seal is “coupled to the first member adjacent the window.” Ex.1002 at Claim 1.



Ex.1013 at PET_AAM_1013-0197 (16), -0203 (12).

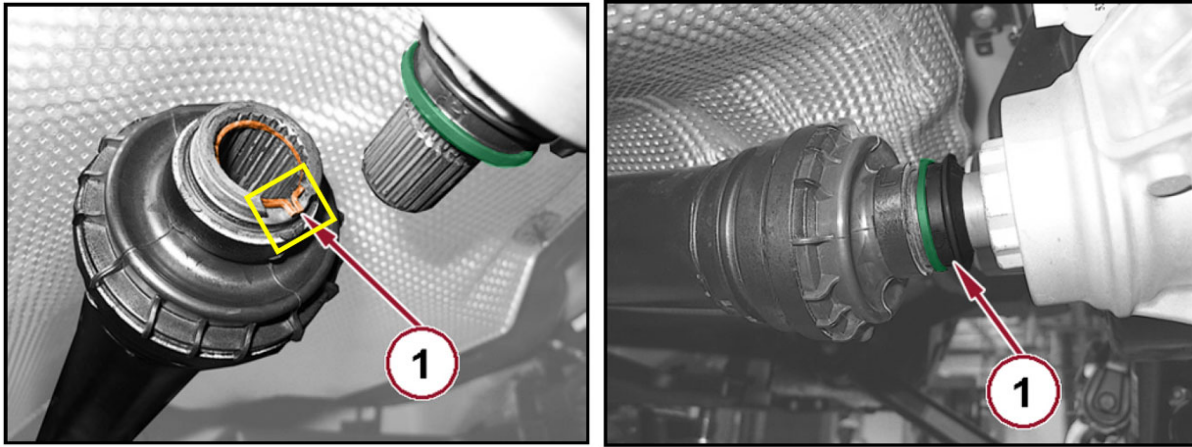


Id. at PET_AAM_1013-0198-0199 (23, 25, 27); *id.* at PET_AAM_1013-0200-0203 (1, 2, 8, 9, 11, 12); Ex.1032 ¶ 271.

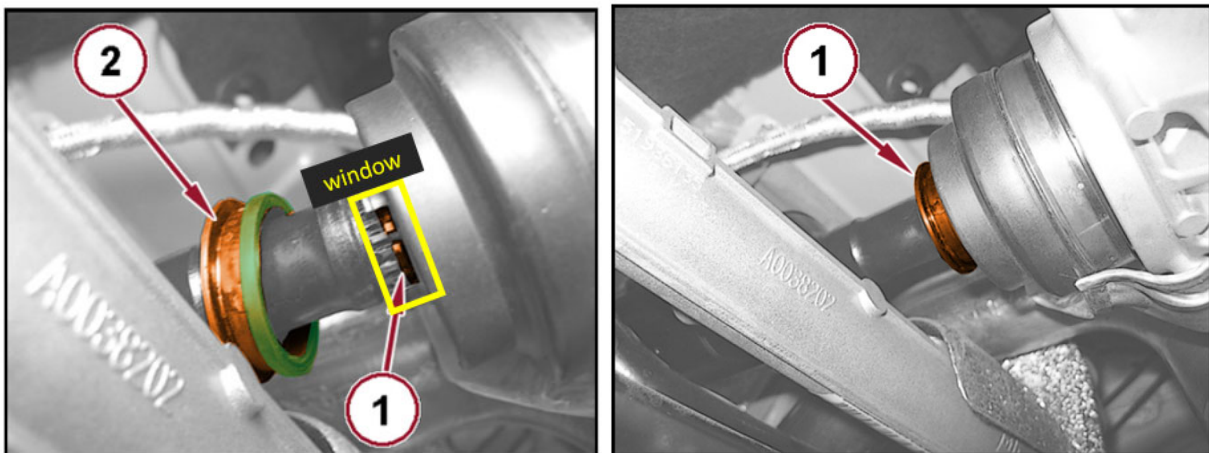
[1e(iii)]

Each seal includes a “cylindrical portion” (green) “directly engaging the outer surface of the first member adjacent the window” (yellow box). Ex.1002 at Claim

1.



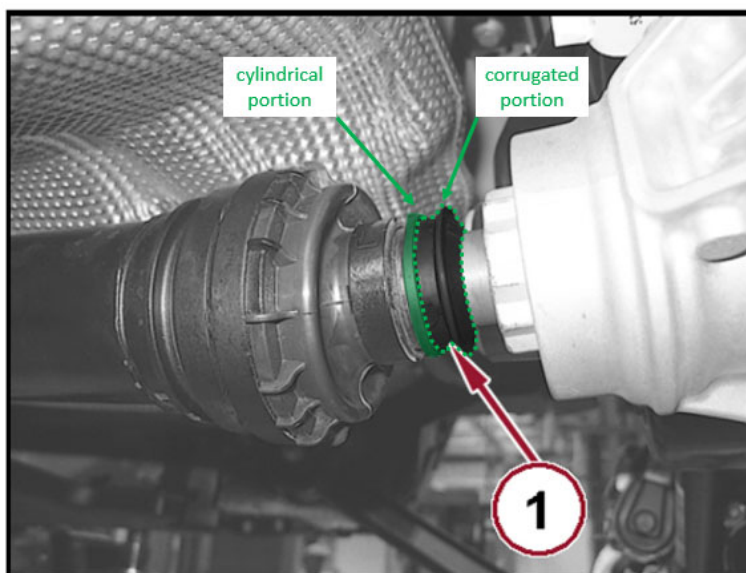
Ex.1013 at PET_AAM_1013-0198 (23), -0202 (8, 9)



Id. at PET_AAM_1013-0197 (16), -0203 (11); *see also id.* at PET_AAM_1013-0197-0201 (17, 23-27 and 1-4), -0203 (12); Ex.1032 ¶¶ 272-273.

[1e(iv)]

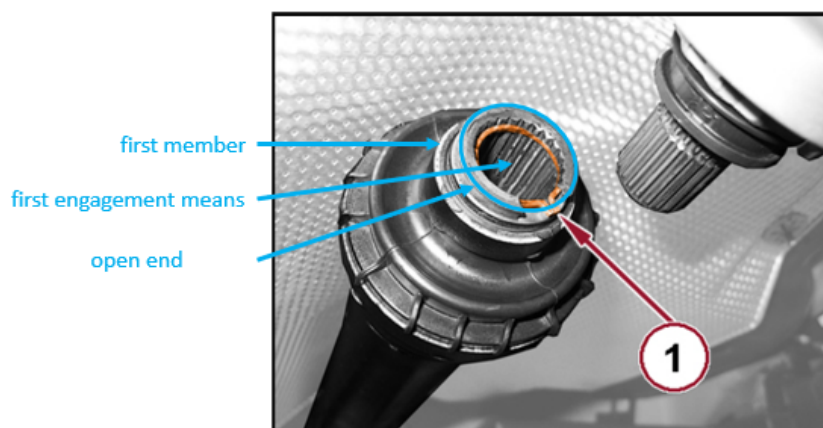
Each seal “further includes a corrugated portion” (green dashed lines) “disposed adjacent the cylindrical portion” (green). Ex.1002 at Claim 1.



Ex.1013 at PET_AAM_1013-0198 (23), -0202 (9); *see also id.* at PET_AAM_1013-0197-0203 (16, 17, 24, 25, 27 and 1, 2, 8, 11, 12); Ex.1032 ¶ 274.

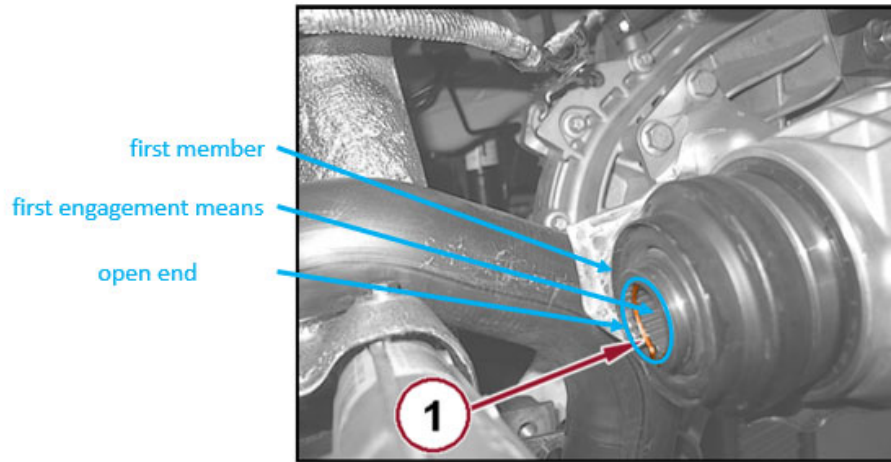
2. Claim 2

In each joint assembly, “the first member includes an open end and the first engagement means of the first member is formed within the open end.” Ex.1002 at Claim 2.



Ex.1013 at PET_AAM_1013-0202 (8); *see also id.* at PET_AAM_1013-0199 (24,

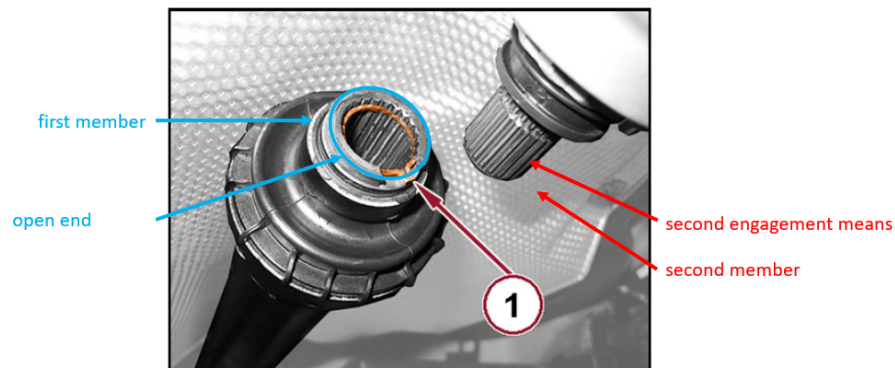
25, 27), -0201-0202 (3, 8, 9).



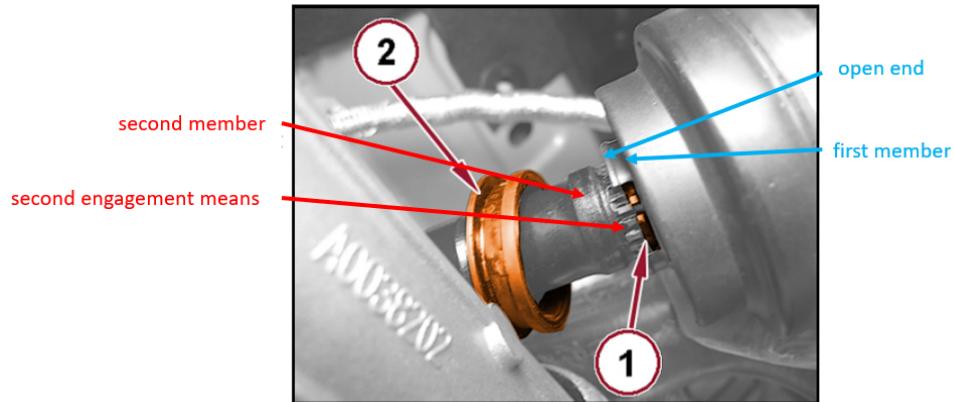
Id. at PET_AAM_1013-0201 (4); *see also id.* at PET_AAM_1013-0197-0198 (17, 19), -0203 (11); Ex.1032 ¶¶ 276-278.

3. Claim 3

In each joint assembly, “the portion of the second member disposed within the first member is disposed within the open end and includes the second engagement means.” Ex.1002 at Claim 3.



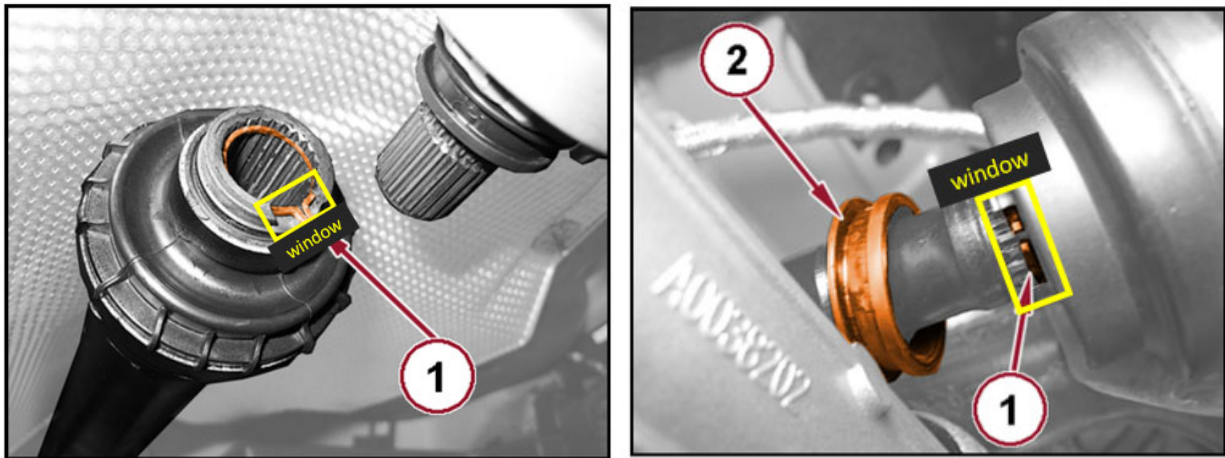
Ex.1013 at PET_AAM_1013-0202 (8); *see also id.* at PET_AAM_1013-0199 (24, 25, 27), -0200-0202 (1, 3, 8, 9).



Id. at PET_AAM_1013-0203 (11); *see also id.* at PET_AAM_1013-0197-0198 (17, 19), -0200-0201 (2, 4); Ex.1032 ¶¶ 279-281.

4. Claim 4

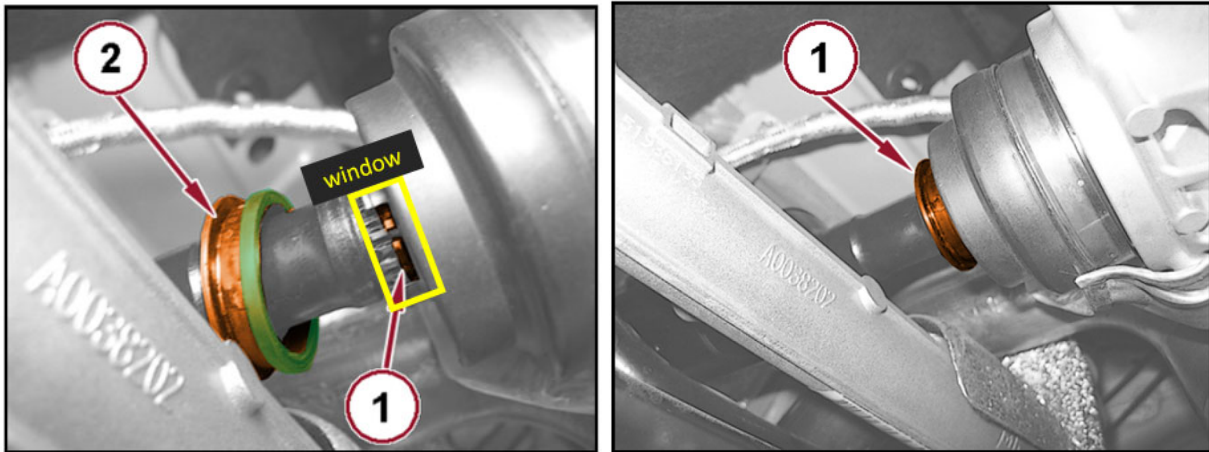
In each joint assembly, “the window is continuous with the open end” of the first member. Ex.1002 at Claim 4.



Ex.1013 at PET_AAM_1013-0202-0203 (8, 11); *see also id.* at PET_AAM_1013-0197-0201 (17, 24, 25, 27 and 3, 4); Ex.1032 ¶¶ 282-284.

5. Claim 5

In each joint assembly, “the seal is coupled to the first member adjacent an end of the window disposed distally from the open end of the first member” of the first member. Ex.1002 at Claim 5.



Ex.1013 at PET_AAM_1013-0197 (16), -0203 (11); Ex.1013 at PET_AAM_1013-0197-0203 (16, 17 and 2, 4, 12); Ex.1032 ¶¶ 285-287.

6. Claim 6

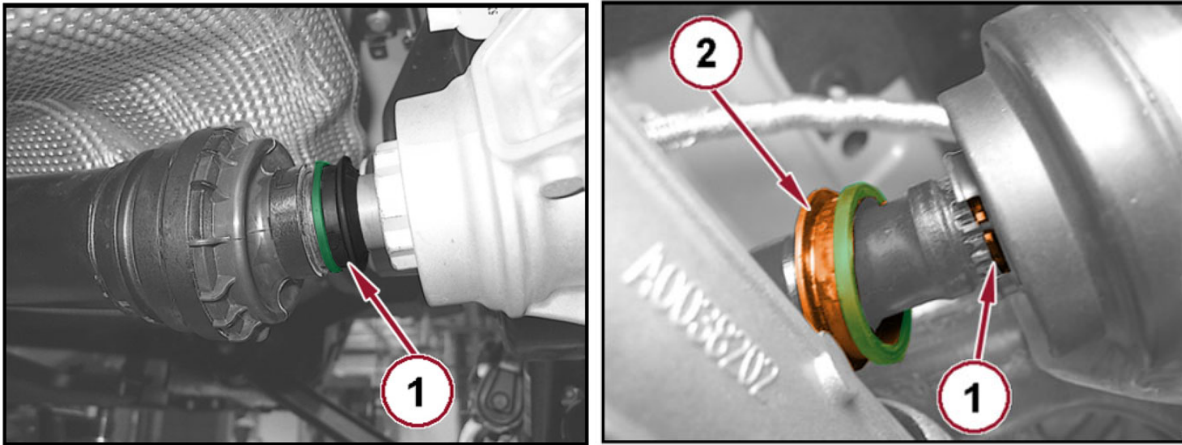
As described above in regard to limitations [1a] and [1b], in each joint assembly, “the first engagement means includes a first plurality of splines and the second engagement means includes a second plurality of splines.” Ex.1002 at Claim 6; *see supra* VI.A.1; Ex.1032 ¶¶ 288-290.

7. Claim 7

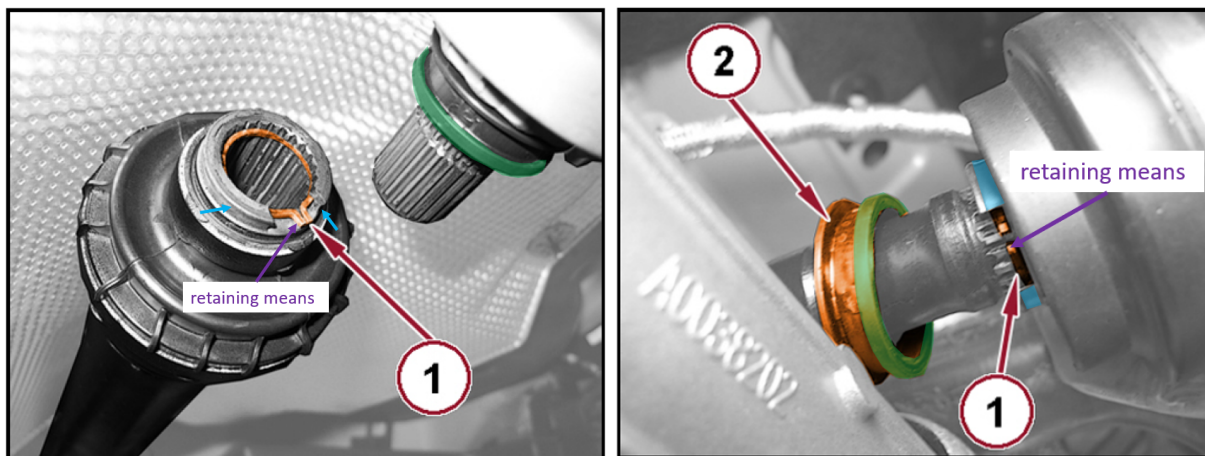
As described above in regard to limitation [1d], in each joint assembly, “the retaining means is configured as a retaining ring.” Ex.1002 at Claim 7; *see supra* VI.A.1; Ex.1032 ¶¶ 291-293.

8. Claim 8

In each joint assembly, “at least a portion of the cylindrical portion” of the seal (green) “directly covers the window.” Ex.1002 at Claim 8.



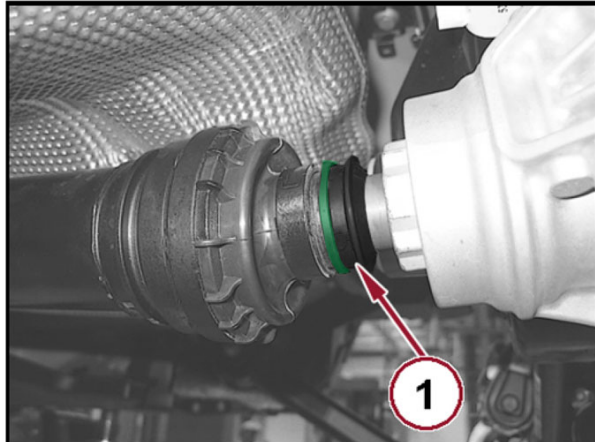
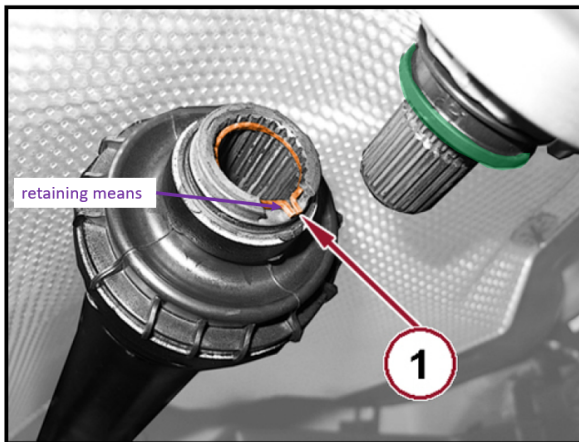
Ex.1013 at PET_AAM_1013-0198 (23), -0202-0203 (9, 11); Ex.1013 at PET_AAM_1013-0197-0203 (16, 17, 24, 25, 27 and 1-4, 8, 12); Ex.1032 ¶¶ 294-298. Dr. Davis testified, for example, that semi-annular grooves on each first member (blue and blue arrows) are (i) broken up by the window of each first member and (ii) configured to receive the cylindrical portion of the seal (green).



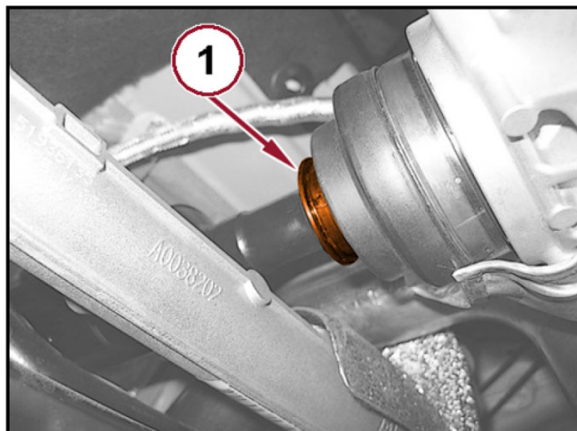
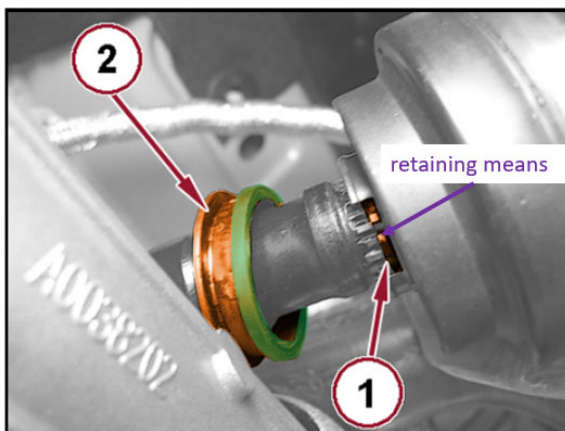
Ex.1032 ¶ 298 (citing Ex.1013 at PET_AAM_1013-0202-0203 (8, 11, 12)); *see also* Ex.1013 at PET_AAM_1013-0197-0203 (16, 17, 19, 23-27 and 1-4, 8, 9, 11, 12). This confirms that “at least a portion of the cylindrical portion” (green) “directly covers the window.”

9. Claim 9

In each joint assembly, “the cylindrical portion” of the seal (green) “is disposed directly radially outwardly of the window.” Ex.1002 at Claim 9.



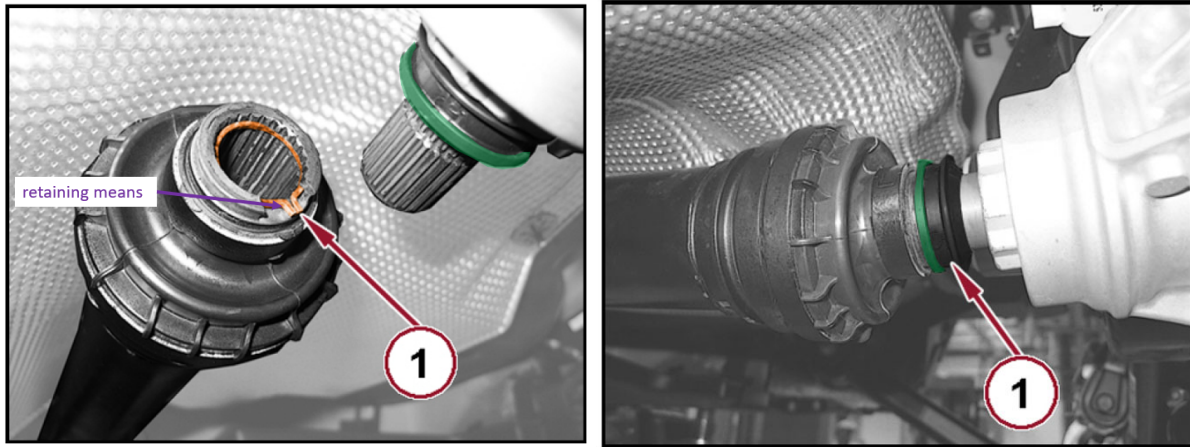
Ex.1013 at PET_AAM_1013-0198 (23), -0202 (8, 9); *see also id.* at PET_AAM_1013-0199-0201 (24, 25, 27 and 1, 3).



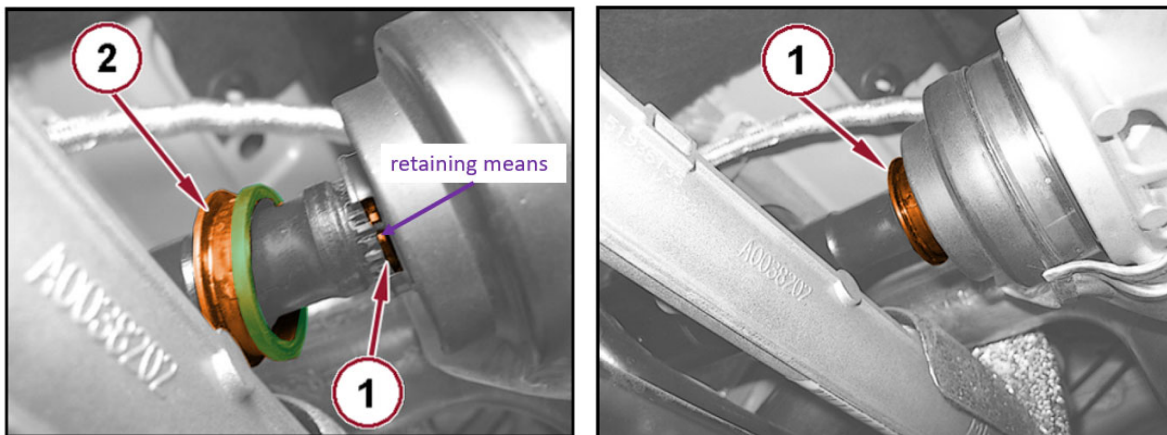
Id. at PET_AAM_1013-0197 (16), -0203 (11); *see also id.* at PET_AAM_1013-0197 (17), -0200-0203 (2, 4, 12); Ex.1032 ¶¶ 299-304; *see also supra* VI.A.8.

10. Claim 10

In each joint assembly, “the cylindrical portion” of the seal (green) “is disposed directly radially outwardly of the retaining means.” Ex.1002 at Claim 10.



Ex.1013 at PET_AAM_1013-0198 (23), -0202 (8, 9); *see also id.* at PET_AAM_1013-0199-0201 (24, 25, 27 and 1, 3).

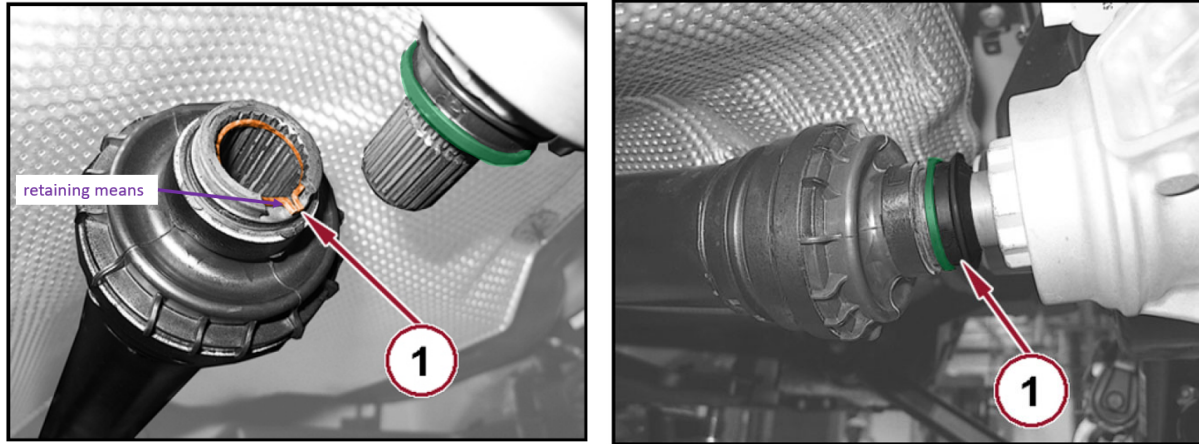


Id. at PET_AAM_1013-0197 (16), -0203 (11); *see also id.* at PET_AAM_1013-0197 (17), -0200-0203 (2, 4, 12); Ex.1032 ¶¶ 305-309; *see also supra* VI.A.8,

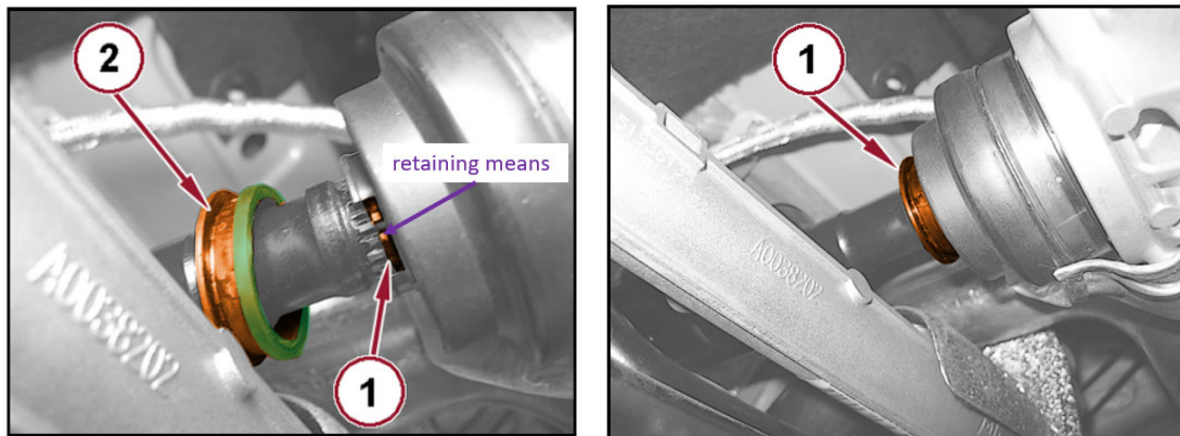
VI.A.9.

11. Claim 11

In each joint assembly, “the cylindrical portion” of the seal (green) “covers the retaining means.” Ex.1002 at Claim 11.



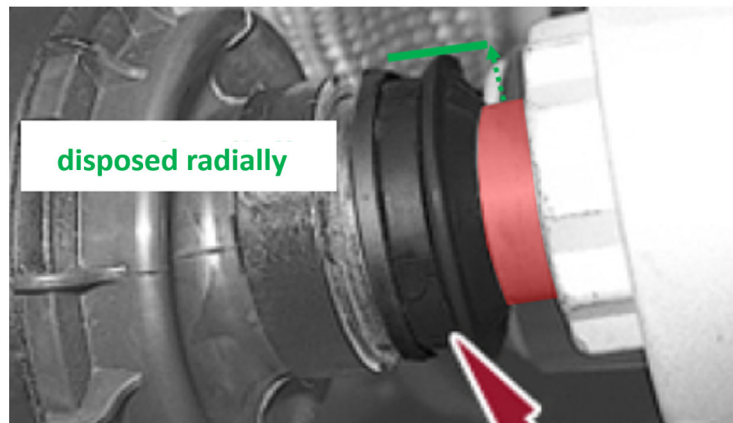
Ex.1013 at PET_AAM_1013-0199 (23), -0202 (8, 9); Ex.1013 at PET_AAM_1013-0199-0201 (24, 25, 27 and 1, 3).



Ex.1013 at PET_AAM_1013-0197 (16), -0203 (11); Ex.1013 at PET_AAM_1013-0197-0203 (16, 17 and 2, 4, 12); Ex.1032 ¶¶ 310-314; *see also supra* VI.A.8, VI.A.9, VI.A.10.

12. Claim 12

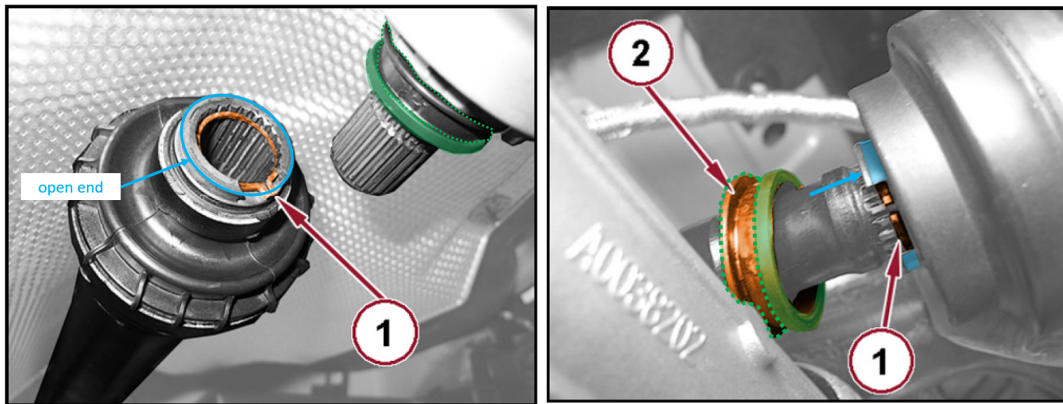
In each joint assembly, “the corrugated portion” of the seal (green) “is disposed radially outwardly of each of the first member and the second member.” Ex.1002 at Claim 12; Ex.1032 ¶¶ 315-319. For example, as shown below in regard to the propshaft-RDU joint assembly, the corrugated portion of the seal—at least around its maximum radius (solid green line)—is disposed radially outwardly from the second, male shaft member (red).



Ex.1013 at PET_AAM_1013-0198 (23), -0202 (9); *see also id.* at PET_AAM_1013-0199-0202 (24, 25, 27 and 1, 8), -0197 (16, 17) (propshaft-PTU joint assembly). Also as shown above, the corrugated portion of the seal has a maximum radius greater than the maximum radius of the cylindrical portion of the seal. *Id.* at PET_AAM_1013-0197-0200 (16, 17, 23-27 and 1, 2), -0202-0203 (8, 11). And, for the reasons stated above in regard to limitation [1e(iii)], because the cylindrical portion of each seal “directly engag[es] the outer surface of the first member” and the “corrugated portion” has a greater maximum radius than the cylindrical portion,

the “corrugated portion” of each seal is also disposed radially outwardly of each first member. *Id.*; *see also supra* VI.A.1; Ex.1032 ¶ 318.

Dr. Davis also testified that semi-annular grooves on each first member (blue, right image), which are broken up by the window of each first member, are (i) configured to receive the cylindrical portion of the seal (green) and (ii) spaced from the open end of the first member (blue circle and blue arrow).



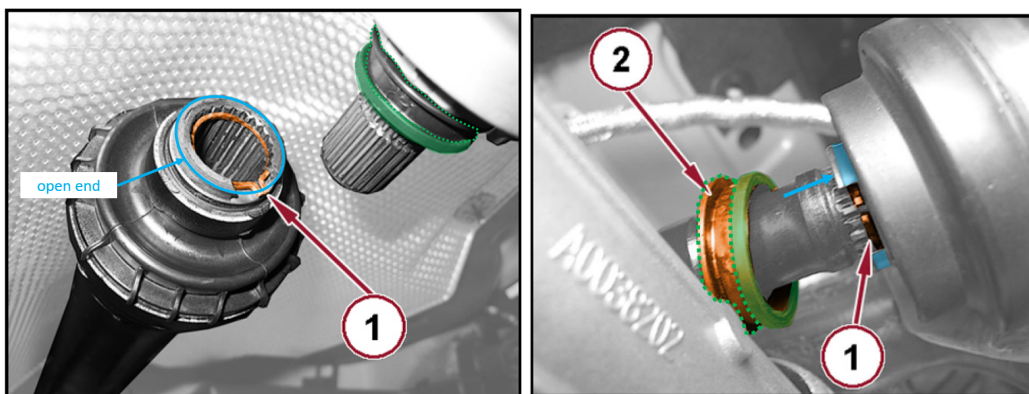
Ex.1032 ¶ 319 (citing Ex.1013 at PET_AAM_1013-0202-0203 (8, 11, 12)); *see also* Ex.1013 at PET_AAM_1013-0197-0203 (16, 17, 19, 23-27 and 1-4, 8, 9, 11, 12). This confirms that the corrugated portion of the seal (green dashed lines), which is disposed adjacent to the cylindrical portion of the seal (green), “is disposed radially outwardly of each of the first member and the second member.”

13. Claim 13

In each joint assembly, “at least a portion of the corrugated portion” of the seal “is disposed radially outwardly of the window.” Ex.1002 at Claim 13; Ex.1032 ¶¶ 320-325. In particular, as described above in regard to Claim 12, for both joint

assemblies, the corrugated portion of the seal has a maximum radius greater than the maximum radius of the cylindrical portion of the seal. Ex.1013 at PET_AAM_1013-0197-0200 (16, 17, 23-27 and 1, 2), -0202-0203 (8, 11). And, for the reasons stated above in regard to limitations [1c] and [1e(iii)], because the window is “formed within the first member,” the cylindrical portion of each seal “directly engag[es] the outer surface of the first member,” and the “corrugated portion” has a greater maximum radius than the “cylindrical portion,” the “corrugated portion” of each seal is disposed radially outwardly of the window. *Id.* at PET_AAM_1013-0197-0203 (16, 17, 23-27 and 1, 2, 8, 11); *see also* Ex.1032 ¶ 324; *supra* VI.A.1, VI.A.12.

Dr. Davis also testified that semi-annular grooves on each first member (blue, right image), which are broken up by the window of each first member, are (i) configured to receive the cylindrical portion of the seal (green) and (ii) spaced from the open end of the first member (blue circle and blue arrow).



Ex.1032 ¶ 325 (citing Ex.1013 at PET_AAM_1013-0202-0203 (8, 11, 12)); *see also* Ex.1013 at PET_AAM_1013-0197-0203 (16, 17, 19, 23-27 and 1-4, 8, 9, 11, 12).

This confirms that at least a portion of the corrugated portion of the seal (green dashed lines), which is disposed adjacent to the cylindrical portion of the seal (green), “is disposed radially outwardly of the window.”

14. Claim 14

[14P]

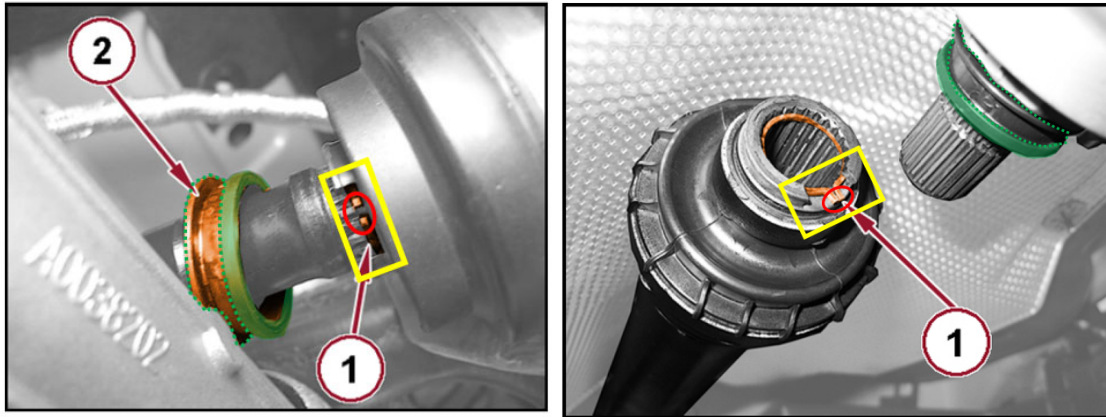
Renegade Manual discloses a series of Removal Steps and Installation Steps for servicing propshaft-PTU and propshaft-RDU joint assemblies of the 2016 Jeep® Renegade. *See supra* VI.A.1; PET_AAM_1013-0194-0203; Ex.1032 ¶ 327.

[14-1]

The “joint assembly” “provided” in step [14-1] is identical to the “joint assembly” of Claim 1. *Compare* Ex.1002 at Claims 1 *and* 14. Renegade Manual discloses limitation [14-1], and limitations [14-1a] through [14-1e(iv)] for the reasons stated above in regard Claim 1. *See supra* VI.A.1; Ex.1032 ¶¶ 328-338, 346-349.

[14-2]

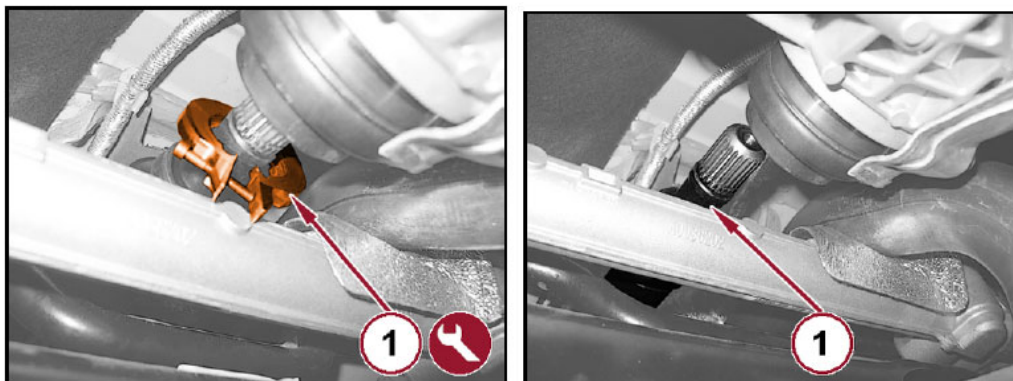
Renegade Manual discloses “uncovering the window” (yellow) “via adjustments to the seal” (green) “to provide access to the distal ends of the retaining means” (red circle). Ex.1002 at Claim 14. In particular, Removal Steps 16 and 23 instruct to “Slide the dust cover (1) ... to access the snap ring.” Ex.1013 at PET_AAM_1013-0197-0198.



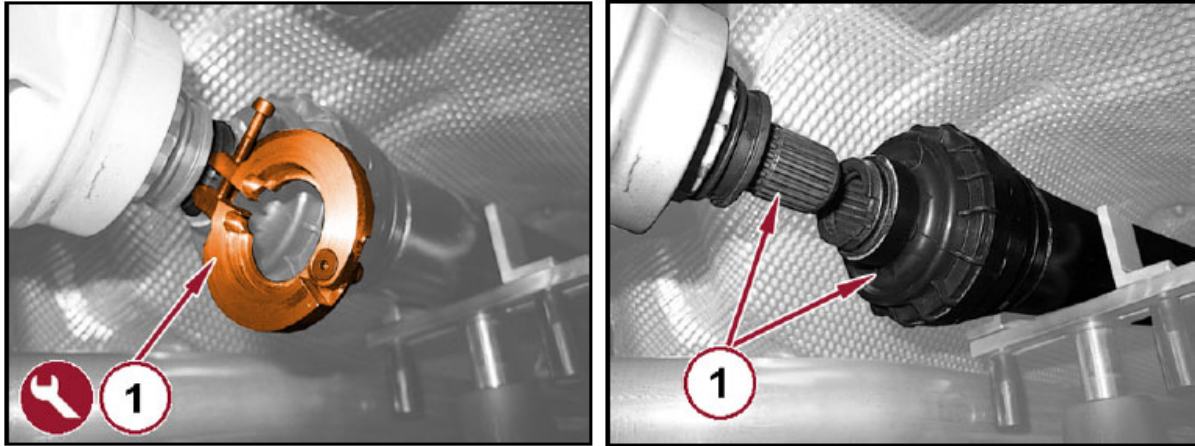
Ex.1013 at PET_AAM_1013-0202-0203 (8, 11); *see also id.* at PET_AAM_1013-0197-0198 (17-19), -0199 (24-26); Ex.1032 ¶¶ 339-341.

[14-3]

Renegade Manual discloses “manipulating the retaining means through the window to release the coupling of the second member to the first member.” Ex.1002 at Claim 14. In particular, Removal Steps 17 and 24 instruct to “Use tool 2019500030 (1),” an “Elastic Ring Spreader,” “to open propeller shaft snap ring,” and Removal Steps 18 and 25 instruct to “Disconnect the propeller shaft (1).”



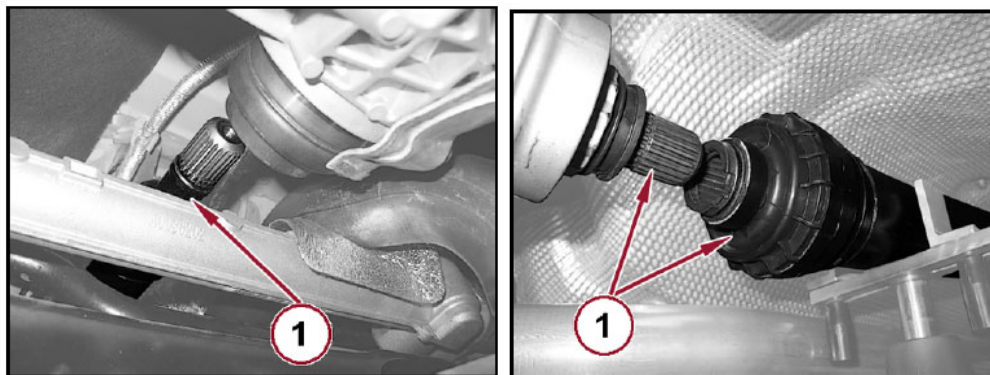
Ex.1013 at PET_AAM_1013-0197 (17 and 18).



Id. at PET_AAM_1013-0199 (24 and 25); *see also* Ex.1032 ¶¶ 342-343.

[14-4]

Renegade Manual discloses “separating the first member and the second member by disengaging the second engagement means from the first engagement means.” Ex.1002 at Claim 14.



Ex.1013 at PET_AAM_1013-0197 (18 (“Disconnect the propeller shaft (1) from the PTU”)), -0199 (25 (same, RDU)); *see also* Ex.1032 ¶¶ 344-345.

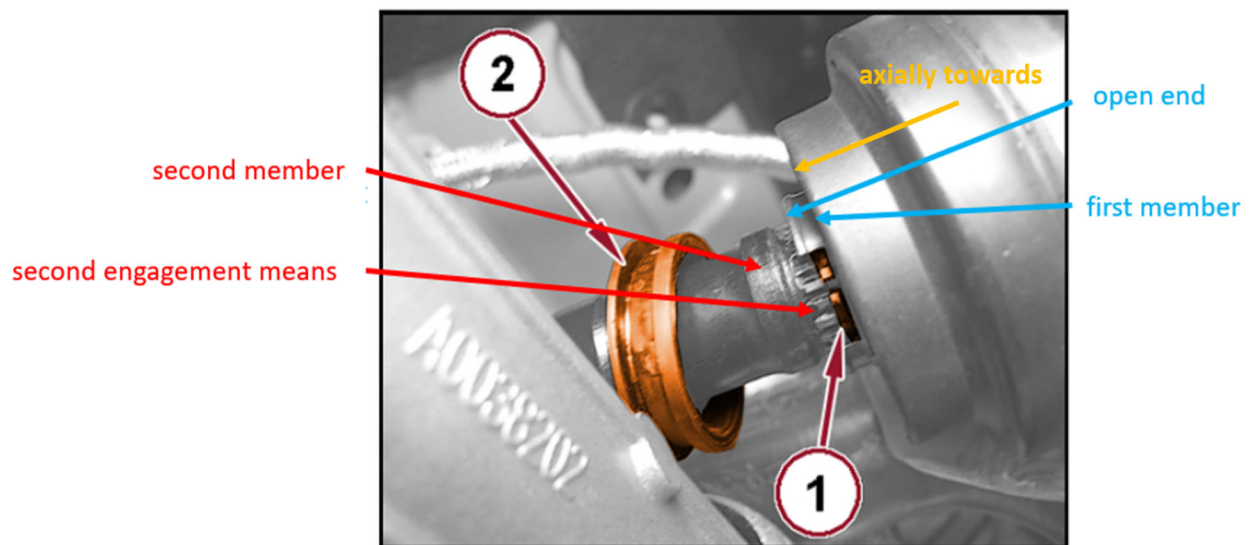
15. Claim 15

As described above in regard to Claims 2 and 4, in each joint assembly, “the first member includes an open end and the window is continuous with the open end.”

Ex.1002 at Claim 15; *see supra* VI.A.2, VI.A.4, VI.A.14; Ex.1032 ¶¶ 351-353.

16. Claim 16

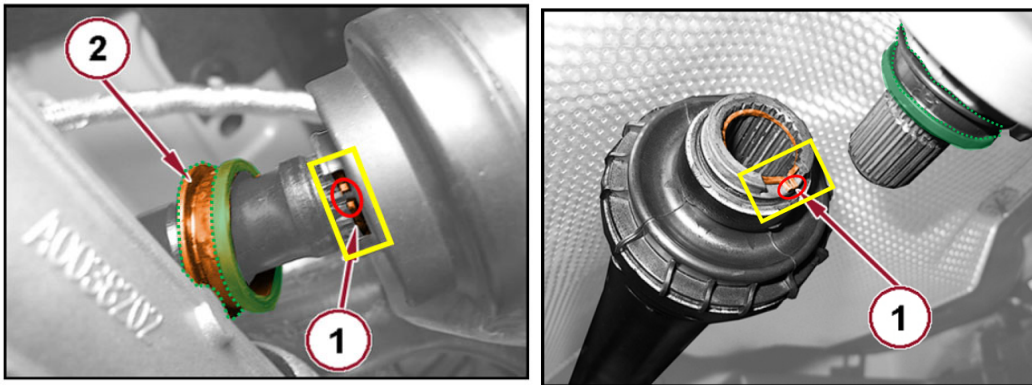
Renegade Manual discloses “wherein uncovering the window includes sliding the seal axially towards the open end of the first member.” Ex.1002 at Claim 16. For example, in regard to the joint assembly between the propshaft and PTU, Removal Step 16 instructs: “Slide the dust cover (1) at the front of the propeller shaft away from the Power Transfer Unit (PTU) to access the snap ring.” Ex.1013 at PET_AAM_1013-0197 (16), -0198 (23 (same, RDU)). As depicted below, practicing this step includes sliding the seal axially towards the open end of the first member to uncover the window.



Ex.1013 at PET_AAM_1013-0203 (11); Ex.1013 at PET_AAM_1013-0197-0201 (17, 19 and 2, 4); Ex.1032 ¶¶ 354-356.

17. Claim 17

Renegade Manual discloses “wherein sliding of the seal axially occurs until the retaining means is uncovered.” Ex.1002 at Claim 17. For example, in regard to the joint assembly between the propshaft and PTU, Removal Step 16 instructs: “Slide the dust cover (1) at the front of the propeller shaft away from the Power Transfer Unit (PTU) to access the snap ring.” Ex.1013 at PET_AAM_1013-0197 (16), -0198 (23 (same, RDU)). As depicted below, practicing this step involves sliding the seal axially until the retaining means (“snap ring”) (red circle) is uncovered.



Ex.1013 at PET_AAM_1013-0203 (11), -0202 (8); Ex.1032 ¶¶ 357-361.

B. Ground 2 – Claims 1-17 are obvious over Renegade Manual in view of Krude '422, Sugiyama, and the knowledge of a POSA.

Claims 1-17 would also have been obvious over Renegade Manual (Ex.1013) in view of Krude '422 (Ex.1008), Sugiyama (Ex.1007), and the knowledge of a POSA. Ex.1032 ¶¶ 362-637. Long before the effective filing date of the '376 patent, each of those references disclosed a joint assembly fixed by a retaining ring that is accessible through a window in the first, female shaft member.

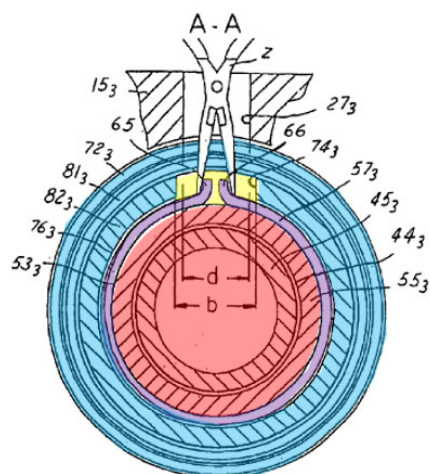
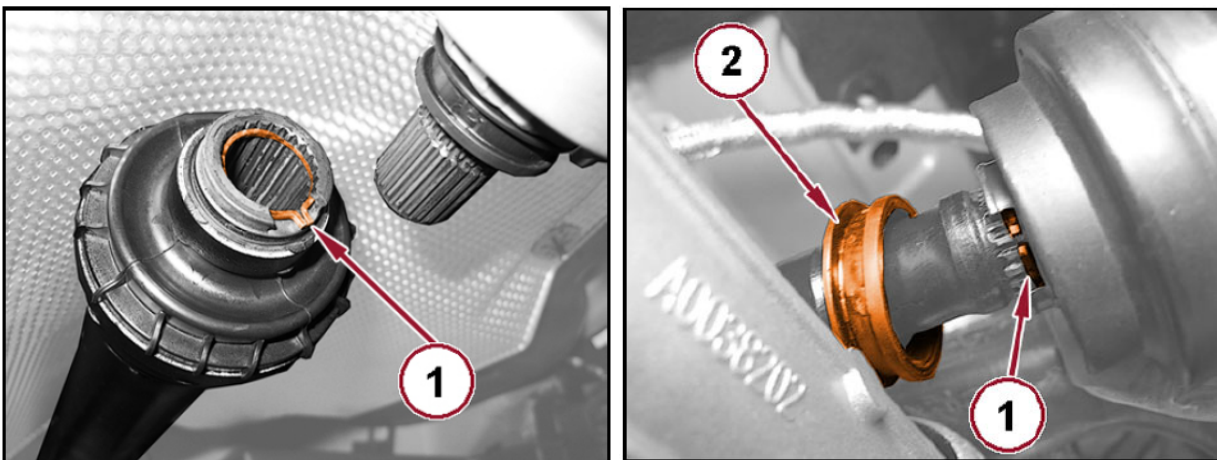


FIG. 8

FIG.4

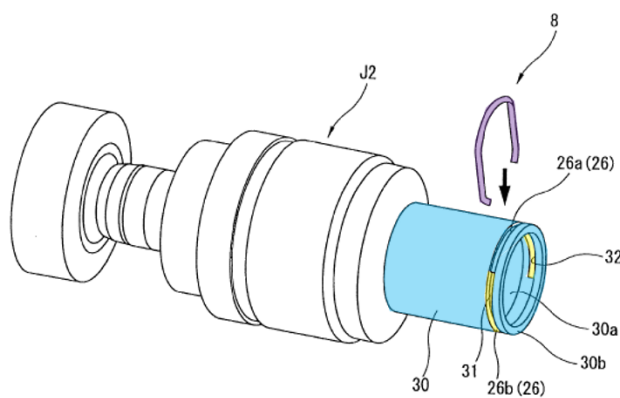
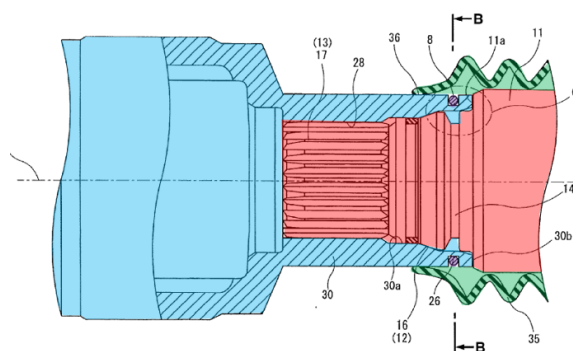


FIG.7



Ex.1013 at PET_AAM_1013-0202-0203 (8, 11); Ex.1008 at 5:28-30, Fig. 8; Ex.1007 at [0011], [0058], Figs. 4, 7; Ex.1032 ¶¶ 232-253, 363; *see also id.* ¶¶ 362-637. It would have been obvious to modify the teachings of Renegade Manual in view of the teachings of Krude '422, Sugiyama, and the knowledge of a POSA, or combine those teachings, to arrive at the claimed inventions at least because each reference relates to the same, well-known technologies and applies similar techniques to achieve similar results, and the function and performance of the joint assemblies of Renegade Manual would not change. Ex.1032 ¶¶ 364-370. Where, as here, “a patent ‘simply arranges old elements with each performing the same function it had been known to perform’ and yields no more than one would expect from such an arrangement, the combination is obvious.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007).

1. It would have been obvious to modify the retaining ring of Renegade Manual to have distal ends that extend radially into the window, but not through the window.

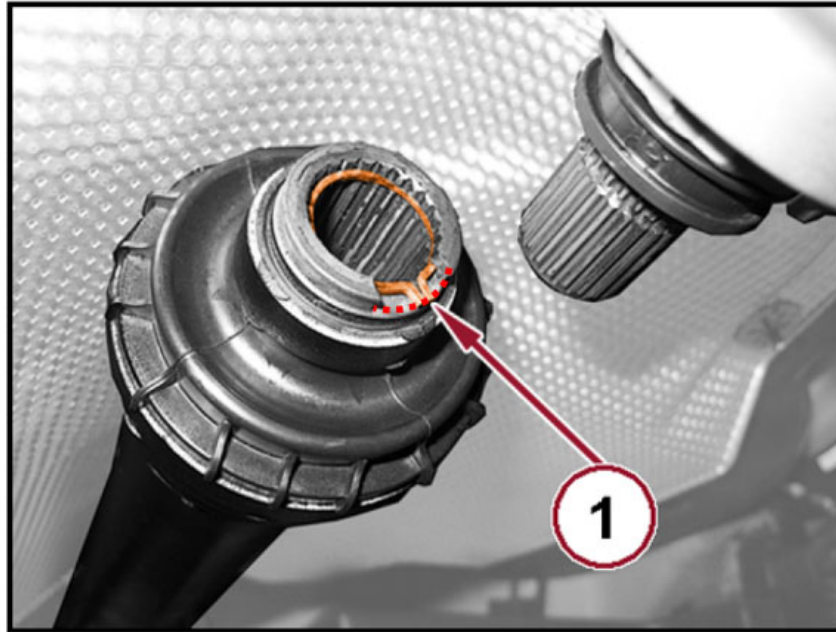
Renegade Manual discloses that its retaining ring “extends in a direction radially outwardly into the window.” Ex.1002 at Claims 1 and 14; *supra* IV.A.1, IV.A.14. To the extent that Renegade Manual does not disclose that the distal ends of the retaining ring extend “to a point at or radially inwardly from an outer wall of the first member” (and no further) as recited in limitations [1d(ii)] and [14-1d(ii)], Krude '422 discloses a retaining ring that satisfies those limitations (*see* Ex.1008 at

5:28-30, Fig. 8), and using such a retaining ring in the joint assemblies of Renegade Manual would have been a known, obvious, and desirable design choice that would have led to predictable results. Ex.1032 ¶¶ 364-370, 389-398, 578-582.

A POSA would have been motivated to use a retaining ring like that of Krude '422 for several reasons. *First*, a POSA would have recognized that they could improve the joint assemblies of Renegade Manual by using known and conventional retaining rings, like those of Krude '422, in the same way and according to their established functions. *See* Ex.1008 at Figs. 7-9; Ex.1010 at Fig. 2; Ex.1017 at [0019], Figs. 6A and 6B (describing and illustrating “conventional snap rings,” like those of Krude '422); *supra* IV.C; Ex.1032 ¶¶ 389–393, 582. *Second*, a POSA would have been motivated to provide discreet means of coupling the shaft members and achieve a discrete profile of the joint assembly. Ex.1032 ¶¶ 394, 582. *Third*, a POSA would have been motivated to prevent the retaining ring of Renegade Manual from contacting, interfering with, or damaging parts located outside of the window, particularly the seal, which a user must slide axially over the window during assembly and disassembly. Ex.1032 ¶¶ 395, 582.

A POSA also would have reasonably expected success, at least based on the disclosures of Krude '422 and other prior art references that successfully couple shaft members by using such retaining rings. Moreover, modifying the retaining

ring of Renegade Manual would not impact its intended function or performance and, if anything, would require shortening its distal ends by millimeters, if that.

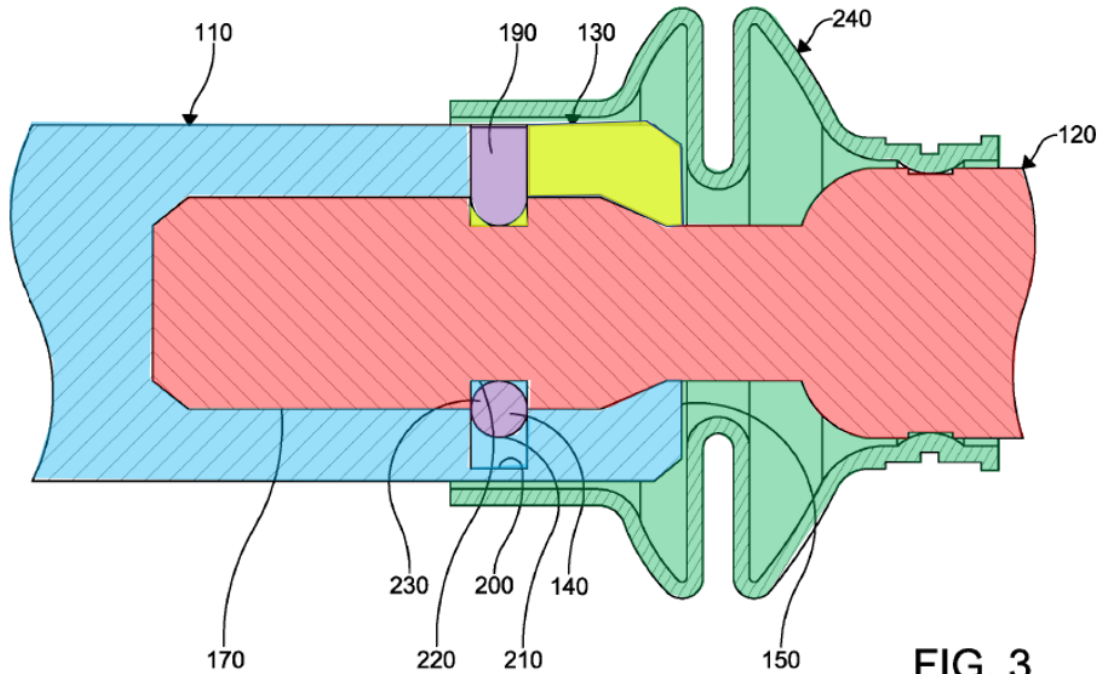


Ex.1013 at PET_AAM_1013-0202 (8); Ex.1032 ¶¶ 396-398, 582.

2. It would have been obvious to modify the seal of Renegade Manual to arrive at the “seal” limitations of the challenged claims.

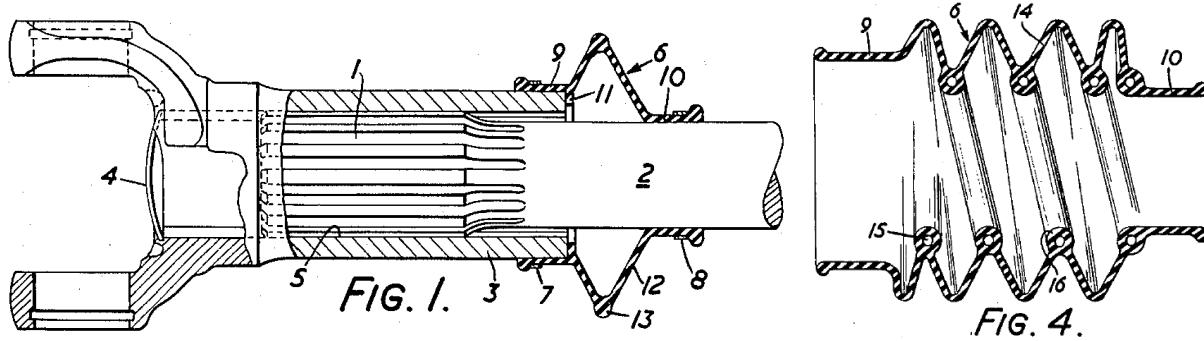
There is scarce description of the “seal” of the ’376 patent. *See* Ex.1002 at 7:5-12. The specification says that “seal 240 can be configured as a boot,” but describes sealing (and “seal 240”) only in general terms. *Id.* It does not use the phrase, “cylindrical portion of the seal” or “corrugated portion of the seal.” *Id.* Simply put, the ’376 patent gives little weight to the “seal,” which makes sense given the state of the art of seals. *Supra* IV.D. Yet, closely tracking the “boot”

embodiment of Figures 1-3, the challenged claims recite several “seal” limitations that define the *structure* and *position* of the seal (green).



Ex.1002 at Fig. 3, Claims 1, 5, 8-14.

As for the *structure* of the seal, limitations [1e(iii)], [1e(iv)], [14-1e(iii)], and [14-1e(iv)] define the seal to have both a “cylindrical portion” and a “corrugated portion disposed adjacent the cylindrical portion.” *Id.* at Claims 1 and 14. This is nothing new. In 1962, Rabson described and illustrated nearly identical seals having “tubular cylindrical end sections 9 and 10” “joined by a single convolution section 12” or “a convoluted section 14 comprising a plurality of convolutions.”

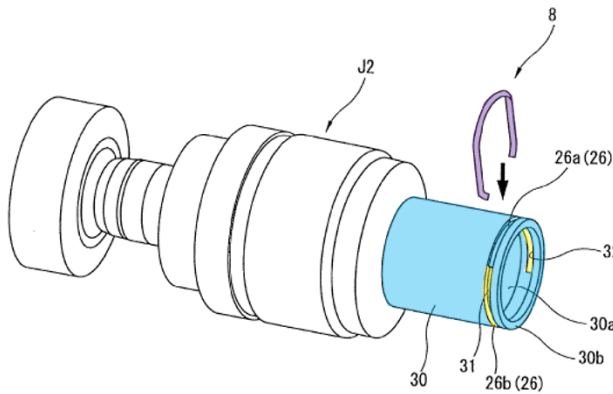
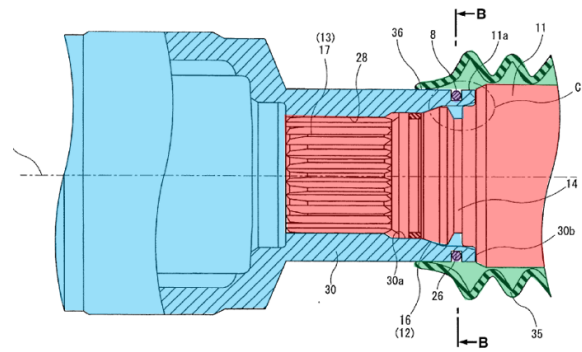


Ex.1019 at 2:43-3:19, Figs. 1-5; *see also supra* IV.D; Ex.1032 ¶¶ 364-370, 422-443, 610-617.

As for the *position* of the seal, limitations [1e], [1e(i)], [1e(ii)], [1e(iii)], Claim 5, Claim 8, Claim 9, Claim 10, Claim 11, Claim 12, Claim 13, [14-1e], [14-1e(i)], [14-e(ii)], and [14-1e(iv)] recite that the seal is coupled to the first and second shaft members and positioned at certain locations relative to the “first member,” “second member,” “window,” and “retaining means.” Ex.1002 at Claims 1, 5, 8-14. These limitations, too, recite nothing new. Ex.1032 ¶¶ 364-370, 402-433, 462-474, 487-548, 587-600, 614-617. They are also simply the result of coupling a boot seal to two shafts. *Id.*

Renegade Manual discloses the seal limitations, including a seal having both a “cylindrical portion” and a “corrugated portion disposed adjacent the cylindrical portion.” Ex.1002 at Claims 1, 14; *supra* VI.A.1, VI.A.14. But, to the extent that Renegade Manual does not disclose the claimed “seal,” these types of seals were taught by Sugiyama and well known in the art. For example, Sugiyama discloses that “water-proof boot 35” (green) “prevent[s] an invasion of water or dust from first

and second through holes 31, 32” and seals the splined connection of a joint assembly that is fixed by “circlip (retaining ring) 8.”

FIG.4**FIG.7**

Ex.1007 at [0058], [0059], Figs. 4, 7. “Water-proof boot 35” has a “corrugated portion,” “a middle section structured in a substantially bellows shape ... to enable expansion and contraction (telescopically) in the axial direction,” which helps during assembly, disassembly, and servicing. *Id.* at [0058]; Ex.1032 ¶¶ 62, 367, 369, 428, 438-439, 612. It is “attached and fixed” to the first, female shaft member (blue) “via a boot attachment section 36,” which, as Sugiyama describes in another boot-seal embodiment, may be “in a tight binding manner via a well-known boot band.” Ex.1007 at [0048], [0058] Figs. 3, 7. Clamping “water-proof boot 35” in this manner would form a “cylindrical portion” adjacent the “corrugated portion,” just like Rabson’s seal from 1962 and countless others known in the art. *Supra* IV.D.

At bottom, though the “seal” limitations are lengthy, they recite the use of well-known, corrugated and clamped boot seals. Ex.1032 ¶¶ 364-370, 402-443,

462-474, 487-548, 587-600, 610-617. For these and the following reasons, using a seal in the joint assemblies of Renegade Manual that meets the “seal” limitations would have been a known, obvious, and desirable design choice that would have led to predictable results.

a. Structure – it would have been obvious use a seal having a “cylindrical portion” and a “corrugated portion disposed adjacent the cylindrical portion.”

The seal of Renegade Manual includes a “corrugated portion” disposed adjacent to a “cylindrical portion,” as recited in limitations [1e(iii)], [1e(iv)], [14-1e(iii)], and [14e(iv)]. Ex.1002 at Claims 1, 14; *supra* VI.A.1, VI.A.14. Sugiyama (and several other references) also disclose seals having a “corrugated portion” disposed adjacent to a “cylindrical portion.” For example, “attach[ing] and fix[ing]” Sugiyama’s “water-proof boot 35” “via a well-known boot band” forms a “cylindrical portion” at the point of attachment, “boot attachment section 36,” which is adjacent the “corrugated portion” of the seal, a “middle section structured in a substantially bellows shape.” Ex.1007 at [0048], [0058] Figs. 3, 7; *supra* IV.D. As taught by Sugiyama itself, and as well known in the art, clamping Sugiyama’s “water-proof boot 35” to the shaft members in this manner, or using another conventional seal with “corrugated” and “cylindrical” portions, would have been a known, obvious, and desirable design choice that would have led to predictable results. Ex.1032 ¶¶ 60-63, 364-370, 422-443, 610-617.

A POSA would have been motivated to use a seal having a “corrugated portion” disposed adjacent to a “cylindrical portion” for several reasons.

First, there are countless different designs, shapes, and sizes for seals of driveline joint assemblies, all known in the art. *Supra* IV.D; Ex.1032 ¶¶ 60-63, 422-426, 434-438. Seals including a “cylindrical portion” were well known. *See* Ex.1013 at PET_AAM_1013-0198-0203 (16, 17, 23-27 and 1-4, 8, 9, 11, 12); Ex.1007 at [0048], [0058], Figs. 3 and 7, Claim 20; Ex.1014 at Figs. 1, 3; Ex.1015 at Figs. 1 and 2; Ex.1016 at 151, Figs. 1, 3, 5; Ex.1012 at 145, 151, 163, 171; Ex.1018 at 2:28-38, Fig. 1; Ex.1019 at 2:43-3:19, Figs. 1-5; Ex.1032 ¶¶ 60-63, 422-426. Seals including a “corrugated portion disposed adjacent the cylindrical portion” were also well known. *Id.*; Ex.1032 ¶¶ 60-63, 434-438. A POSA would have recognized that it could improve the joint assemblies of Renegade Manual by using known and conventional seals, like those of Sugiyama and others, in the same way and according to their established functions. Ex.1032 ¶¶ 426, 438.

Second, a POSA would have understood that a “cylindrical portion” provides more sealing surface area to engage the shaft members than conical, frustoconical, or tapered seals. A POSA would be motivated to use seals having a “cylindrical portion” to better seal and protect the joint assemblies. Ex.1032 ¶ 427.

Third, a POSA would be motivated to clamp the ends of the seal to each shaft member, again, to provide a better seal. Ex.1032 ¶ 428. Sugiyama, for example,

teaches that boot seals, like “water-proof boot 35,” may be fixed “in a tight binding manner via a well-known boot band.” Ex.1007 at [0048], [0058]; Ex.1016 at 151, Figs. 1 and 3; Ex.1014 at Fig. 1; Ex.1018 at 2:28-38, Fig. 1; Ex.1012 at 191. And, as known and described in the art, clamped seals have “cylindrical portions” where they are clamped. Ex.1007 at Fig. 3; Ex.1015 at Fig. 1; Ex.1016 at Figs. 1, 3, and 5; Ex.1014 at Fig. 1; Ex.1018 at 2:28-38, Fig. 1; Ex.1019 at 2:43-65, Figs. 1-5.

Fourth, as to seals with a “corrugated portion disposed adjacent the cylindrical portion,” a POSA would have known that clamped seals typically have this claimed structure. *Supra* IV.D; Ex.1032 ¶ 438. Because a POSA would have been motivated to clamp the ends of the seal to each shaft member, they would have also been motivated to use a seal having a “corrugated portion” disposed adjacent the clamped, “cylindrical portion.” Ex.1032 ¶ 438.

Fifth, a POSA would have been motivated to use a seal including a “corrugated portion disposed adjacent the cylindrical portion” “to enable expansion and contraction (telescopically) in the axial direction,” as taught by Sugiyama and known in the art. Ex.1007 at [0058], Fig. 7; *see also supra* IV.D; Ex.1032 ¶ 474. Using seals that are able to expand and contract makes it easier to uncover the window of the joint assembly (even without removing the seal entirely), which is desirable, particularly during assembly and disassembly. Ex.1032 ¶ 474. As taught by Sugiyama, this remains true even for joint assemblies that are fixed and do not

accommodate relative axial motion, like those of Renegade Manual. *Id.*; Ex.1007 at [0058], Fig. 7.

Finally, a POSA would also have understood that a “corrugated portion” on the exterior of a seal may provide a useful gripping feature to, again, help with assembly and disassembly, and a “corrugated portion” on the interior of a seal may create a tighter seal. *See supra* IV.D; Ex.1026 at Figs. 1-4; Ex.1027 at Figs. 2, 7; Ex.1028 at 1, 4, 5; Ex.1032 ¶¶ 440-441.

A POSA also would have reasonably expected success for several reasons. *First*, the disclosures of the prior art, which teach the routine, successful use of seals having a “corrugated portion” disposed adjacent to a “cylindrical portion,” would have led a POSA to reasonably expect success in using such a seal in the joint assemblies of Renegade Manual. *Second*, either forming the seal of Renegade Manual to have a “corrugated portion” disposed adjacent to a “cylindrical portion,” or using a seal having a “corrugated portion” disposed adjacent to a “cylindrical portion,” such as a conventional clamped boot seal, would have been a known, obvious, and desirable design choice and would have led to predictable results. A POSA would reasonably expect success without any impact or change on the intended function of the Renegade Manual seal, i.e., covering the windows in the first, female shaft members and sealing the joints assemblies. *See* Ex.1032 ¶¶ 431-433, 442-443.

b. Position – it would have been obvious to position the seal relative to the “first member,” “second member,” “window,” and “retaining means” as claimed.

The seal of Renegade Manual is *positioned* in the same manner as recited by limitations [1e], [1e(i)], [1e(ii)], [1e(iii)], Claim 5, Claim 8, Claim 9, Claim 10, Claim 11, Claim 12, Claim 13, [14-1e], [14-1e(i)], [14-e(ii)], and [14-1e(iv)]. Ex.1002 at Claims 1, 5 8-13, 14; *supra* VI.A.1, VI.A.5, VI.A.8, VI.A.9, VI.A.10, VI.A.11, VI.A.12, VI.A.13, VI.A.14. Moreover, the recited limitations are simply the result of coupling a conventional boot seal to shaft members of a joint assembly, and arriving at these limitations would have been a known, obvious, and desirable design choice that would have led to predictable results. Ex.1032 ¶¶ 364-370, 402-433, 462-474, 487-548, 587-600, 614-617.

A POSA would have been motivated to use a seal positioned in the claimed manner for several reasons.

First, as described above, there are countless different designs, shapes, and sizes for seals of driveline joint assemblies, all known in the art. *See supra* IV.D; Ex.1032 ¶¶ 364-370, 404-408, 413-417, 422-426, 462-469, 487-494, 502-509, 511-519, 521-529, 531-537, 539-547, 587-600, 610-617. Seals that are “coupled to the second member adjacent an end of the first member” ([1e(i)], [14-1e(i)]) were well known.

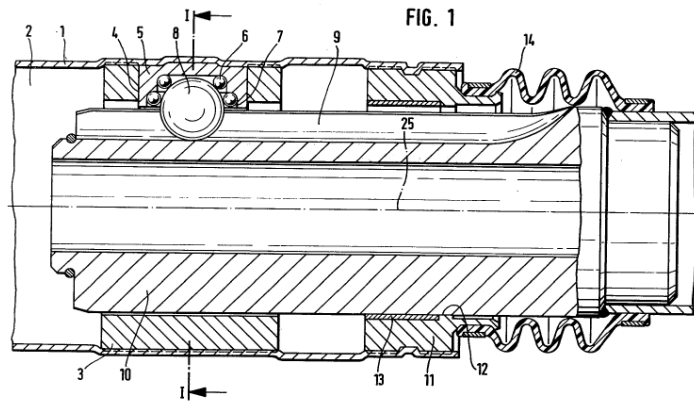
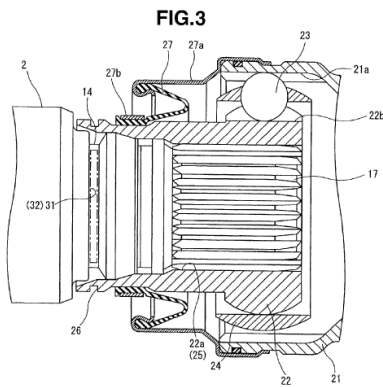
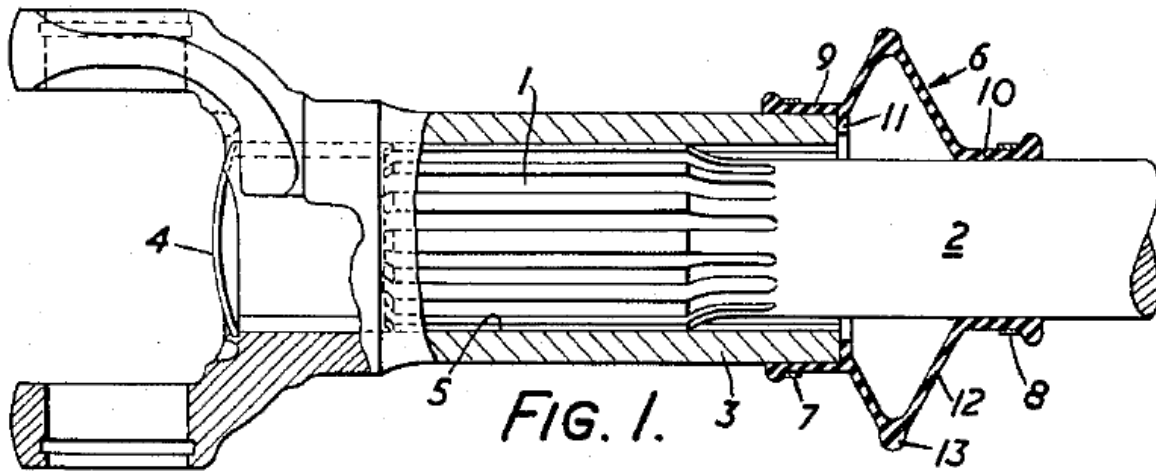


FIG. 4.

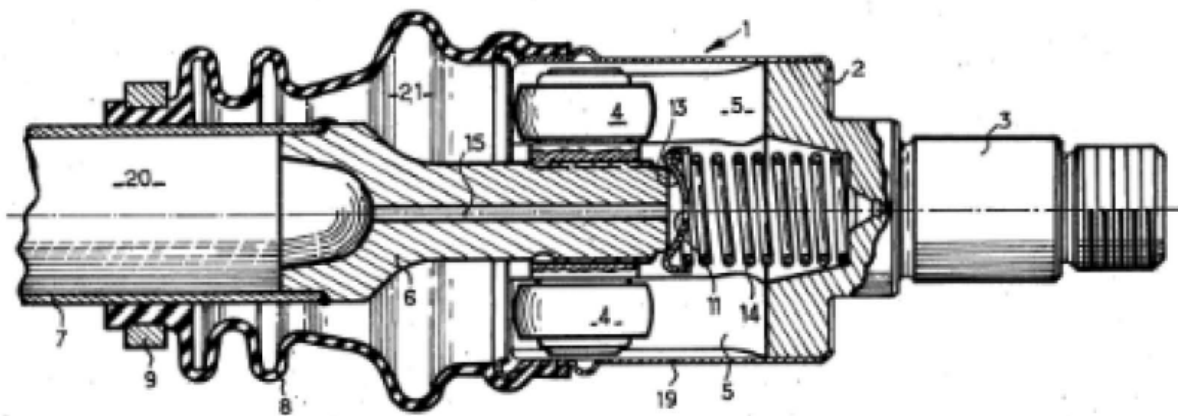


FIG. 3

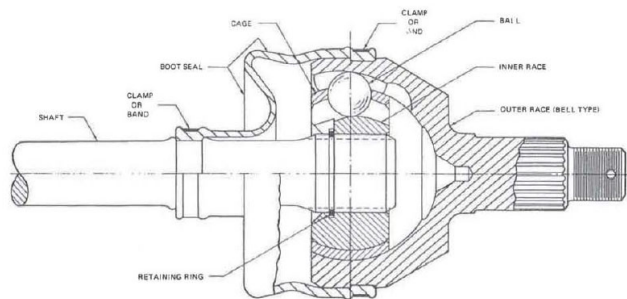
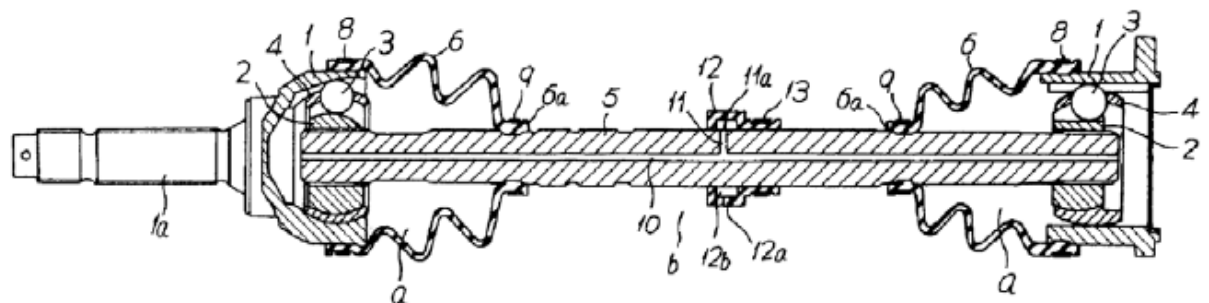


Fig. 1 — Rzeppa universal joint (bell type)

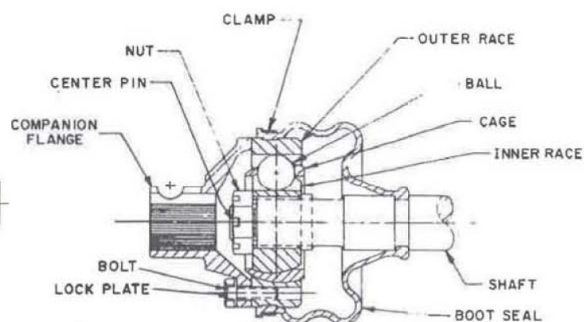


Fig. 1 — Double offset universal joint (fixed center type)

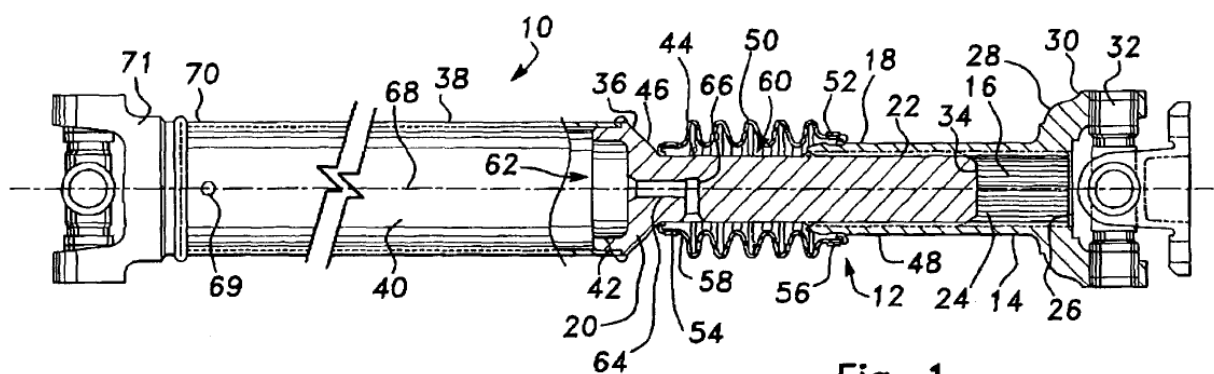
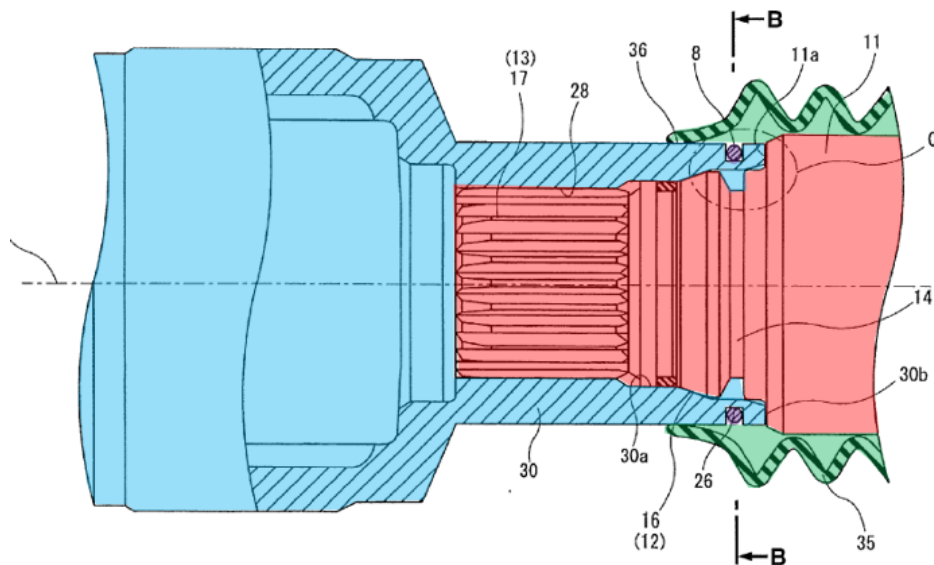


Fig-1

Ex.1019 at 2:43-65, Figs. 1-5; Ex.1007 at Figs. 3 and 7, Claim 20; Ex.1014 at Figs. 1, 3; Ex.1015 at Figs. 1 and 2; Ex.1016 at 151, Figs. 1, 3, 5; Ex.1012 at 145, 151, 163, 171; Ex.1018 at 2:28-38, Fig. 1; Ex.1032 ¶¶ 60-63, 404-408, 595. As shown above, seals that are “coupled to the first member adjacent the window” ([1e(ii)],

[14-1e(ii))] or “coupled to the first member adjacent an end of the window disposed distally from the open end of the first member” (Claim 5), including seals with a “cylindrical portion” “directly engaging the outer surface of the first member adjacent the window” ([1e(iii)]), “covering” the window (or retaining means) ([1e], Claim 8, Claim 11, [14e], [14-1e(iv)]), or “disposed directly radially outwardly of the window” (or retaining means) (Claim 9, Claim 10) were also well known. Sugiyama, for example, teaches that “water-proof boot 35” (green) “is attached and fixed” to a first, female shaft member (blue) adjacent windows, “through holes 31, 32.”

FIG.7

Ex.1007 at [0058], Fig. 7. Sugiyama (and other references) likewise teach that boot seals may be clamped at the end of a first, female shaft member—the location of the window in the joint assemblies of Renegade Manual (*see* Ex.1013 at

PET_AAM_1013-0197-0203 (17, 24, 25, 27 and 3, 4, 8, 11))—thereby also teaching a “cylindrical portion” of the seal “directly engaging the outer surface of the first member adjacent the window,” covering the window (and retaining means), and “disposed directly radially outwardly of the window” (and retaining means). Ex.1007 at [0048], Fig. 3; Ex.1015 at Fig. 1; Ex.1016 at 151, Figs. 1 and 3; Ex.1014 at Fig. 1; Ex.1018 at 2:28-38; Ex.1019 at 2:43-65, Figs. 1-5; *supra* IV.D.; Ex.1032 ¶¶ 60-63, 364-370, 413-417, 422-426, 462-469, 487-494, 502-509, 511-519, 521-529, 587-600, 610-617. Finally, as shown above, seals that have a “corrugated portion” “disposed radially outwardly of each of the first member and the second member” (Claim 12) and “of the window” (Claim 13) were also well known. *See, e.g.*, Ex.1007 at Fig. 7; *supra* IV.D.; Ex.1032 ¶¶ 60-63, 531-537, 539-547. A POSA would have recognized that it could improve the joint assemblies of Renegade Manual by using conventional seals known in the art in the same way and according to their established functions, including boot seals clamped to the end of a first, female shaft member, and clamped to a second, male shaft member adjacent the first member, as taught by Sugiyama and known in the art. Ex.1032 ¶¶ 408, 417, 426, 469, 494, 509, 519, 529, 537, 547, 595, 600, 617.

Second, a POSA would have been motivated to minimize the size and cost the seal, and would know to do so by coupling the seal “to the second member adjacent an end of the first member” (as opposed to further away from the end of the first

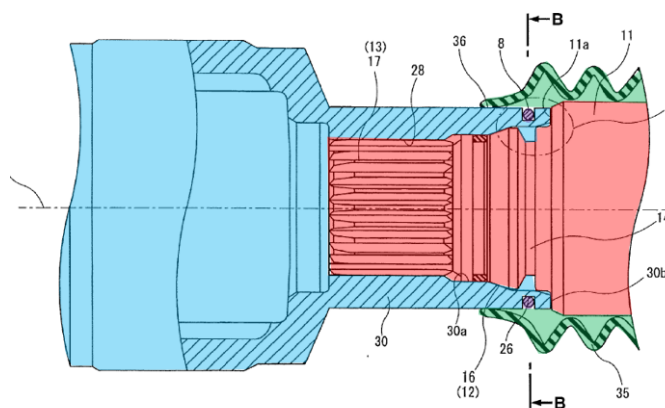
member) ([1e(i)], [14-1e(i)]), and by coupling the seal to the first member adjacent the end of the first member (the location of the window in the joint assemblies of Renegade Manual), thereby also coupling the seal to the first member “adjacent the window” ([1e(ii)], [14-1e(ii)], Claim 5). Ex.1032 ¶¶ 409, 418, 430, 471, 498, 509, 519, 529, 595, 600, 617. Coupling a seal in this manner would reduce the cost and size of the seal while maintaining its sealing functionality. *Id.* And, by using a seal having a cylindrical portion or clamping the seal to form a cylindrical portion (as a POSA would have been motivated to do, *supra* IV.D, VI.B.2.a), the cylindrical portion would “directly engag[e] the outer surface of the first member adjacent the window” ([1e(iii)]), cover the window (and retaining means) ([1e], Claim 8, Claim 11, [14e], [14-1e(iv)]), and be “disposed directly radially outwardly of the window” (and retaining means) (Claim 9, Claim 10).

Third, as to positioning the “cylindrical portion” of the seal so that it is “adjacent the window” ([1e(ii)], [14-1e(ii)]), specifically so that it “directly engag[es] the outer surface of the first member adjacent the window” ([1e(iii)]), covers the window (and retaining means) ([1e], Claim 8, Claim 11, [14e], [14-1e(iv)]), and is “disposed directly radially outwardly of the window” (and retaining means) (Claim 9, Claim 10), this also would have been a known, obvious, and desirable design choice. Ex.1032 ¶¶ 429-430, 470-471, 497-498, 509, 519, 529, 595, 600, 617. Windows in the first, female splined shaft member of Renegade Manual

expose the splined connection of each joint assembly. A POSA would have been motivated to position the cylindrical portion of the seal—which engages and seals the first member— adjacent the window and as recited in the challenged claims to ensure that the window is covered and sealed. *Id.* This is particularly true for a clamped seal because the clamped, cylindrical portion will form a tight seal with the first member at that location. *Id.*; *see also* Ex.1007 at [0048] (describing clamping ends of a water-proof boot seal “in a tight binding manner via a well-known boot band”), Fig. 3; Ex.1015 at Fig. 1; Ex.1016 at Figs. 1, 3, and 5; Ex.1014 at Fig. 1; Ex.1018 at 2:28-38, Fig. 1; Ex.1019 at 2:43-65, Figs. 1-5.

Fourth, as described above, a POSA would have been motivated to use in the joint assemblies of Renegade Manual a conventional, corrugated boot seal (clamped or unclamped), as taught in Sugiyama and several other prior art references.

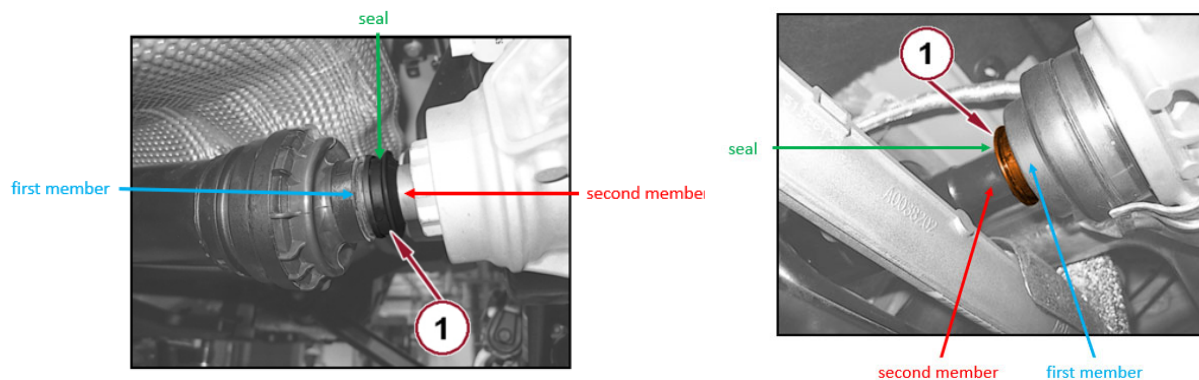
FIG.7



Ex.1007 at [0058], Fig. 7; *supra* IV.D, VI.B.2.a. A POSA would have understood that such seals have a “corrugated portion” that is “disposed radially outwardly of

each of the first member and the second member” (Claim 12) and “of the window” (Claim 13), as taught by Sugiyama and known in the art. *See, e.g.*, Ex.1007 at Fig. 7; *supra* IV.D, VI.B.2.a; Ex.1032 ¶¶ 537, 547.

A POSA would also have reasonably expected success for several reasons. Ex.1032 ¶¶ 410-412, 419-421, 431-433, 472-474, 499-501, 510, 520, 530, 538, 548, 595, 600, 617. *First*, the disclosures of the prior art, which teach the routine, successful use of seals coupled and positioned relative to a first and second shaft member as claimed, would have given a POSA a reasonable expectation of success in using such a seal in the joint assemblies of Renegade Manual. Ex.1032 ¶¶ 411, 420, 432, 473, 500, 510, 520, 530, 538, 548, 595, 600, 617. *Second*, as described above, Renegade Manual discloses a seal that satisfies, if not all, nearly all of the seal limitations related to the *position* of the seal.



Ex.1013 at PET_AAM_1013-0197-0203 (16, 23, 25 and 1, 2 8, 9, 11, 12). To the extent that the seal of Renegade Manual is not coupled to the first and second members at the exact locations claimed, adjusting the position of the Renegade

Manual seal or using a conventional, clamped boot seal, as taught by Sugiyama and described above, to arrive at the seal limitations of the challenged claims, would have been a known, obvious, and desirable design choice and would lead to predictable results. A POSA would reasonably expect success in modifying the seal of Renegade Manual without any impact or change on its intended function, i.e., covering the windows in the first, female shaft members and sealing the joint assemblies. Ex.1032 ¶¶ 412, 421, 433, 474, 501, 510, 520, 530, 538, 548, 595, 600, 617.

3. There is no evidence of secondary considerations.

Petitioner has seen no evidence of secondary considerations that weigh against obviousness, and any such evidence cannot overcome the strong case of obviousness of the challenged claims. Ex.1032 ¶¶ 636-637.

VII. DISCRETIONARY CONSIDERATIONS

A. The board should not deny institution under § 314(a).

The factors set forth in *Apple v. Fintiv*, IPR2020-00019, Paper 12 at 6 (PTAB Mar. 20, 2020) weigh against denying institution under § 314(a).

Factor 1 (stay): Petitioner intends to move for a stay of the co-pending litigation, which the district court will likely grant given that it has yet to hold a scheduling conference and the IPR will undoubtedly simplify the issues and create efficiencies.

Factor 2 (trial date): The district court has yet to set a trial date and, based on publicly available information (e.g., Docket Navigator, Lex Machina), trial is likely to be three or more years away, long after the Board’s Final Written Decision in May 2026.

Factor 3 (investment): There has been very little investment in the co-pending litigation, which is stagnant.

Factor 4 (overlap): There is no overlap between the issues raised in the Petition and in the co-pending litigation because the co-pending litigation has not advanced beyond the pleadings, let alone to invalidity contentions.

Factor 5 (same party): Petitioner and Patent Owner are parties to the co-pending litigation.

Factor 6 (other circumstances, including merits): The merits of the Petition are strong, which outweighs any inefficiencies born of parallel litigation.

B. The board should not deny institution under § 325(d).

The Board should also not deny institution under § 325(d) under the two-part framework of *Advanced Bionics v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 at 8-9 (PTAB Feb. 13, 2020).

Under *part one*, the same or substantially the same art or arguments were not previously presented during prosecution of the ’376 patent. Neither Renegade Manual—the primary reference in Grounds 1 and 2—nor the testimony of Dr. Davis

were presented to the Examiner. The Examiner did not cite either Sugiyama or Krude '422 in any Office Action. Nor does the Examiner's citation to Krude '422 and Sugiyama during prosecution of U.S. Application No. 15/966,085 (parent of the '376 patent) support denying institution. Petitioner relies on Krude '422 as a secondary reference that teaches the retaining ring limitations [1d(ii)] and [14d(ii)]—an obviousness combination that Patent Owner never disputed. Ex.1004 at PET_AAM_1004-0174-0190, -0224-0235, -0237-0239, -0251-0262, -0264-0278, -0292-0310, -0317-0333, -0348-0371. And, as for Sugiyama, Patent Owner's arguments during prosecution centered around whether the seal includes a "cylindrical portion" that "covers the outer wall of the first member along at least a portion of a perimeter of the window"—a limitation that is (i) not recited by the challenged claims, and (ii) taught by Renegade Manual.

Under *part two*, as set forth in the Petition and supporting Declaration of Dr. Davis, the Examiner erred in a manner material to the patentability of the challenged claims. Here, *Becton, Dickinson* factors (c), (e), and (f) all weigh against discretionary denial. Renegade Manual was not evaluated by the Examiner and was not the basis for any rejection. *Advanced Bionics*, IPR2019-01469, Paper 6 at 9 n.10 (factor (c)). The Examiner also erred in not citing Sugiyama to reject the challenged claims of the '376 patent and accepting Patent Owner's argument during prosecution of U.S. Application No. 15/966,085 (parent of the '376 patent) that it would not have

been obvious to modify Sugiyama’s “water-proof boot 35” to have a “cylindrical portion” that covers “at least a portion of a perimeter of the window.” *Compare* Ex.1004, ’085 Application PH at PET_AAM_1004-0292-0310, -0348-0371 *and* -0386; *see also Advanced Bionics*, IPR2019-01469, Paper 6 at 9 n.10 (factor (e)). The Examiner’s error is apparent, not just from the widespread use of boot seals having the same design, but also because Sugiyama itself teaches that boot seals may be clamped to the end of shafts “via a well-known boot band” to form a “cylindrical portion.” Ex.1007 at [0048], Fig. 3. Finally, Petitioner presents substantial additional evidence that was not before the Examiner, including the testimony of Dr. Davis and other prior art references that demonstrate the state of the art. *Advanced Bionics*, IPR2019-01469, Paper 6 at 9 n.10 (factor (f)).

VIII. MANDATORY NOTICES

A. Real Parties-in-Interest

Petitioner American Axle & Manufacturing, Inc. and American Axle & Manufacturing Holdings, Inc. are the real parties-in-interest.

B. Related Matters

The ’376 patent is currently asserted in the following litigation: *Neapco Components, LLC v. American Axle & Manufacturing, Inc.*, Case No. 2:23-cv-12470-LVP-EAS (E.D. Mich.). Neapco served its Complaint on November 17, 2023, less than one year from the filing of this Petition. Ex.1030; Ex.1031.

C. Designation of Lead and Back-up Counsel

Petitioner provides the following designation of counsel:

Lead Counsel	Back-up Counsel
James R. Nuttall Registration No. 44,978 STEPTOE LLP 227 West Monroe Street Suite 4700 Chicago, IL 60606 Tel: (312) 577-1260 Fax: (312) 577-1370 jnuttall@steptoe.com	Robert F. Kappers Registration No. 70,202 STEPTOE LLP 227 West Monroe Street Suite 4700 Chicago, IL 60606 Tel: (312) 577-1254 Fax: (312) 577-1370 rkappers@steptoe.com

D. Service Information Under

Petitioner consents to electronic service by email at:
SJAAMTeam@Steptoe.com.

IX. PAYMENT OF FEES UNDER

Petitioner authorizes the USPTO to charge the fees for this Petition, and any additional fees that might be due, to Deposit Account No. 19-4293.

X. CONCLUSION

Claims 1-17 of the '376 patent are unpatentable as anticipated and obvious.

Date: November 15, 2024

Respectfully Submitted,

/s/ James R. Nuttall

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*Counsel for Petitioner American Axle
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CERTIFICATION UNDER 37 C.F.R. § 42.24(d)

This Petition complies with the requirements of 37 C.F.R. § 42.24. As calculated by the word count feature of Microsoft Word 2010, this Petition contains 13,254 words, excluding the words contained in the following: Cover Page, Table of Contents, Table of Authorities, Exhibit List, Claim Listing, Mandatory Notices, Certification Under 37 C.F.R. § 42.24(d), and Certificate of Service.

Date: November 15, 2024

Respectfully Submitted,

/s/ James R. Nuttall

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*Counsel for Petitioner American Axle
& Manufacturing, Inc.*

CERTIFICATION OF SERVICE

The undersigned certifies service pursuant to 37 C.F.R. §§ 42.6(e) and 42.105(b) on the Patent Owner on November 15, 2024, by filing a copy of this Petition for IPR of U.S. Patent No. 11,598,376 and supporting materials through the Patent Trial and Appeal Case Tracking System and sending of a copy of the same via pre-paid, overnight Federal Express at the correspondence address of record for U.S. Patent No. 11,598,376:

Shumaker, Loop & Kendrick, LLP
c/o Neapco Components, LLC
1000 Jackson Street
Toledo, OH 43604

With a courtesy copy to the Patent Owner at the purported address according to the assignment records of the United States Patent and Trademark Office and according to Patent Owner's website, <https://www.neapco.com/contact-us/>:

Neapco Components, LLC
38900 Hills Tech Drive
Farmington Hills, MI 48331

With a courtesy copy to Patent Owner's counsel of record in *Neapco Components, LLC v. American Axle & Manufacturing, Inc.*, Case No. 2:23-cv-12470-LVP-EAS (E.D. Mich.) by electronic mail:

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