

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

RJ MACHINE COMPANY, INC.
Petitioner,

v.

ARMATURENFABRIK FRANZ
SCHNEIDER GMBH + CO. KG,
Patent Owner

Case IPR2024- 00851
Patent No. 9,851,030

PETITION FOR INTER PARTES REVIEW

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EXHIBIT LIST

Exhibit No.	Description
1001	U.S. Patent No. 9,851,030
1002	Expert Declaration of Dr. John P. Rodgers
1003	Prosecution File History, U.S. Patent No. 9,852,030
1004	Original Complaint filed on September 20, 2023
1005	U.S. Published Application No. 2013/0187075 to Craig (“Craig”)
1006	AS-Schneider Catalog: “Instrument Valves and Manifolds - Hook-Ups” (“2008 Hook-Ups Catalog”)
1007	Web archive from Wayback Machine ® showing Hook-Ups Catalog dated 2008
1008	AS-Schneider Catalog: Instrumentation Products – Pressure Instrument Accessories (“2012 Accessories Catalog”)
1009	Web archive from Wayback Machine ® showing Accessories Catalog dated 2012
1010	Parker Direct-Mount® Duo™ I.O.M. Manual (“Parker-1”)
1011	Parker Direct-Mount® Duo™ I.O.M. Manual (“Parker-2”)
1012	Webpage Wayback Machine® Parker Catalog dated March 2014
1013	RJ Machine Waiver of Service of Summons dated October 2, 2023

LISTING OF CHALLENGED CLAIMS

Claim No.	Identifier	Claim Language
1	[Preamble]	A connecting apparatus comprising:
	1[a]	a first connecting device that is connectable to a pipeline or to a metering orifice device in a sealing manner, said first connecting device having a first through-opening in a longitudinal direction
	1[b]	a second connecting device that provides a sealing connection to a measuring instrument or to a valve block/valve, said second connecting device having a second through-opening in a longitudinal direction; and
	1[c]	a connecting unit that provides a sealing connection to the first and second connecting devices,
	wherein clause (i)	wherein the first and second connecting devices are interconnected with sealing effect,
	wherein clause (ii)	the connecting unit is designed so that the sealing connection can be created solely by rotation of the connecting unit without rotating the first and second connecting devices,
	wherein clause (iii)	an upper edge region of the first connecting device has an outwardly pointing outer flange and an end-face sealing surface,
	wherein clause (iv)	a lower edge region of the second connecting device has a male thread and an end-face sealing surface,
	wherein clause (v)	the connecting unit is designed as a nut unit with a female thread and an inwardly pointing inner flange which is arranged in the lower edge region,
	wherein clause (vi)	the outwardly pointing outer flange of the first connecting device fits behind the inner flange of the nut unit,
	wherein clause (vii)	the female thread of the nut unit is screwed onto the male thread of the second connecting device so that by means of the inner flange and the outer flange the end-face

		sealing surfaces are clamped together with sealing effect,
	1[d]	a shutoff valve is connected to the second connecting device, a longitudinal axis of which extends obliquely to a longitudinal axis of the apparatus,
	wherein clause (viii)	the outer flange and the inner flange are provided in an encompassing manner on the first connecting device or on the nut unit, and
	wherein clause (ix)	sealing means are arranged between the end-face sealing surface of the first connecting device and the end-face sealing surface of the second connecting device
2	2	The connecting apparatus as claimed in claim 1, wherein the first connecting device has a thread in a lower edge region of the first connecting device.
3	3	The connecting apparatus as claimed in claim 2, wherein the thread has a conical shape.
4	4	The connecting apparatus as claimed in claim 1, wherein the first connecting device has a male thread upon which can be screwed a clamping nut with female thread, wherein the clamping nut can be clamped on the surface of the first connecting device.
5	5	The connecting apparatus as claimed in claim 4, further comprising: a baseplate that has through-openings through which the first connecting device can pass, in certain sections, in the longitudinal direction, said baseplate being clamped by means of the clamping nut on the surface of the pipeline.
6	6	The connecting apparatus as claimed in claim 1, wherein the second connecting device has an outwardly pointing outer flange in an upper edge region of the second connecting device that is connectable to a valve block or to a measuring instrument.
7	7	The connecting apparatus as claimed in claim 1, wherein the longitudinal axis of the shutoff valve extends to the longitudinal axis of the apparatus at an angle of 90°.

RJ Machine Company, Inc. (“RJ Machine”) respectfully requests *Inter Partes* Review of claims 1-7 of U.S. Patent No. 9,851,030 (“the ’030 patent”) pursuant to 35 U.S.C. §311 and 37 C.F.R. §42.100.

I. MANDATORY NOTICES (37 C.F.R. §42.8)

A. Real Parties in Interest (37 C.F.R. §42.8(b)(1))

RJ Machine is the real party-in-interest for this proceeding.

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

Patent Owner *Armaturenfabrik Franz Schneider GMBH + Co. KG* (“Patent Owner or AS-Schneider”) asserted the ’030 patent challenged herein against Petitioner in the Western District of Texas (Waco Division) in *Armaturenfabrik Franz Schneider GMBH + Co. KG v. RJ Machine Company, Inc.*, No. 6:23-cv-00680 (W.D. Tex.). AS-Schneider filed the complaint on RJ Machine on September 20, 2023. Ex. 1004. RJ Machine executed a waiver of service of summons on October 2, 2023. Ex. 1013.

C. Lead and Backup Counsel (37 C.F.R. §42.8(b)(3))

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D. Service Information (37 C.F.R. §42.8(b)(4))

Please direct all correspondence to lead counsel and back-up counsel at the addresses shown above. Petitioner consents to electronic service by e-mail, provided that all counsel for Petitioner are copied at the foregoing email addresses.

II. COMPLIANCE WITH REQUIREMENTS FOR INTER PARTES PETITION PURSUANT TO 37 C.F.R. §§42.101, 42.103, & 42.104(A)

Petitioner certifies that (1) the '030 patent is available for *inter partes* review; and (2) Petitioner is not barred or estopped from requesting *inter partes* review of any of the challenged claims on the grounds identified herein.

The undersigned authorizes the Commissioner to charge the fee specified by 37 C.F.R. § 42.15(a) to Blank Rome LLP Deposit Account No. 23-2185, referencing docket number 169335-00602. The undersigned authorizes the

Commissioner to charge any additional fees which may be required, or credit any overpayment, to that deposit account.

III. SUMMARY OF THE ARGUMENT

The '030 patent discloses a connector apparatus that connects a measuring instrument to a pipeline, so an operator can monitor gas flow through the pipeline. The '030 patent states the prior art connecting apparatuses were difficult to install, because the two ends of the apparatus were bolted together. Because of this fixed connection, the entire connector apparatus had to be rotated to install its ends on the pipeline and measuring instrument, causing complications. The '030 patent purports to solve this installation problem. The '030 patent's connector apparatus combines all of the components of prior art connector apparatuses, except the two ends of the apparatus are not fixed by a bolt connection; rather, they are connected by a union nut. At the point of installation, the operator simply turns the union nut, instead of the whole apparatus, to install the apparatus on the pipeline and measuring instrument.

The '030 patent's purported "advance" over the prior art was already known at the time of the invention. Connecting apparatuses with union nuts were already disclosed and in use in the oil and gas industry. The prior art establishes the claimed connecting apparatus is a conventional union connection, typically used with pipe fitting, which was well known before the effective filing date of the

application for the '030 patent. This prior art includes the Patent Owner's own prior art disclosures, which were not disclosed to the Examiner during prosecution.

Consequently, claims 1-7 are unpatentable. Petitioner hereby seeks institution of an *inter partes* review of those claims.

IV. U.S. PATENT NO. 9,851,030

The '030 patent (entitled "Connecting Apparatus for Creating a Connection Between a Measuring Instrument/Valve Block and a Pipeline") relates to a connecting apparatus adapted to connect a gas pipeline with a pressure measuring instrument and/or with a valve associated therewith, such as a 3-way or 5-way valve block. Ex. 1001 at 1:12-38.

A. The Effective Filing Date is No Earlier Than April 23, 2014

The '030 patent was filed as application no. 14/694,204 ("the '204 application") on April 23, 2015, and granted on December 26, 2017. *Id.* at (21), (22), and (54). It claims priority to German application no. DE 10 2014 005 783, filed on April 23, 2014. *Id.* at (30).

B. Disclosure

The '030 patent describes a connecting apparatus 10 for connecting a pressure measuring instrument to a pipeline that incorporates a connecting unit or nut 50 which allows the installer to assemble the instrument with the pipeline by tightening of the nut. *Id.* at Abstract, 1:28-31, 2:55-67.

As seen in Fig. 3 below, the connecting apparatus 10 includes a first or lower connecting device 30 and a second or upper connecting device 40 that are interconnected by nut 50. *Id.* at Fig. 3.

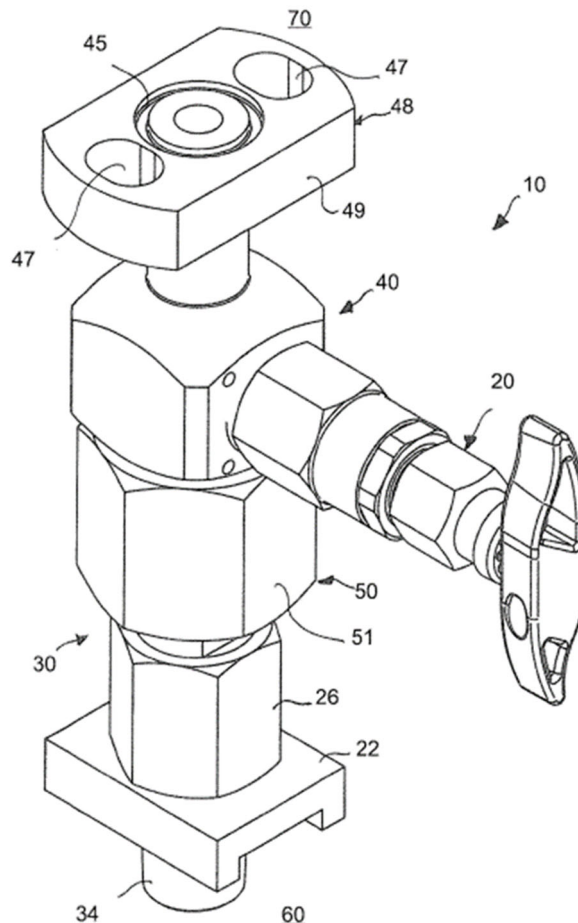


Fig. 3

As seen in Fig. 6 below, connecting apparatus 10 connects to the pipeline's metering orifice device 18 and also connects to a pressure measuring instrument 14, either directly or via the instrument's valve block 12. *Id.* at 6:5-8.

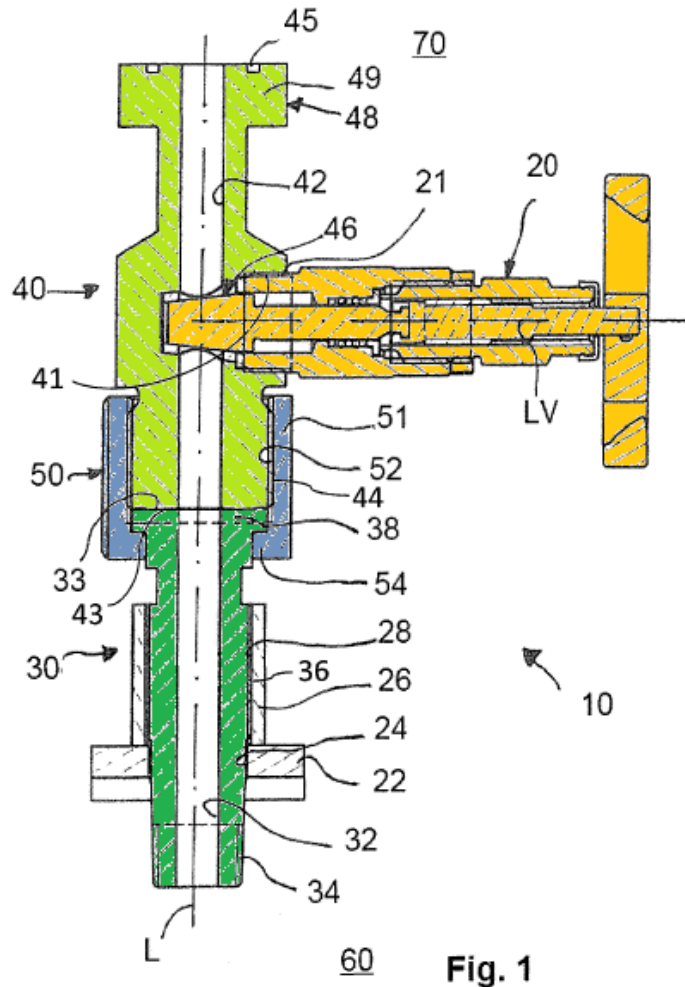


Fig. 1 of '030 Patent (annotated with color)

First connecting device 30 includes a through-opening 32 in the longitudinal direction L and an “outwardly pointing, encompassing” connecting flange 38 at its upper end region. *Id.* at 3:11-13. Base plate 22 and clamping nut 26 are provided at its lower end region for clamping first connecting device 30 to the metering orifice device 18. *Id.* at 7:25-31. Second connecting device 40 includes a through-opening 42. *Id.* at 6:25-27. Second connecting device 40 has a male/outer thread 44 and has an upper connecting unit 48 with a connecting flange 49 for engaging

valve block 12. *Id.* at 6:51-52.

A shutoff valve 20 (**orange** above) extends from second connecting device 40 at an oblique angle (e.g. a right angle as described in the patent) to the longitudinal direction L of the connecting apparatus 10, as seen in Fig. 1. *Id.* at 3:47-51 (“An especially preferred embodiment is distinguished by the fact that a shutoff valve, the longitudinal axis of which extends obliquely to the longitudinal axis of the apparatus, especially at an angle of 90°, is connected to the second connecting device.”).

Connecting devices 30 and 40 are interconnected by nut 50 with “sealing effect.” The “sealing effect” is accomplished by outer flange 38 of first connecting device 30 fitting behind inner flange 54 of nut 50 and female thread 52 of nut 50 being screwed onto male thread 44 of second connecting device 40 so that their end-face sealing surfaces 33 and 43 are clamped to each other. *Id.* at 3:19-34. An o-ring can be disposed between end-face sealing surfaces 33 and 43 as a sealing means. *Id.* at 3:59-66, 7:46-49.

C. The Claims

The '030 patent has 7 claims, with claim 1 being the sole independent claim. Ex. 1001 at claims 1-7. Petitioner challenges the validity of each of these claims. A listing of claims 1-7 is provided above on pages v-vi. Petitioner provides identifiers for the claim limitations in the claims listing and uses those identifiers

throughout this Petition. Each limitation of claims 1-7 is addressed below in connection with the prior art, particularly showing how the prior art renders each challenged claim unpatentable.

V. IDENTIFICATION OF CLAIMS BEING CHALLENGED AND RELIEF REQUESTED PURSUANT TO §42.104(B)

A. Challenged Claims, Specific Art, and Statutory Grounds

Petitioner requests institution of trial and cancellation of claims 1-7 of the '030 patent. The specific grounds for each challenged claim are detailed below and summarized as follows:

Ground 1: Claims 1, 2, 6, and 7 of the '030 patent are anticipated under 35 U.S.C. §102 in view of Craig.

Ground 2: Claims 1 and 7 of the '030 patent are anticipated under 35 U.S.C. §102 in view of the AS-Schneider 2008 Hook-Ups catalog.

Ground 3: Claims 1, 2, 6, and 7 of the '030 patent are obvious under 35 U.S.C. §103 over Craig in view of the common knowledge of a person of ordinary skill in the art ("POSITA").

Grounds 4 and 5: Claims 1, 2, and 4-7 are obvious under 35 U.S.C. §103 in view of the October 2013 Parker Direct-Mount® Duo™ I.O.M. Manual ("Parker-1") or the March 2014 Parker Direct-Mount® Duo™ I.O.M. Manual ("Parker-2"), combined with AS-Schneider 2012 Accessories catalog and the common

knowledge of a POSITA.¹

Ground 6: Claims 1-3, 6, and 7 of the '030 patent are obvious under 35 U.S.C. §103 in view of the AS-Schneider 2008 Hook-Ups catalog, combined with AS-Schneider 2012 Accessories Catalog and the common knowledge of a POSITA.

B. Claim Construction

For purposes of this Petition, Petitioner does not believe any claim term requires a construction to find claims 1-7 invalid for the reasons provided herein. This Petition shows that the challenged claims are unpatentable when construed in accordance with the ordinary and customary meaning as understood by one of ordinary skill in the art in light of the specification and prosecution history. Petitioner does not waive its right to assert a construction of any claim term in other proceedings or as further information is developed.

VI. CLAIMS 1-7 ARE UNPATENTABLE

A. The Level of Ordinary Skill in the Art

The field of art associated with the '030 patent relates to pipe fitting,

¹ Parker 1 and Parker 2 disclose the same tool, but have different publication dates. Because the tools are identical, the descriptions and their mappings to claim elements are identical, and thus these two references are addressed together for convenience and simplicity.

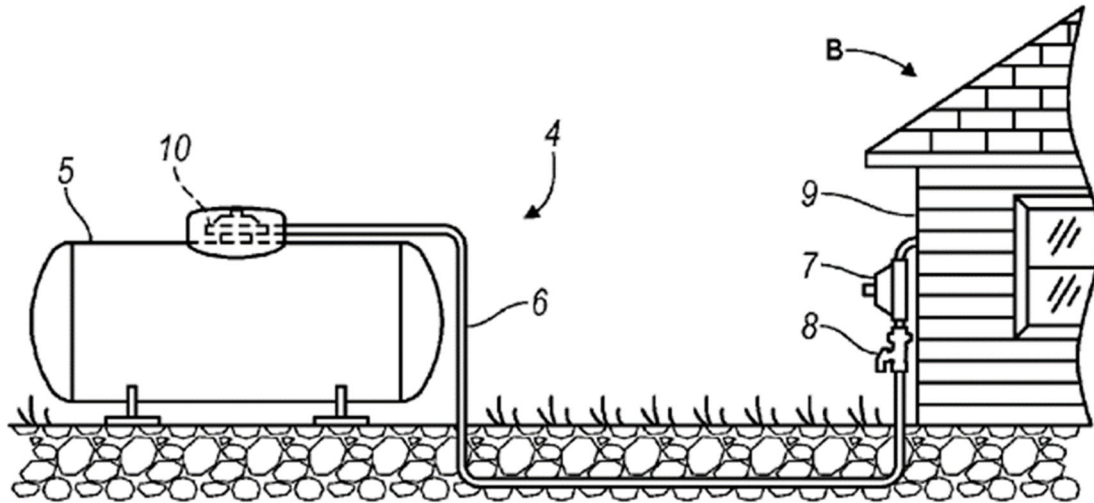
including tube fitting. Ex. 1002 ¶[48]. The level of ordinary skill in the art is reflected by the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). In this case, a POSITA would have had a trade school certificate in pipe fitting or equivalent training and experience, or a certificate in plumbing. Ex. 1002 ¶[51]. As another alternative, a POSITA would have had a mechanical or petroleum engineering degree. *Id.*

B. The Prior Art References

1. Craig (U.S. Publication No. 2013/0187075)

Craig qualifies as prior art under 35 U.S.C. §102 as it published on July 25, 2013, which is before the effective filing date of the '030 patent. *See* Ex. 1005 at (43). Craig was not cited during prosecution of the '030 patent. *See* Ex. 1001 at (56).

Craig discloses a system for delivering propane gas from an outdoor propane storage tank 5 to a building B, as seen in Fig. 1 (shown below). Ex. 1005 at ¶¶[0003]-[0004], Fig. 1.

FIG. 1

Pressure regulator 7 is connected to a propane gas feed line 6 at building B for regulating and/or reducing the pressure of the propane gas entering the building. *Id.* at ¶¶[0003], [0007]. Union valve 8 has a union part and a valve part. *Id.* at Fig. 2; Ex. 1002 ¶[92]. Union valve 8 also has a shutoff feature to enable the propane gas being supplied to the building to be turned off. *See* Ex. 1005 at Abstract.

As seen in Fig. 2 of Craig (shown below annotated with color), the union part of the union valve 8 includes end connector 11 (**lime**), union end 13 (**green**), and nut 12 which interconnects end connector 11 and union end 13 (**blue**). *Id.* at Claim 1, Fig. 2. End connection 11 (**lime**) is associated with the inlet of pressure regulator 7 (Fig. 1 above), and union end 13 (**green**) is associated with the outlet of the feed line 6 (Fig. 1 above). *Id.*

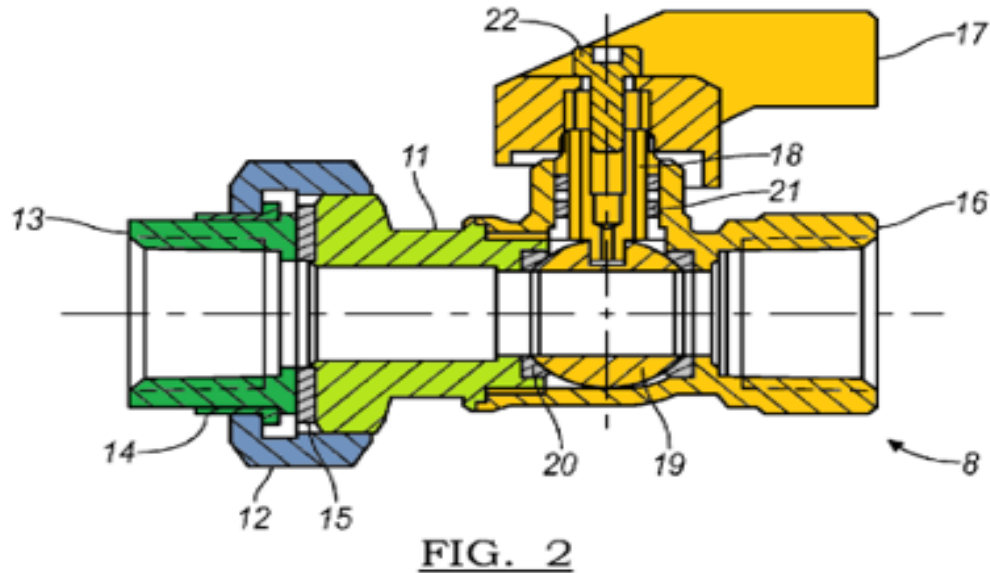


Fig. 2 of Craig (annotated with color)

End connection 11 has an internal through-bore in fluid communication with the through-bore of union end 13. *Id.* at Fig. 2. End connection 11 also has outer threads at one end that engage inner threads of nut 12. *Id.* at ¶[0008]. Nut 12 retains union end 13 in place “securely mounted” on end connection 11. *Id.*

A ring 14 is on one end of union end 13 and gasket 15 is interposed between the end faces of end connection 11 and union end 13, as seen in Fig. 2 above. *Id.*

As seen in Fig. 2 above, the valve part (**orange**) of union valve 8 includes a main body 16, and an external handle 17 connected to a valve stem 18 which rotates a ball 19 (located within an internal cavity of valve body 16) between open and closed positions. *Id.* at ¶[0009], Fig. 2.

2. AS-Schneider 2008 Hook-Ups Catalog

Patent Owner's own 2008 Hook-ups Catalog is related to hook-ups for its instrument manifolds and valves. *See* Ex. 1006 at 1. The catalog qualifies as prior art under 35 U.S.C. §102 because it was published in 2008, which is more than a year prior to the earliest possible effective filing date of the '030 patent. The publication of the Hook-ups Catalog in 2008 is evidenced by the Wayback Machine®. Ex. 1007; Ex. 1002 ¶[96]; MPEP §2128 II.D (“Prior art obtained via the Wayback Machine® sets forth a *prima facie* case that the art was publicly accessible at the date and time provided in the time stamp. The burden then shifts to the applicant should they wish to challenge the authenticity, reliability or accessibility of such information.” (citing *Valve Corp. v. Ironburg Inventions Ltd.*, 8 F.4th 1364, 1374-75 (Fed. Cir. 2021))). This catalog was not cited during prosecution of the '030 patent. *See* Ex. 1001 at (56).

i. PR08

The 2008 Hook-ups Catalog discloses several hook-up products including a PR08 hook-up (hereinafter “PR08”). Ex. 1006 at 1, 37. PR08 is designed for connecting rack mounted “pressure instruments” to a “process line”. *Id.* As seen in the annotated figure below, PR08 includes an “impulse line” 3 (**green**) that connects at one end to the process line via a “pressure tap” 1 and an “isolation

valve” 2 and at the other end to a “pressure gauge valve” 7 (**lime**) via a “union nut” 4 (**blue**). *Id.*

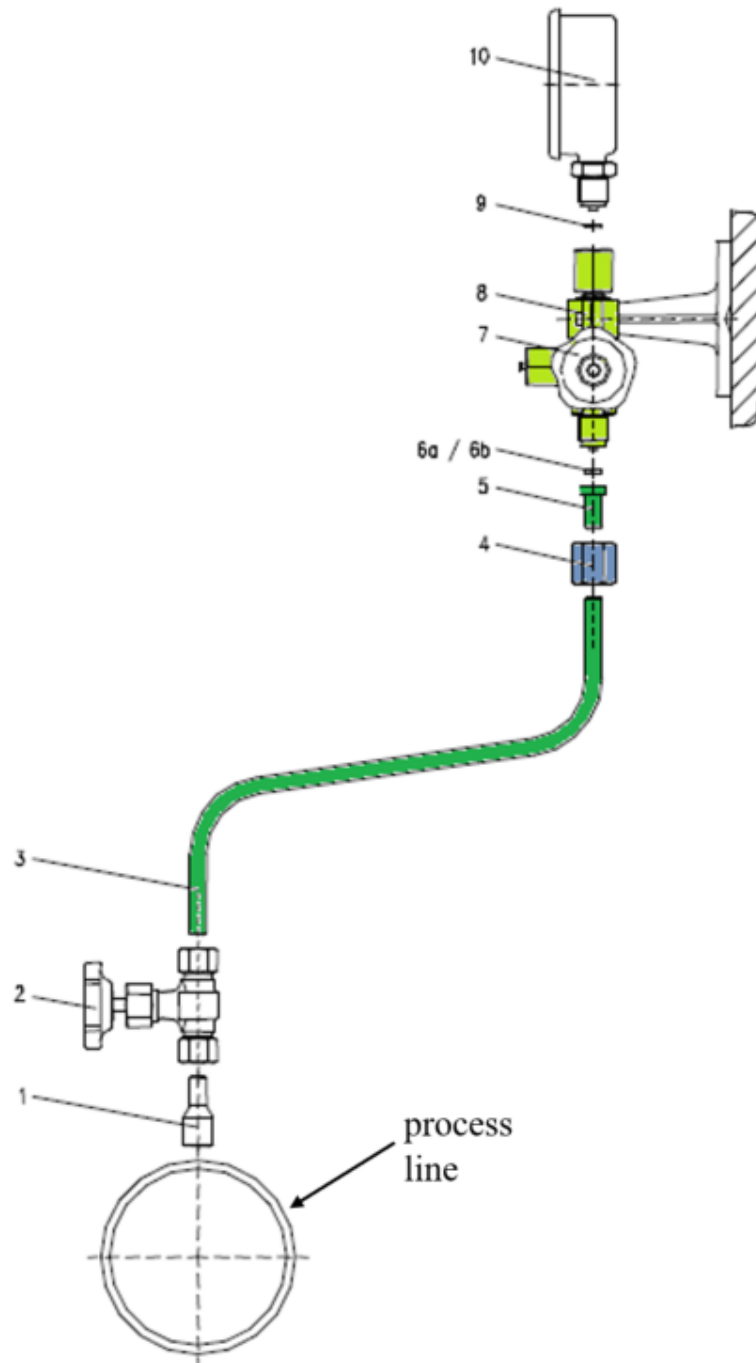


*Figure from 2008 Hook-Ups Catalog of PR08
(annotated with color/text)*

Impulse line 3 includes a “nipple” 5 that engages union nut 4. *Id.* The connection of impulse line 3 and valve 7 is sealed via the “sealing washer 6a/6b”. *Id.* Valve 7 connects to a measuring “instrument” 10 in a sealing manner via a “sealing washer” 9. *Id.* Below is an exploded front view of PR08 showing the pressure gauge/measuring instrument above the valve (**lime**). Valve 7 includes two outwardly extending side valves, as seen in the figure below. One of the side valves is a shutoff valve (shown in **orange** below as the left side valve for illustrative purposes). Ex. 1002 ¶[99].

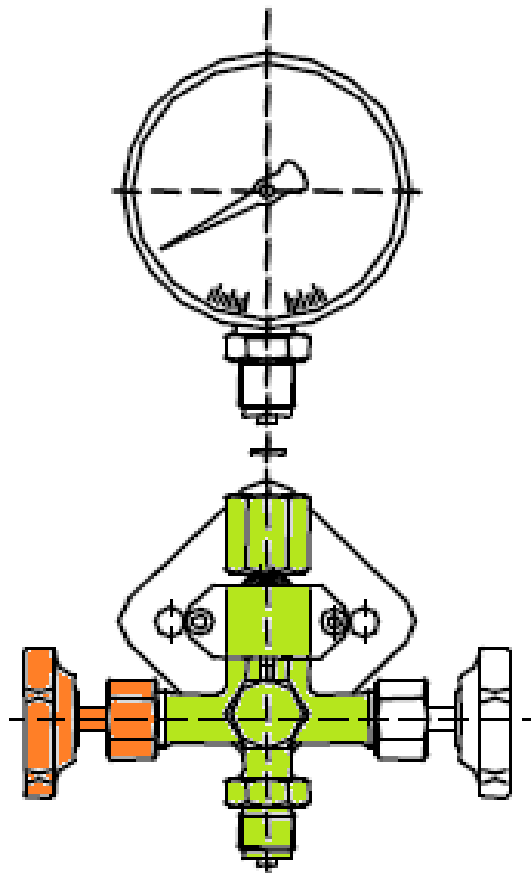
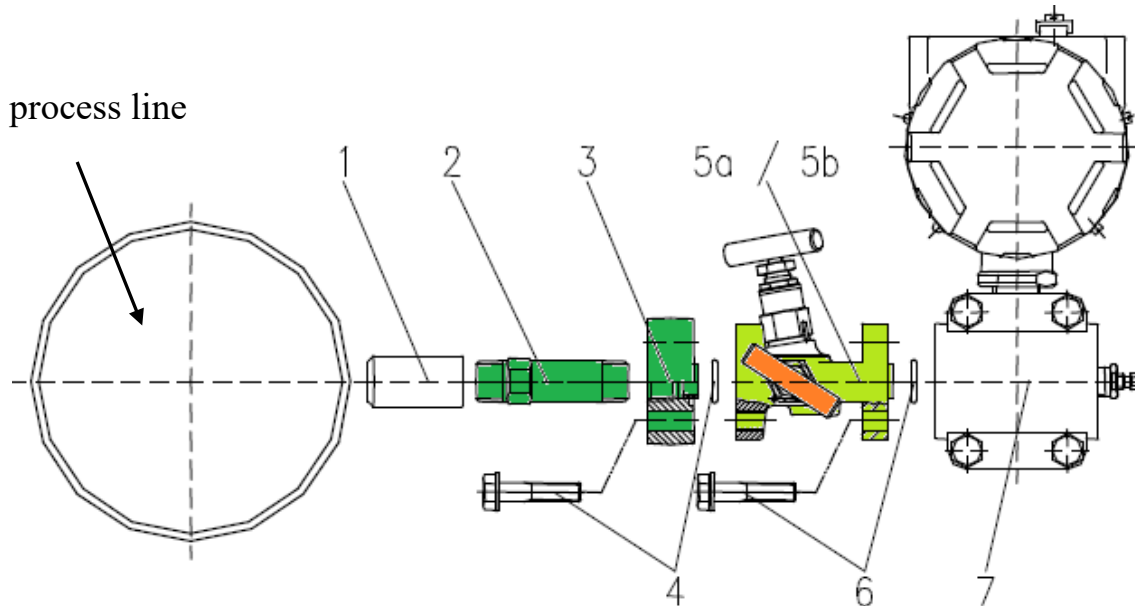


Figure from 2008 Hook-Ups Catalog of PR08 (annotated with color)

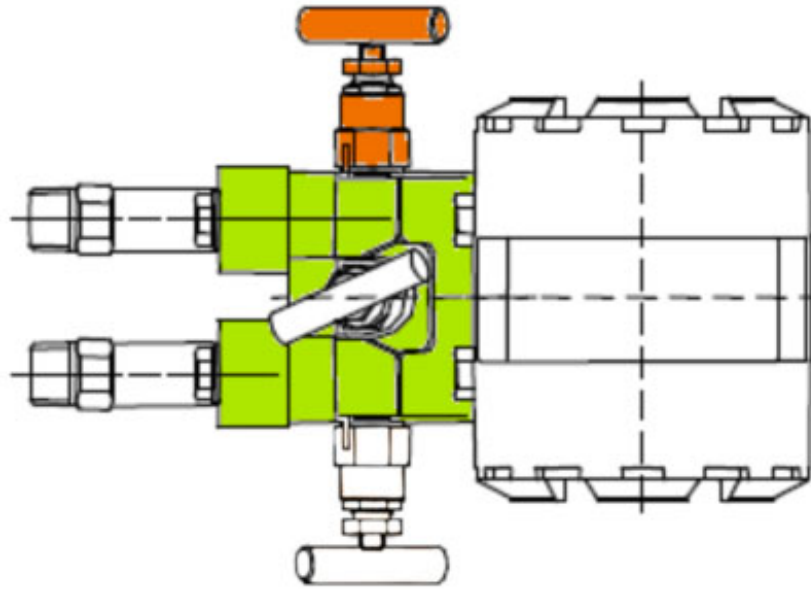
ii. DPD

Another hook-up product (hereinafter “DPD”) disclosed in the Hook-ups Catalog is designed for “directly” mounting a differential pressure measurement instrument on the process line, as seen in the figure below. Ex. 1006 at 52.



Exploded view of DPD from 2008 Hook-Ups Catalog (annotated with color)

DPD includes a pressure tap 1, a hex nipple 2 (**green**), a flange 3 (**green**), a valve block 5a/5b (**lime**), sealing rings 4 and 6, and a pressure instrument 7. *Id.* The process line on which the differential pressure instrument is mounted is left of the pressure tap 1 in the view above. *Id.* An assembled view of DPD is shown below.



Assembled view of DPD from 2008 Hook-ups catalog (annotated with color)

3. Parker Direct-Mount® Duo™ I.O.M. Manuals (Parker-1/Parker-2)

Parker-1 and Parker-2 are manuals for installation, operation, and maintenance of block valves. Ex. 1010 at 1-4 (“Stabilized Connector with Integral Block Valves Installation, Operation & Maintenance (I.O.M.) Manual); Ex. 1011. Parker-1 and Parker-2 disclose the same tool with identical components—i.e., the AK-147 Direct-Mount Duo. Ex. 1002 ¶[103].

Parker-1 qualifies as prior art under 35 U.S.C. §102 because it published by October 2013, which is before the effective filing date of the '030 patent. The publication of Parker-1 is evidenced by a Google search showing the date the manual was live on the internet, and also the October 2013 copyright date on the

manual. Ex. 1010; Ex. 1002 ¶[103]. Parker-1 was not cited during prosecution of the '030 patent. *See* Ex. 1001 at (56).

Parker-2 qualifies as prior art under 35 U.S.C. §102 because it published by March 2014, which is before the effective filing date of the '030 patent. The publication of Parker-2 is evidenced by the Wayback Machine®. Ex. 1011; MPEP §2128 II.D; Ex. 1002 ¶[103]. Parker-2 was not cited during prosecution of the '030 patent. *See* Ex. 1001 at (56).

Parker-1/Parker-2 disclose a connecting apparatus for “mounting block valves to an orifice fitting” of a pipeline for pressure measurement of the gas in the pipeline. Ex. 1010 at Fig. 2,1-6 (“2.1 Installation without dielectric isolators to Jr./Sr. Orifice Fittings or Other”); Ex. 1011. As seen in Parker-1, Fig. 2 below, the connecting apparatus of Parker-1 includes a “stabilized connector” (**green**), an “integral block valve” (**lime**), and a “union nut” (**blue**) for interconnecting the stabilized connector and the integral block valve. *Id.* at Fig. 2, 4-9.

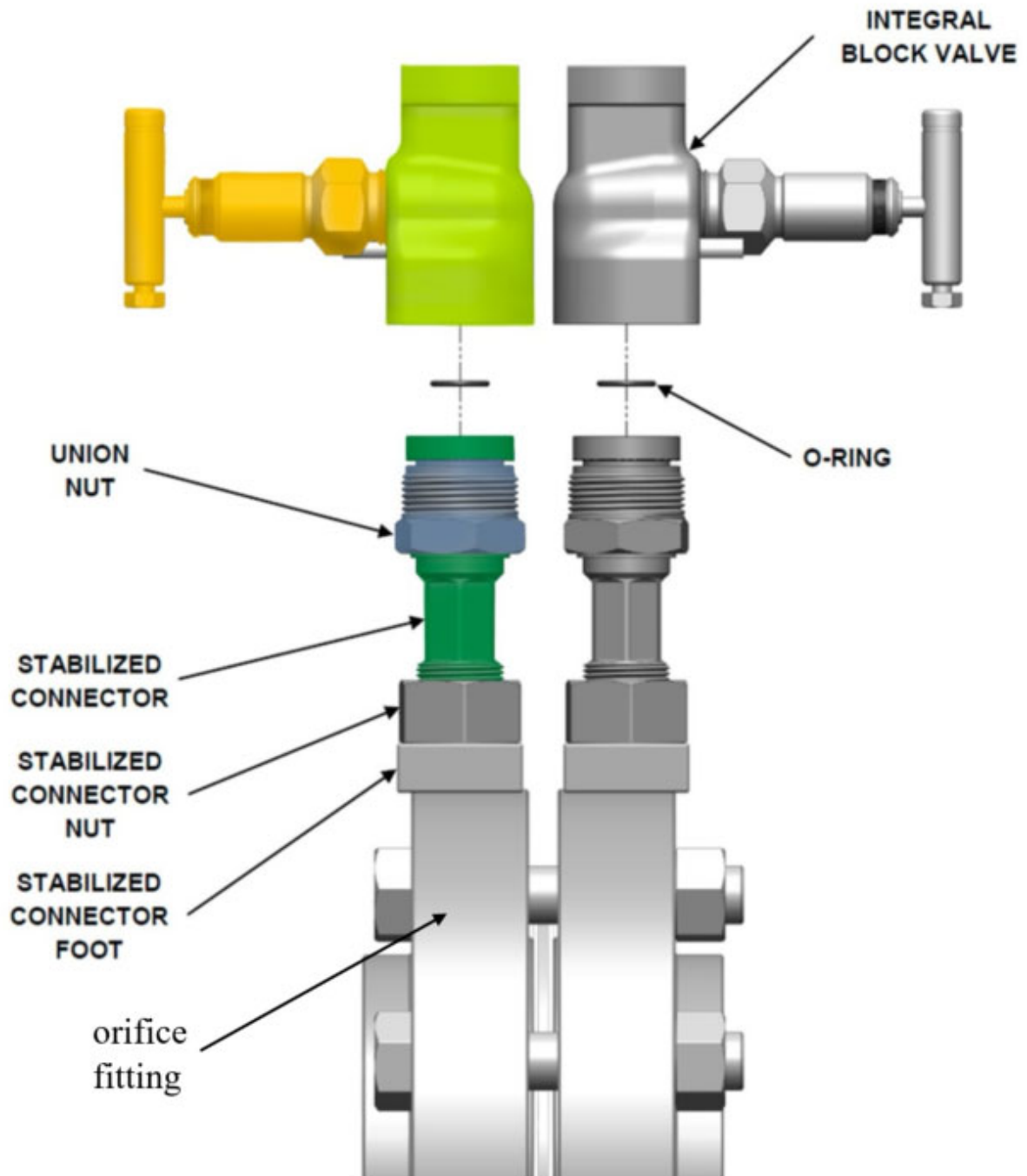


Figure 2

Parker-1 Figure 2 (annotated with color/text)

An o-ring is provided between the connection of the stabilized connector and the block valve, as seen in Figure 2 above. *Id.* A shutoff valve (**orange** above) extends outwardly from the valve block at a right angle. Ex. 1002 ¶[105]. Figure 4 of Parker-1 (shown below with annotations) is a side view showing the stabilized connector threadably mounted to the orifice fitting and showing the block valve with an outer flange at its upper end on which a measuring instrument can be attached. Ex. 1010 at 8.

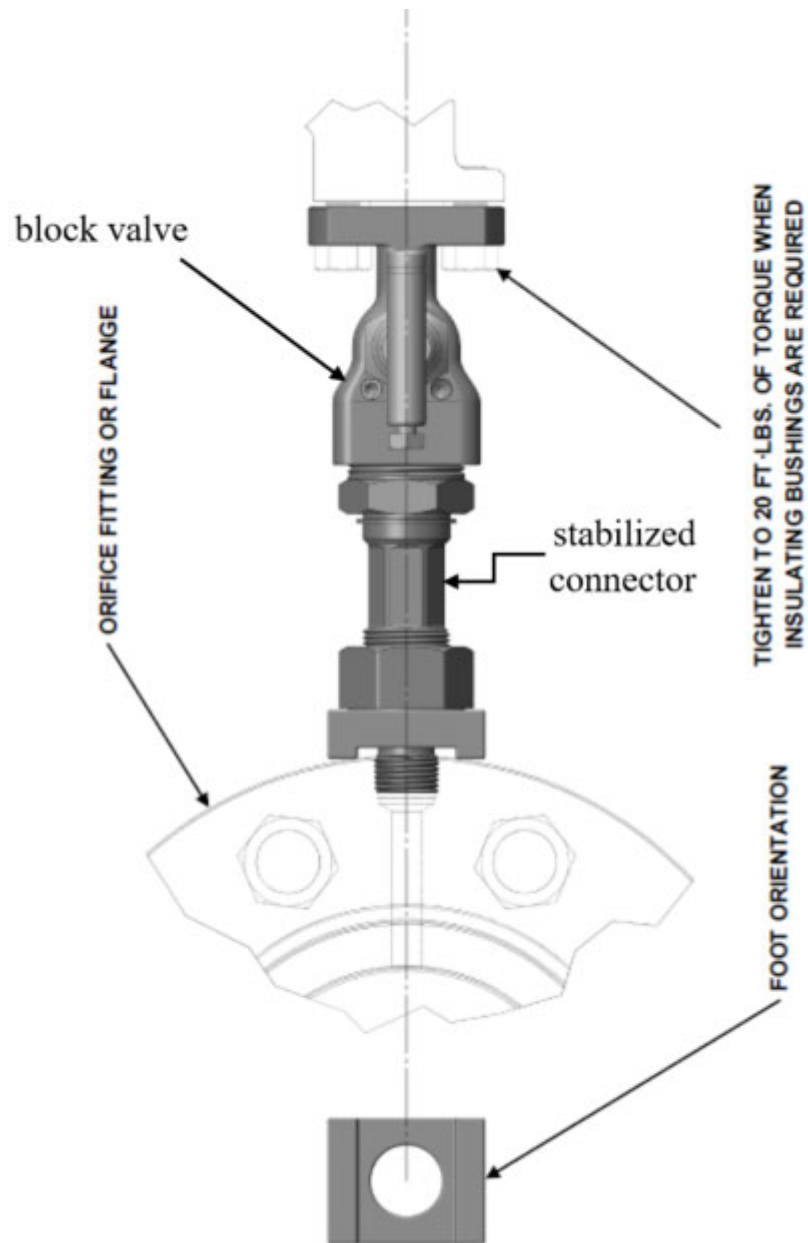
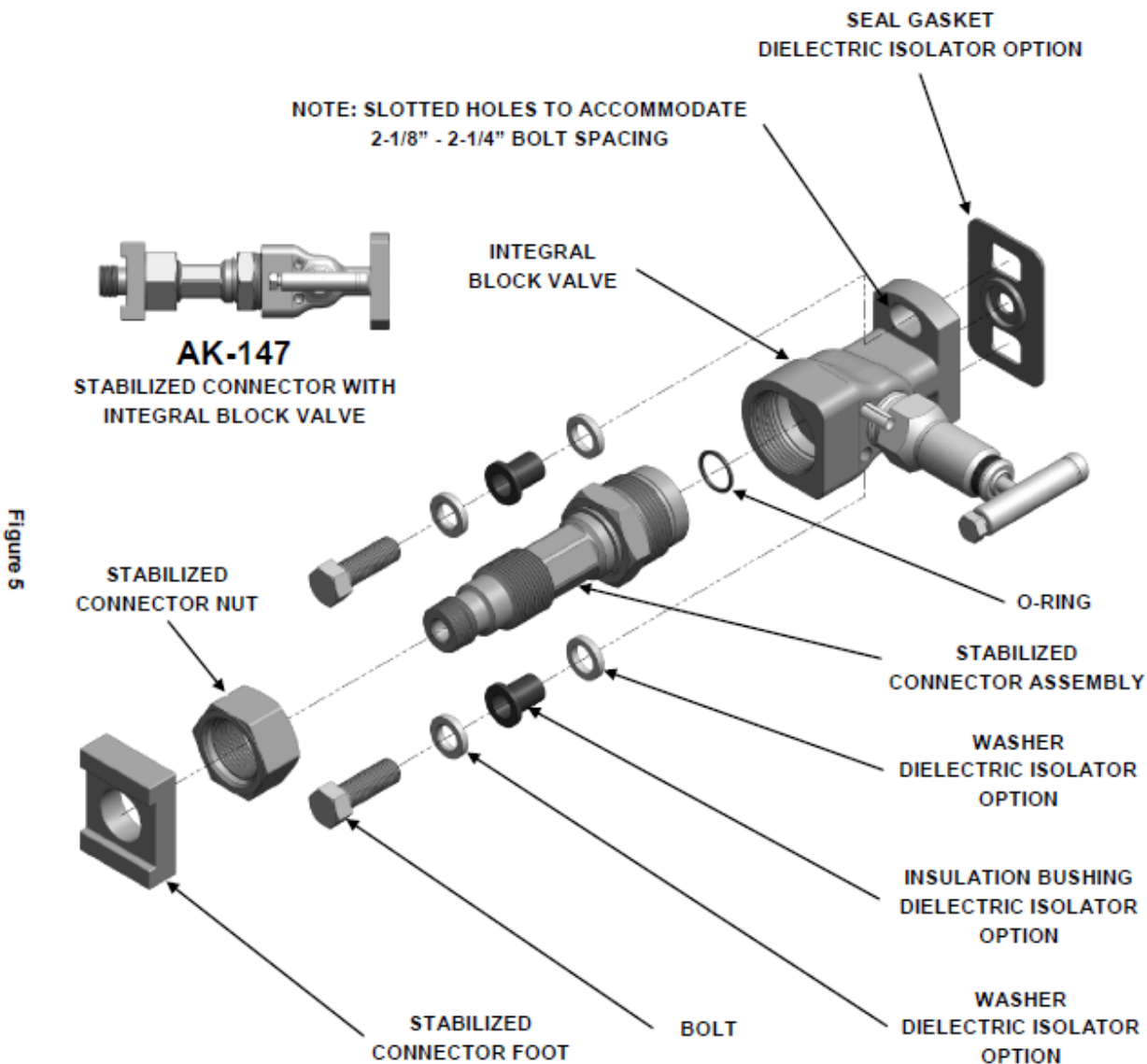


Figure 4

Parker-1 Figure 4 (annotated with text)

The stabilized connector mounts directly to the orifice fitting via a “stabilized connector nut” and a “stabilized connector foot”, as seen in Figures 2 and 4. *Id.* The block valve is configured to connect to a pressure measuring

instrument via the outer flange (that has “slotted holes to accommodate 2-1/8” – 2-1/4” bolt spacing), as seen in Figure 5 of Parker-1, shown below.



Parker-1 Figure 5

The components illustrated above in Figs. 2, 4, and 5 of Parker-1 are identical to those in Parker-2. *Compare* Ex. 1010, Figs. 2, 4, and 5, *with* Ex. 1011; Ex. 1002 ¶[106]. .

4. AS-Schneider 2012 Accessories Catalog

Patent Owner's 2012 Accessories Catalog relates to instrumentation products and accessories. Ex. 1008 at 1. This catalog qualifies as prior art under 35 U.S.C. §102 because it was published in 2012, which is more than a year prior to the effective filing date for the '030 patent. The publication of the Accessories Catalog in 2012 is evidenced by the Wayback Machine®. Ex. 1009; MPEP §2128 II.D; Ex. 1002 ¶[107]. This catalog was not cited during prosecution of the '030 patent. *See* Ex. 1001 at (56).

The 2012 Accessories Catalog includes a swivel gauge adaptor (hereinafter “the Schneider Adaptor”), that is a union connection. Ex. 1008 at 111. As shown in the annotated figure below, the Schneider Adaptor (“Type 2b”) includes a union nut (**blue**) that has an inner flange for engaging the first connecting device (**green**) and inner threads for engaging the second connecting device (**lime**). *Id.*

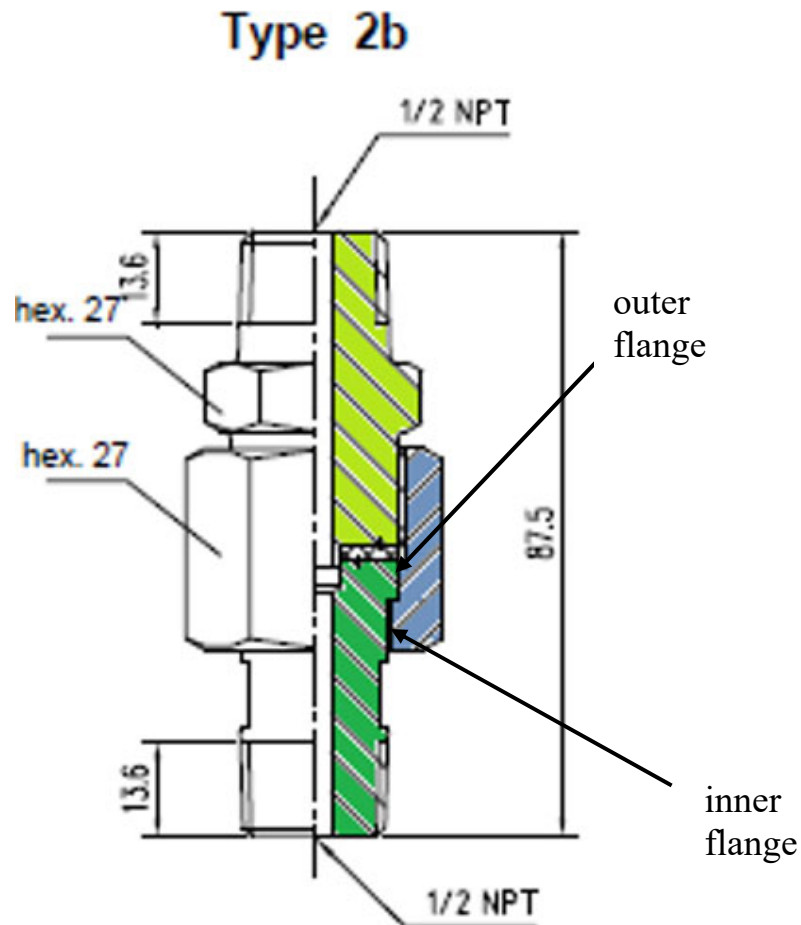


Figure of the Schneider Adaptor of Accessories Catalog (annotated with color/text)

The inner flange of the nut (**blue**) engages an outer flange located at an upper region of the first connecting device (**green**), and the inner threads of the nut (**blue**) engage outer threads at a lower region of the second connecting device (**lime**). Ex. 1002 ¶¶[108]-[109]. A sealing ring/gasket is provided between the respective end faces of the first and second connecting devices. *Id.* at ¶[109].

C. Claims 1, 2, 6, and 7 are Invalid Under 35 U.S.C. §102 and Thus Unpatentable

A claim is anticipated if every element in the claim is disclosed, either

expressly or inherently, in a single prior art reference. *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987). When a claim covers several structures or compositions, either generically or as alternatives, the claim is deemed anticipated if any of the structures or compositions within the scope of the claim is known in the prior art. *Brown v. 3M*, 265 F.3d 1349, 1351 (Fed. Cir. 2001).

Ground 1 – Claims 1, 2, 6 and 7 are anticipated under 35 U.S.C. §102
in view of Craig.

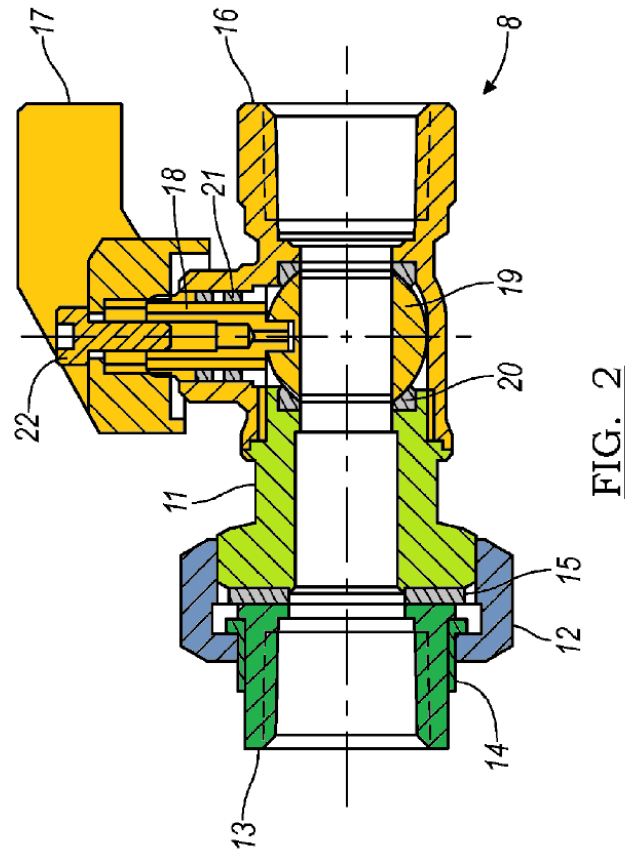
As demonstrated below, Craig teaches every element of claims 1, 2, and 6-7 of the '030 patent. As discussed below, each and every element of claim 1 is identically found in Craig, including a connecting apparatus that is the union connection valve 8, used in association with a pressurized gas feed line. *See* Ex. 1005 at ¶¶[0007]-[0008].

Claim 1 [preamble]²

Craig discloses a connecting apparatus comprising a union valve 8 that has a

² The terms Claim 1 [preamble], Claims 1[a]-1[d], and Wherein Clauses (i)-(ix) are used herein as short-hand identifiers for the elements of claim 1, as shown above in the Listing of Challenged Claims on pages v-vi.

first connecting device 13 (**green** in annotated Fig. 2 below), a second connecting device 11 (**lime** in annotated Fig. 2 below), and a connecting nut 12 (**blue** in the annotated Fig. 2 below). *Id.* at ¶¶[0007][0008], Fig. 2.



Craig Fig. 2 (annotated with color, rotated counterclockwise 90°)

For ease of comparison, the union valve of Fig. 2 of Craig is shown above rotated counterclockwise 90° (which is rotated 180° from the orientation of the union valve shown in Fig. 1). A POSITA would understand that the union valve of Craig could be rotated and work in either orientation. Ex. 1002 ¶[114].

Claim 1[a]

Craig teaches a “threaded union end 13” which is a first connecting device that has a through-opening in a longitudinal direction, as seen in Fig. 2. *See* Ex. 1005 at ¶[0008]. The union end 13 being a threaded end is connectable to a pipeline in a sealing manner. Ex. 1002 ¶[115].

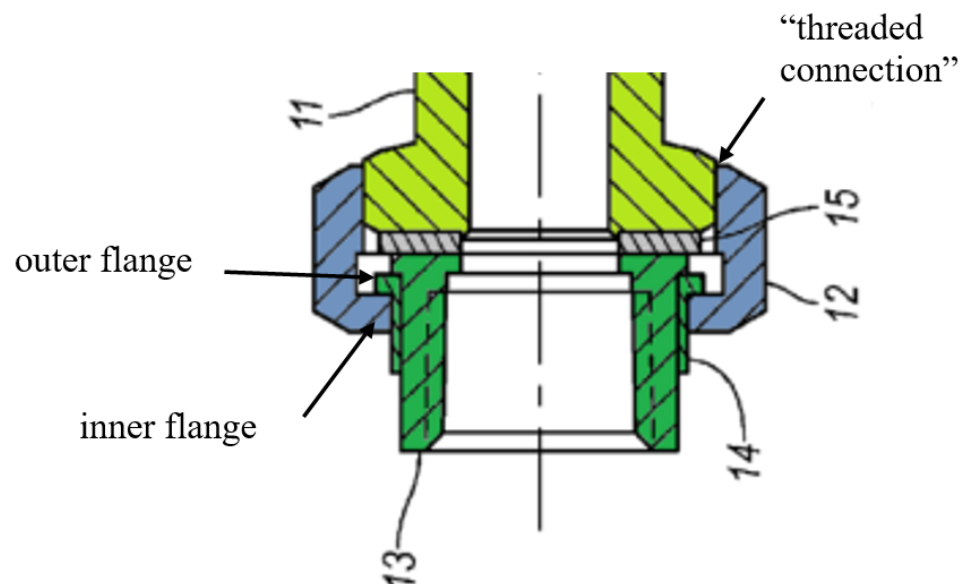
Claim 1[b]

Craig teaches an “end connection 11” which is a second connecting device that has a through-opening (in a longitudinal direction) complementary to the through-opening of union end 13 (first connecting device), as seen in Fig. 2 above. *See* Ex. 1005 at Fig. 2. A POSITA would understand that end connection 11 of Craig necessarily provides a sealing connection to a valve by virtue of the assembly of union valve 8 in which end connection 11 of union part connects to the main body 16 and also seals to the ball 19 of the valve part of the union valve 8. Ex. 1002 ¶[116]. Main body 16 of union valve 8 surrounds the end of end connection 11, thereby inherently providing a sealing connection between the end of end connection 11 and the valve. *Id.* The union valve 8 would not work for its intended purpose if that was not a sealing connection. *Id.* A POSITA would recognize that there must be sealing to avoid leaks and ensure gas flow through union valve 8. *Id.* The union valve 8 can shutoff or seal off the gas flow to the

pressure regulator by rotating ball 19 via stem 18 and valve handle 17. *See* Ex. 1005 at ¶[0009].

Claim 1[c]

Craig teaches a nut 12 which is a connecting unit that connects union end 13 (first connecting device) with end connection 11 (second connection device). *See* Ex. 1005 at ¶[0008]. The nut 12 provides a sealing connection between the two connecting devices 11 and 13 in the same manner as taught by the '030 patent. As seen in Fig. 2 below, the sealing connection is created when the inner flange of nut 12 and the outer flange of union end 13 of the first connecting device are interlocked, along with the threaded engagement between nut 12 and end connection 11 (second connecting device). *Id.* at ¶[0008], Fig. 2.

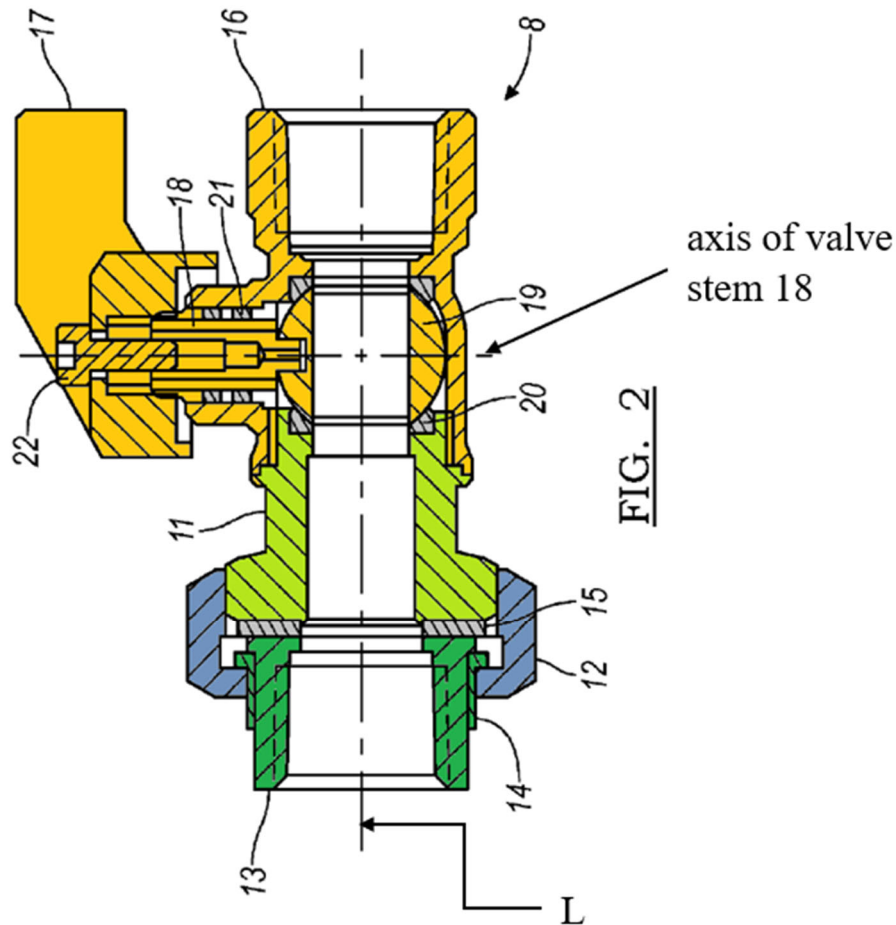


Partial view of Craig Fig. 2 (annotated with color/text)

The connecting apparatus of Craig also includes a rubber gasket 15 between the end-face surfaces of union end 13 and the end connection 11. *Id.* A POSITA would understand that such a rubber gasket 15 would inherently provide sealing between the two connecting devices 11 and 13 when clamped together by tightening the nut 12. Ex. 1002 ¶[118].

Claim 1[d]

The valve part of union valve 8 of Craig, which is connected to end connection 11 (second connecting device), includes a shutoff feature comprising handle 17, stem 18, and rotating ball 19, which can be moved between ON and OFF positions. *See* Ex. 1005 at ¶[0009] and Claim 1. The axis of the shutoff feature extends obliquely with respect to the longitudinal axis of the connecting apparatus of Craig because, as seen in Fig. 2 (shown annotated below), at least the stem 18 thereof extends at a right angle with respect to the longitudinal axis L of assembled union valve 8, end connection 11, and union end 13. *Id.* at Fig. 2.



Craig Fig. 2 (annotated with color/text)

Claim 1 [wherein clause (i)]

Nut 12 of Craig retains union end 13 (first connecting device) “securely mounted” on end connection 11 (second connecting device), thereby interconnecting the two connecting devices 11 and 13. *Id.* at ¶[0008]. The nut 12 interconnects the two connecting devices 11 and 13 with “sealing effect” in the same manner as taught by the ’030 patent. The sealing effect is provided by the interlocking of the inner flange of nut 12 and the outer flange of union end 13 (first

connecting device), along with the threaded engagement between nut 12 and end connection 11 (second connecting device) causing the respective end faces of union end 13 and end connection 11 to be clamped and sealed together. *Id.* at ¶[0008], Fig. 2; Ex. 1002 ¶[121].

In addition, the connecting apparatus of Craig includes a gasket 15 between the end-face surfaces of union end 13 and end connection 11. *See* Ex. 1005 at ¶[0008]. A POSITA would understand that such a gasket 15 would inherently provide sealing between the two connecting devices 11 and 13 when clamped together by tightening the nut 12. Ex. 1002 ¶[122].

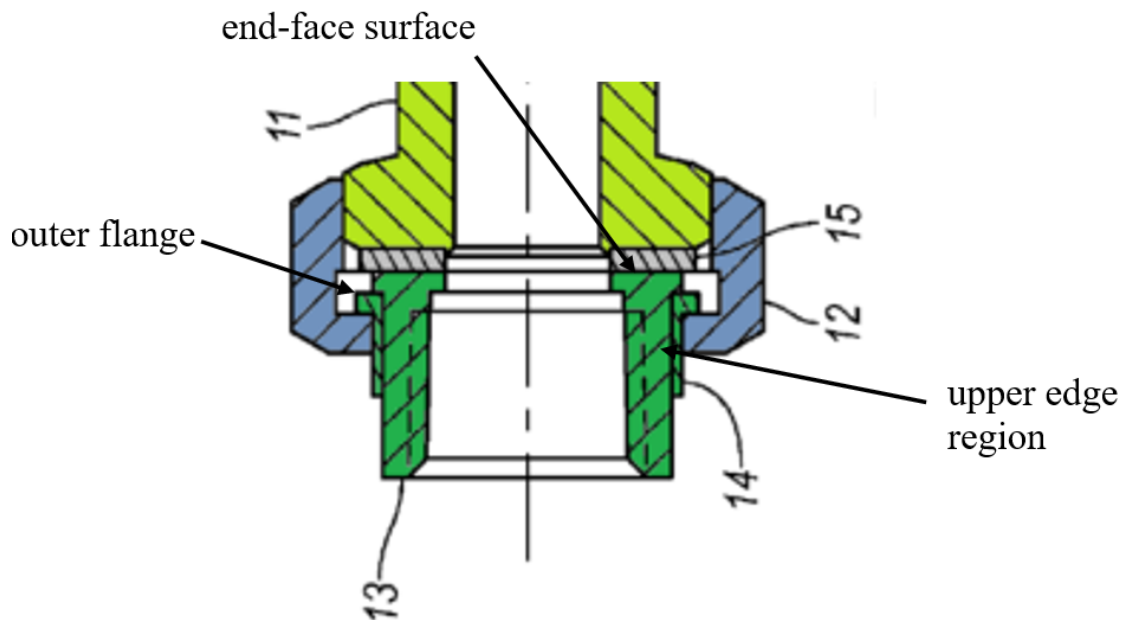
Claim 1 [wherein clause (ii)]

A POSITA would recognize that nut 12 of Craig sealingly interconnects union end 13 (first connecting device) with the end connection 11 (second connecting device) by rotation of the nut 12; that is by solely rotating nut 12 to threadably engage end connection 11. Ex. 1002 ¶[123].

Claim 1 [wherein clause (iii)]

As shown in Fig. 2 below, Craig teaches that union end 13 (first connecting device) of Craig has a ring 14 at an upper edge region thereof, and ring 14 includes an outwardly pointing outer flange. Ex. 1005 at ¶[0008], Fig. 2. Although union end 13 and ring 14 are two pieces assembled together, a POSITA would understand that such is equivalent to a single integral construction. Ex. 1002

¶[124]. A POSITA would also recognize that union end 13 (first connecting device) of Craig has an end-face sealing surface (as seen in annotated Fig. 2 below) that can seal with an end-face surface of end connection 11 (second connecting device) when nut 12 is tightened by virtue of the gasket 15. *Id.* A POSITA would understand that such a gasket 15 would inherently provide sealing between the end-face sealing surfaces of first and second connecting devices 11 and 13 when clamped together by screwing nut 12 on to end connection 11 (second connecting device). *Id.*

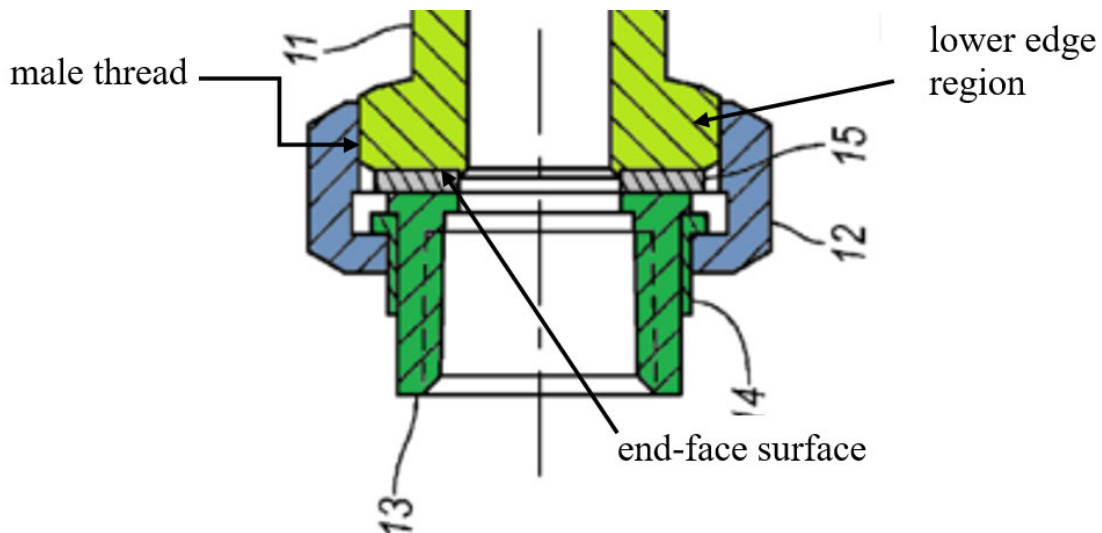


Partial view of Craig Fig. 2 (annotated with color/text)

Claim 1[wherein clause (iv)]

Craig teaches a “threaded connection” between end connection 11 (second connecting device) and nut 12. *See* Ex. 1005 at ¶[0008]. As shown in Fig. 2

below, nut 12 threads onto the end of the end connection 11. *Id.* at Fig. 2. As such, a POSITA would recognize that end connection 11 necessarily has a male/outer thread which engages an inner thread of nut 12. Ex. 1002 ¶[125]. The thread of end connection 11 (second connecting device) is at the lower end region thereof, as seen in Fig. 2 below. *See* Ex. 1005 at Fig. 2. A POSITA would also recognize that end connection 11 (second connecting device) of Craig has an end-face sealing surface (shown below in annotated Fig 2) that can seal with the end-face surface of union end 13 (first connecting device) when nut 12 is tightened by virtue of gasket 15. *See id.* at ¶[0008], Fig. 2; Ex. 1002 ¶[125].

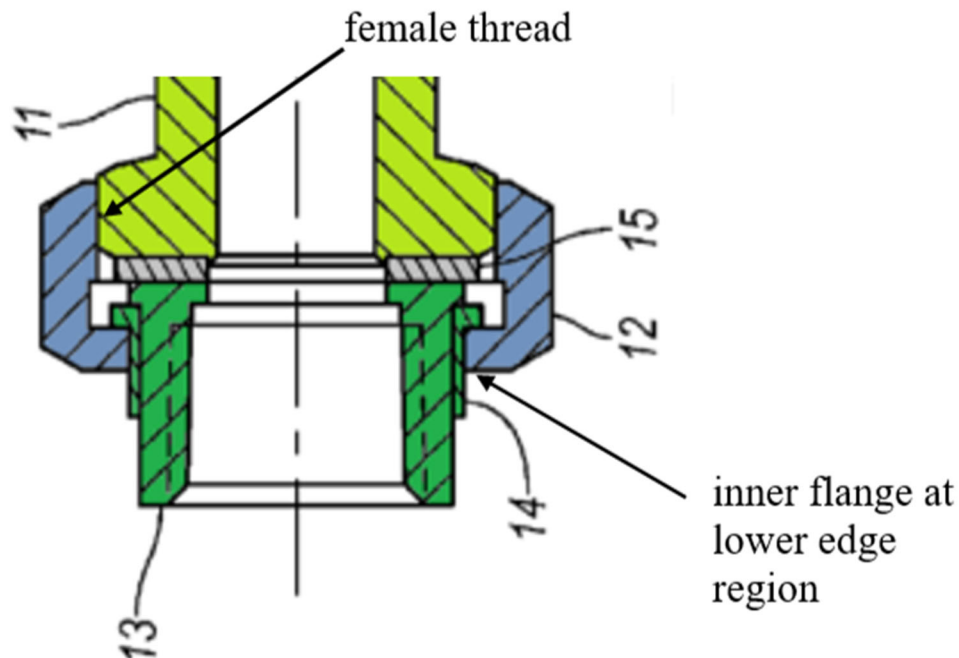


Partial view of Craig Fig. 2 (annotated with color/text)

Claim 1[wherein clause (v)]

As shown in Fig. 2 below, nut 12 of Craig necessarily has a female thread.

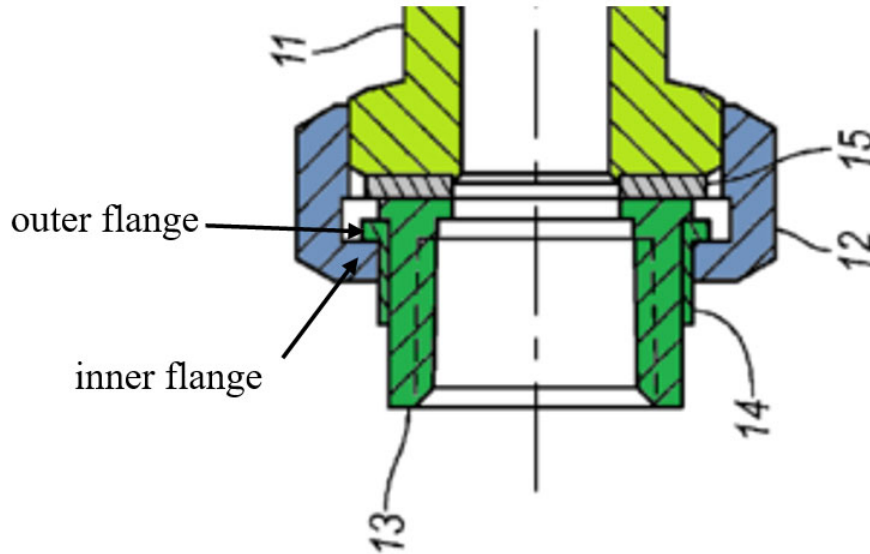
Craig teaches a “threaded connection” between nut 12 and end connection 11 (second connecting device). *See* Ex. 1005 at ¶[0008]. Nut 12 of Craig includes an inwardly pointing inner flange (see annotated Fig. 2 below) arranged at second connecting device 11’s lower edge region. *Id.* at Fig. 2. A POSITA would understand that because nut 12 threads onto end connection 11, nut 12 necessarily has a female/inner thread on its inwardly pointing inner flange which engages the male/outer thread of end connection 11. Ex. 1002 ¶[126].



Partial view of Craig Fig. 2 (annotated with color/text)

Claim 1[wherein clause (vi)]

As shown in Fig. 2 below, Craig discloses the outer flange of ring 14 of union end 13 (first connecting device) fits behind the inner flange of nut 12. *See* Ex. 1005 at Fig. 2.



Partial view of Craig Fig. 2 (annotated with color/text)

Claim 1[wherein clause (vii)]

A POSITA would recognize that nut 12 taught by Craig interconnects the two connecting devices 11 and 13 with “sealing effect” in the same manner as taught by the ’030 patent. Ex. 1002 ¶[128]. As shown in Fig. 2 above, the sealing effect is provided by means of the inner flange of nut 12 interlocking with the outer flange of union end 13 (first connecting device), along with the threaded engagement between nut 12 and end connection 11 (second connecting device). *See* Ex. 1005 at ¶[0008]. The threaded engagement (or “threaded connection”) is

accomplished by screwing nut 12 onto end connection 11, as seen in Fig. 2. *Id.* And screwing the nut necessarily brings the two end-face sealing surfaces together to make the seal. Ex. 1002 ¶[128]. A POSITA would understand that because nut 12 is screwed onto end connection 11, nut 12 necessarily has the female/inner thread and end connection 11 (second connecting device) has the male/outer thread of the threaded engagement between the two. *Id.*

Notably, Craig teaches providing a gasket 15 between the end-face surfaces of union end 13 and end connection 11 (first and second connecting devices), respectively. *See* Ex. 1005 at ¶[0008]. A POSITA would understand that such a gasket 15 would inherently provide sealing between the end-face sealing surfaces of the connecting devices 11 and 13 when clamped together by screwing nut 12 on to end connection 11. Ex. 1002 ¶[129].

Claim 1[wherein clause (viii)]

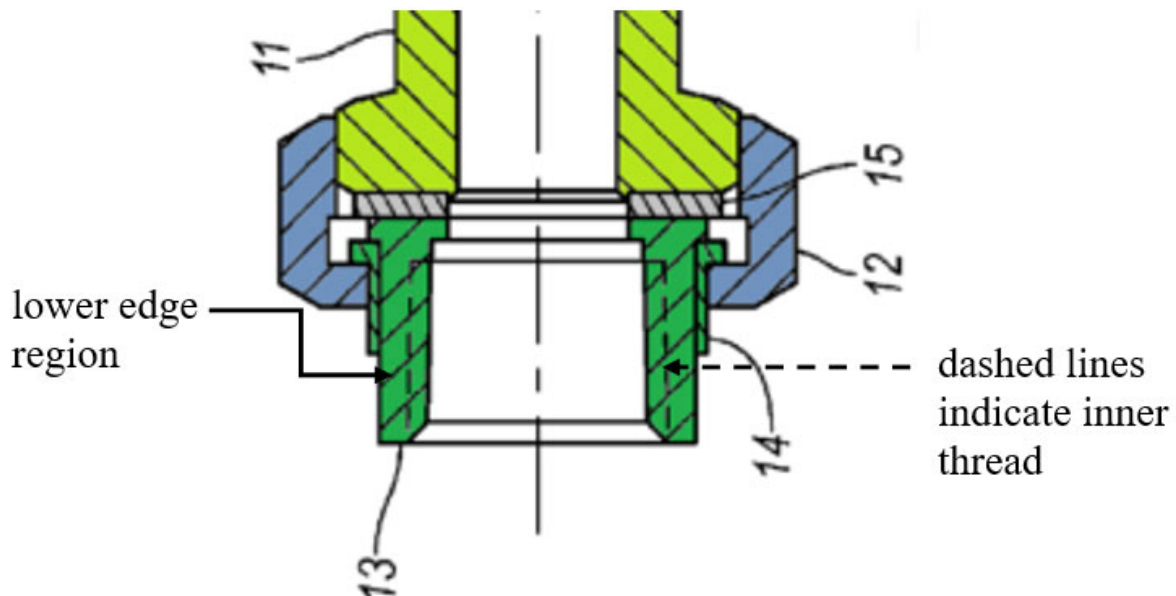
A POSITA would recognize that the outer flange of ring 14 of union end 13 (first connecting device) and the inner flange of nut 12 taught by Craig are provided in an encompassing manner because each extends circumferentially around the first connecting device to accomplish the connection between union end 13 and end connection 11. *Id.* ¶[130].

Claim 1[wherein clause (ix)]

Craig teaches providing gasket 15 between the end-face surfaces of union end 13 and end connection 11 (first and second connecting devices) which inherently provides a sealing means when nut 12 is tightened, as explained above regarding wherein clause (vii).

Claim 2

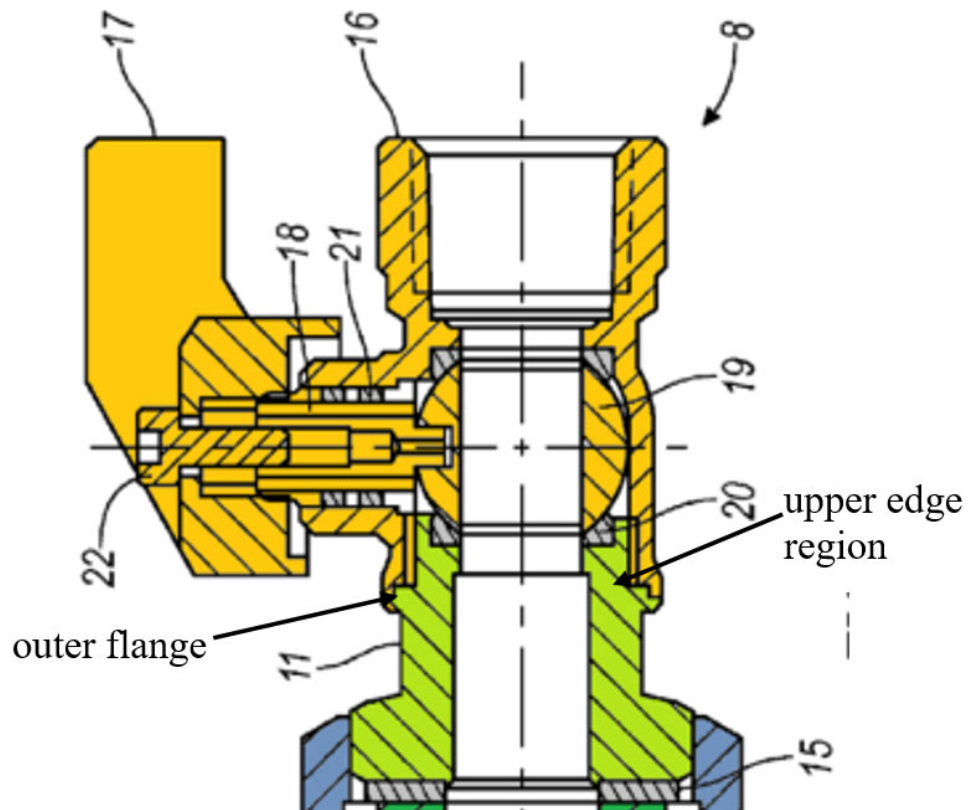
Craig teaches that union end 13 (first connecting device) is a “threaded” union end 13. *See* Ex. 1005 at ¶[0008]. A POSITA would recognize that the dashed lines illustrated in Fig. 2 below show that the thread of union end 13 extends to the end, or lower edge region, of union end 13. *Id.* at Fig. 2; Ex. 1002 ¶[132].



Partial view of Craig Fig. 2 (annotated with color/text)

Claim 6

Fig. 2 of Craig (partial view shown below) shows that end connection 11 (second connecting device) has an outer flange at the upper end region thereof. See Ex. 1005 at Fig. 2.



Partial view of Craig Fig. 2 (annotated with text/color)

Claim 7

As seen in Fig. 2 above, the axis of handle 17 and stem 18 of union valve 8 is at a right angle to the longitudinal axis of the connecting apparatus of Craig. See Ex. 1005 at Fig. 2.

Ground 2 – Claims 1 and 7 are anticipated by the 2008 Schneider
Hook Ups Catalog under 35 U.S.C. §102(b).

PR08 of the 2008 Schneider Hook-Ups Catalog, designed for connecting pressure instruments to a process line, teaches all of the elements of claims 1 and 6-7 of the '030 patent. PR08 is a connecting apparatus that includes a union nut or connecting unit for interconnecting first and second connecting devices with sealing effect, where the first connecting device is connectable to a process line and the second connecting device is sealingly connected to a pressure measuring instrument, as recited in claim 1. *See* Ex. 1006 at 37.

Claim 1 [preamble]

As shown in the figure below (annotated), PR08 is a connecting apparatus that comprises a “union nut” 4 (**blue**) which interconnects a first connecting device (**green**), that is impulse line 3, with a second connecting device (**lime**), that is valve 7. *See id.* As also seen in the figure below, impulse line 3 connects to the process line and valve 7 connects to pressure measuring instrument 10, like in the '030 patent.

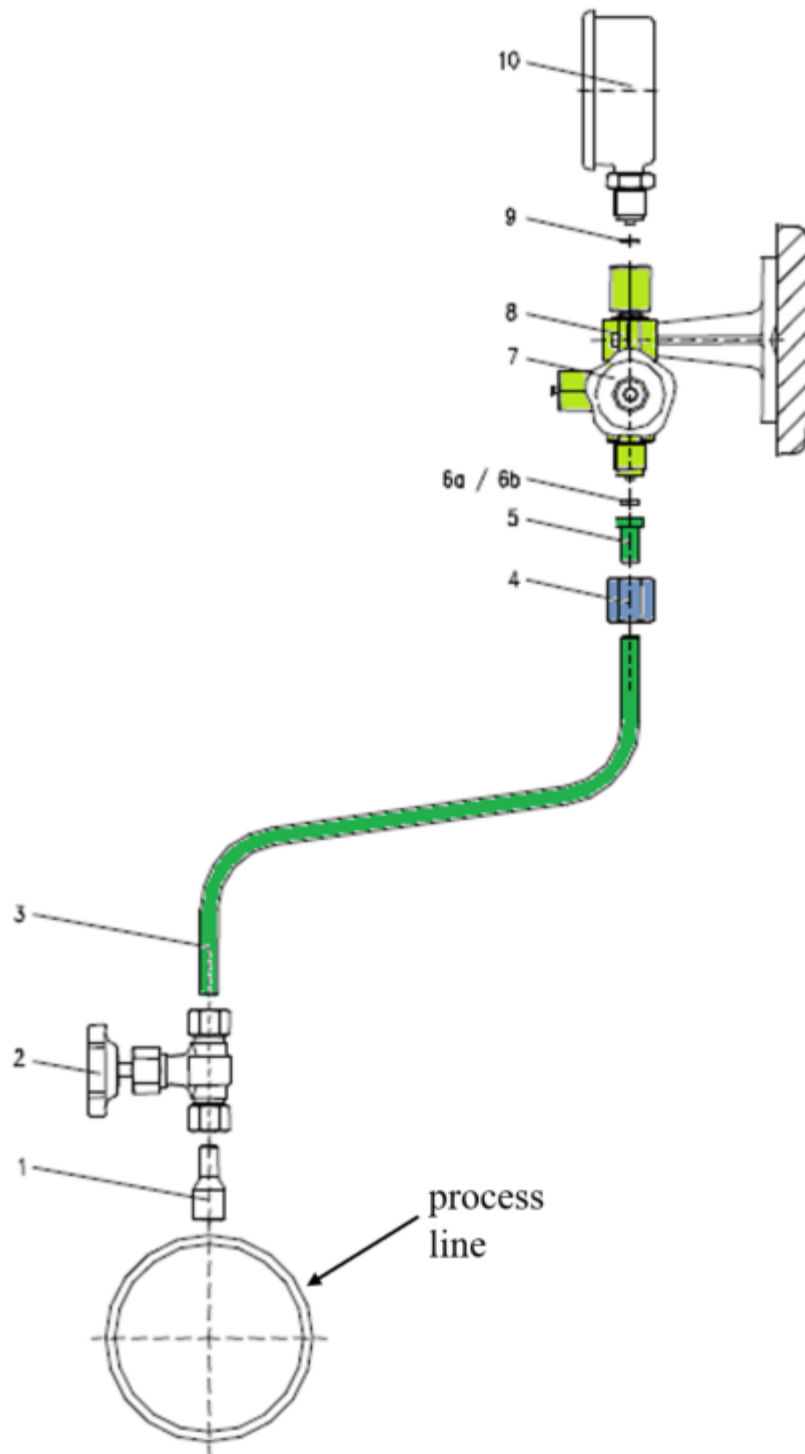


Figure of PR08 (annotated with color/text)

Claim 1[a]

As mentioned above, PR08 includes a first connecting device or impulse line 3 (**green** in the annotated figure above), which connects to the process line at its lower end and has a “nipple” 5 at its upper end for assembly to union nut 4. *See* Ex. 1006 at 37. Although the nipple 5 is a separate piece that is attached to the end of impulse line 3, a POSITA would understand that such is equivalent to a single integral construction. Ex. 1002 ¶[137]. In any event, the claim does not require the first connecting device be a single integral construction. Impulse line 3, which connects to the process line, inherently includes a through-opening in a longitudinal direction necessary for fluid communication from the process line to valve 7 and ultimately to a pressure measuring instrument. *Id.*

Claim 1[b]

As mentioned above, PR08 includes a second connecting device or valve 7 (**lime** in the figure above). *See* Ex. 1006 at 37. A POSITA would understand that the valve 7 is a connecting device because it connects at its lower end to the nut and at its upper end to instrument 10. Ex. 1002 ¶[138].

A POSITA would recognize that valve 7 provides a sealing connection to a measuring instrument, that is instrument 10, via a “sealing washer” 9 (shown in the figure above). *See* Ex. 1006 at 37; Ex. 1002 ¶[139]. The valve 7 inherently includes a through-opening in a longitudinal direction for fluid communication

with both impulse line 3 and instrument 10 necessary for conducting the pressure measurement by the instrument 10. *Id.*

Claim 1[c]

Union nut 4 of PR08 (**blue** in the figure above) is a connecting unit that connects impulse line 3 (first connecting device), which includes nipple 5, with valve 7 (second connecting device). *See* Ex. 1006 at 37. A POSITA would recognize that union nut 4 of PR08 provides a sealing connection to impulse line 3 and valve 7 via the “sealing washer” 6a/6b (shown in the figure above) when clamped together by tightening union nut 4. *Id.*; Ex. 1002 ¶[140].

Claim 1[d]

Valve 7 or the second connecting device (**lime** in figure below) of PR08 includes the shutoff valve (**orange** in figure below). *See* Ex. 1006 at 37.

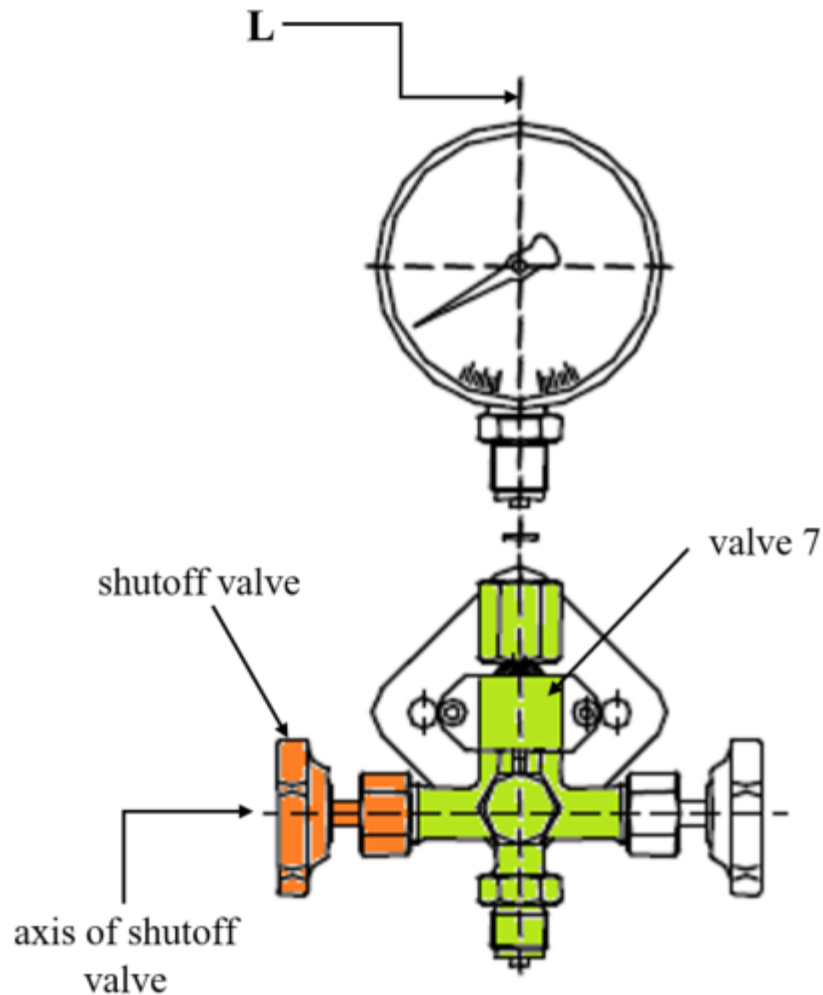


Figure of PR08 (annotated with color/text)

The axis of the shutoff valve extends obliquely, and specifically at a right angle, with respect to the longitudinal axis L of the connecting apparatus, as seen in the figure above. *Id.*

Claim 1 [wherein clause (i)]

A POSITA would recognize that union nut 4 of PR08 interconnects impulse line 3 and valve 7 (first and second connecting devices) with “sealing effect” via

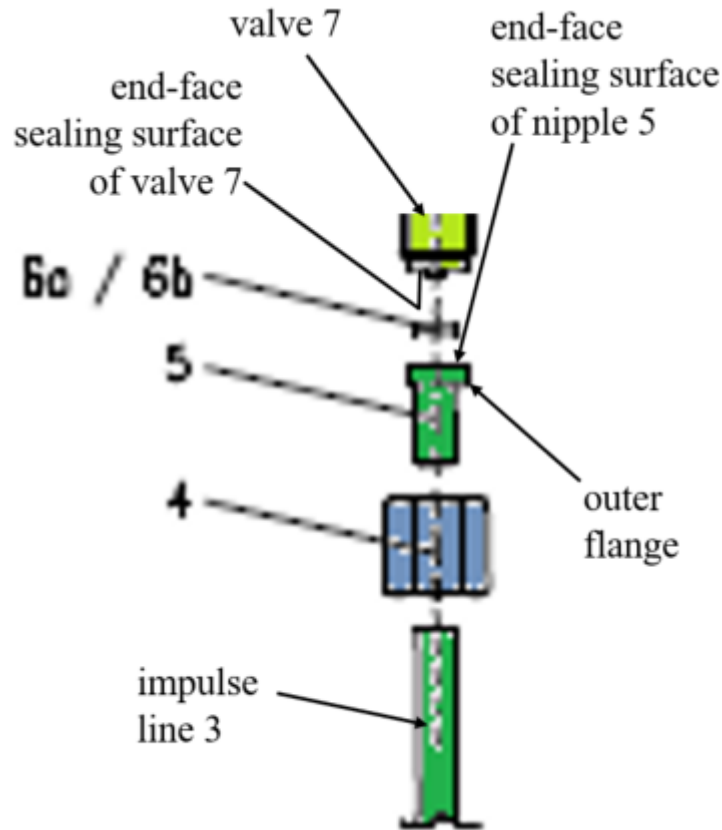
sealing washer 6a/6b. Ex. 1002 ¶[143]. A POSITA would readily understand that the sealing washer 6a/6b of PR08 would be received in union nut 4 and arranged between nipple 5 of impulse line 3 and valve 7 to provide a seal when impulse line 3 and valve 7 are clamped together by tightening union nut 4. *Id.*

Claim 1 [wherein clause (ii)]

A POSITA would recognize that union nut 4 of PR08 interconnects the impulse line 3 (first connecting device) with valve 7 (second connecting device) by rotating union nut 4, that is by solely rotating the union nut 4 to threadably engage valve 7 without rotating either impulse line 3 or valve 7. *Id.* ¶[144].

Claim 1 [wherein clause (iii)]

Nipple 5 of impulse line 3 (first connecting device) of PR08 has an outwardly pointing outer flange at its upper edge region, as seen in the annotated figure below. *See* Ex. 1006 at 37.

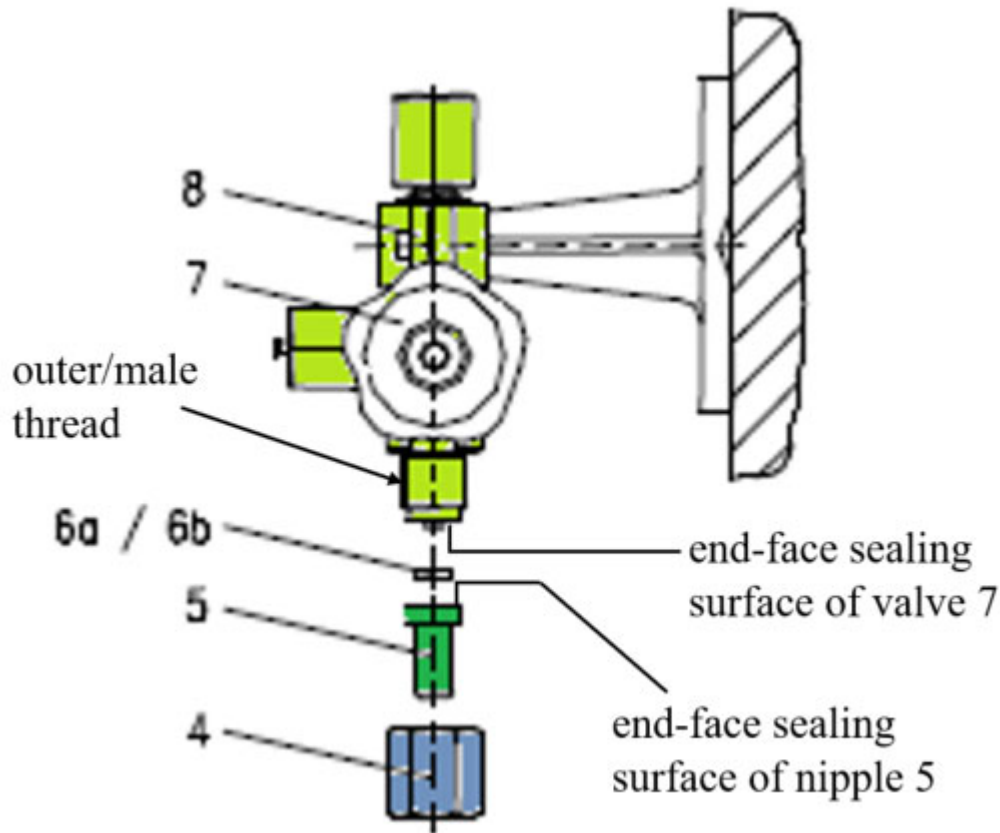


Partial enlarged view of PR08 (annotated with color/text)

A POSITA would recognize that nipple 5 of impulse line 3 has an end-face surface (see annotated figure above) that can seal with a corresponding end-face surface (see annotated figure above) of valve 7 (second connecting device) when union nut 4 is tightened on valve 7. Ex. 1002 ¶[146]. A POSITA would also understand that sealing washer 6a/6b provides sealing between those end-face sealing surfaces of impulse line 3 and valve 7, when they are clamped together by screwing union nut 4 onto valve 7. *Id.*

Claim 1[wherein clause (iv)]

The valve 7 (second connecting device) of PR08 includes an outer/male thread at its lower edge region, as seen in the annotated figure below. *See Ex. 1006 at 37.*



Partial enlarged view of PR08 (annotated with color/text)

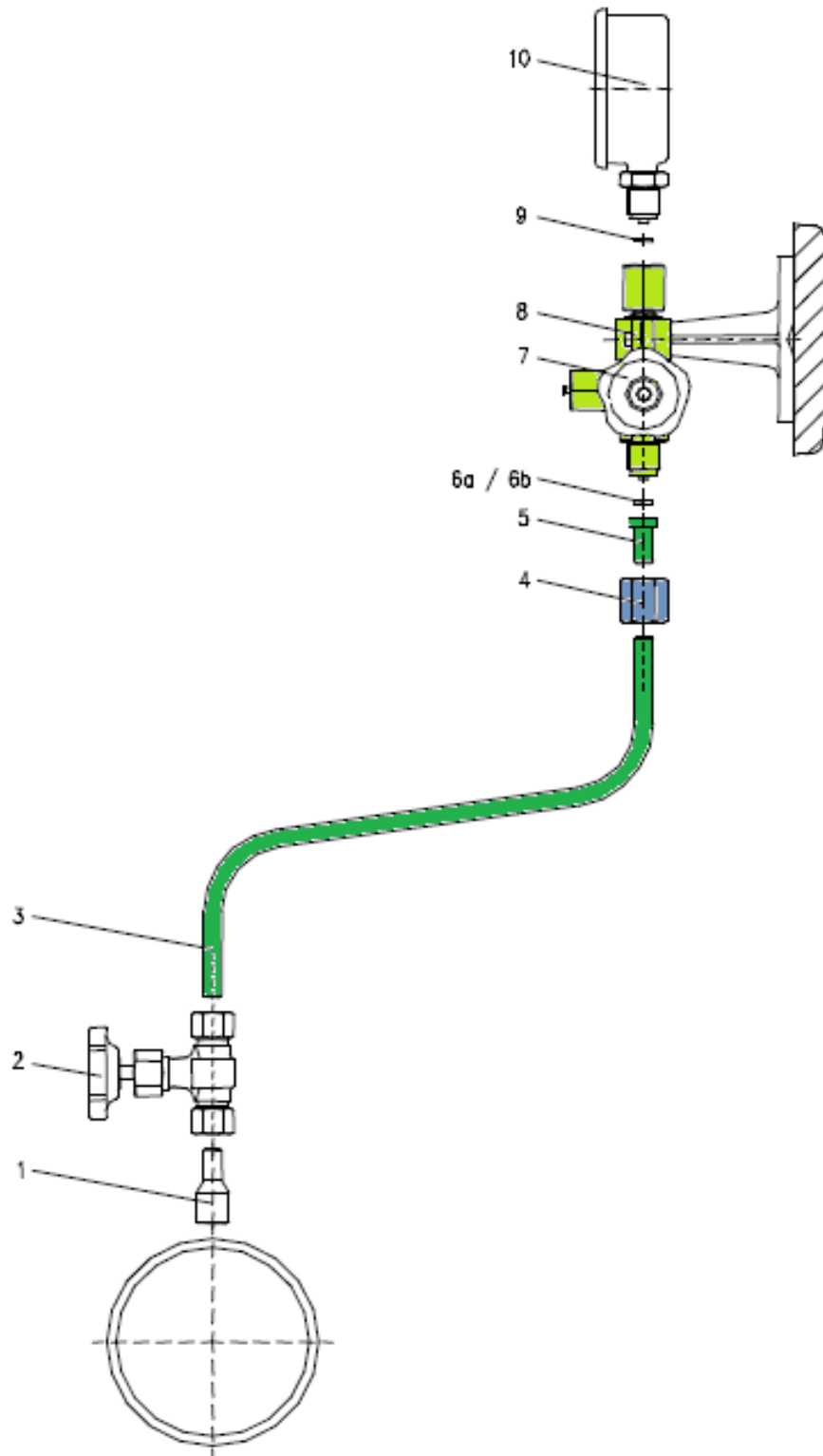
A POSITA would recognize that valve 7 necessarily includes a male/outer thread (see annotated figure above) to threadably engage union nut 4. Ex. 1002 ¶[148]. Also, a POSITA would understand that valve 7 has an end-face surface (see annotated figure above) that can seal with the corresponding end-face surface

(see annotated figure above) of nipple 5 of the first connecting device when union nut 4 is tightened on valve 7. *Id.*

Claim 1[wherein clause (v)]

Union nut 4 of PR08 is a connecting unit designed as a nut unit. *Id.* ¶[149]. A POSITA would understand that union nut 4 of PR08, being a conventional union-type nut, inherently includes both an inwardly pointing inner flange and an inner/female thread, so that the nut 4 can engage impulse line 3 and valve 7, respectively, to interconnect the two. *Id.*

A POSITA would understand that union nut 4 of PR08 must include an inner flange for cooperating with the outer flange (discussed above with regard to wherein clause (iii)) of nipple 5 of impulse line 3. *Id.* ¶[150]. In addition, a POSITA would recognize that union nut 4 of PR08 inherently has an inner flange based on the structure and assembly of the components of PR08. *Id.* The exploded view of PR08 (reproduced below) shows nipple 5 of impulse line 3 above union nut 4 which would indicate to a POSITA that nipple 5 is assembled with union nut 4 by sliding union nut 4 up and over nipple 5. *Id.*



Exploded view of PR08 (annotated with color)

As such, union nut 4 must have an inner flange to catch the outer flange of nipple 5 of the first connecting device when it is received therein, otherwise nipple 5 would pass through union nut 4. *Id.* ¶[151].

Moreover, the inner flange of union nut 4 of PR08 would be located at the lower edge region thereof (rather than an upper edge region) so that union nut 4 can connect with impulse line 3 (first connecting device), which is positioned below union nut 4, as seen in the exploded view. *Id.* ¶[152]. In other words, a POSITA would understand that the inner flange must be in the lower region of union nut 4 so that the inner threads can be above in the upper region of union nut 4 in order to engage the outer threads of valve 7, which is located above union nut 4. *Id.* This is necessary so that the threaded engagement is above and out of the way of the end-face to end-face sealing engagement between nipple 5 and valve 7. *Id.*

A POSITA would further understand that union nut 4 of PR08 must include an inner thread for engaging the corresponding outer thread (discussed above with regard to wherein clause (iv)) of valve 7 to allow the union nut 4 to be threadably tightened onto the valve 7 to accomplish the connection of the impulse line 3 to the valve 7. *Id.* ¶[153].

Claim 1[wherein clause (vi)]

As explained above regarding wherein clause (v), a POSITA would understand that union nut 4 of PR08 has an inner flange that cooperates with the outer flange of nipple 5 of impulse line 3. *Id.* ¶[154]. Additionally, the exploded view of PR08 (shown above) shows nipple 5 of impulse line 3 above union nut 4 which would indicate to a POSITA that nipple 5 is assembled with union nut 4 by sliding union nut 4 up and over nipple 5. *Id.* In other words, when assembling the apparatus, union nut 4 is first positioned on impulse line 3 below nipple 5, then nipple 5 is attached to the upper end of impulse line 3, and then union nut 4 is slid back up such that the nut's inner flange engages or catches the outer flange of the nipple 5. *Id.* As such, union nut 4 must have an inner flange to catch the outer flange of nipple 5 of the first connecting device when it is received therein such that the outer flange of nipple 5 fits behind the inner flange of the union nut 4. *Id.* Otherwise, nipple 5 would pass through union nut 4 when assembling union nut 4 with nipple 5, which would result in no connection between the two. *Id.*

Claim 1[wherein clause (vii)]

A POSITA would recognize that union nut 4 of PR08 interconnects impulse line 3 and valve 7 with “sealing effect” in the same manner as taught by the '030 patent. Ex. 1002 ¶[155]. This sealing effect is provided by means of the inner flange of union nut 4 interlocking with the outer flange of nipple 5 of impulse line

3 (first connecting device), as discussed above regarding wherein clause (vi), along with the threaded engagement between union nut 4 and valve 7 (the second connecting device), as discussed above regarding wherein clause (iv) and wherein clause (v). *Id.* This threaded engagement is accomplished by screwing union nut 4 onto valve 7 which necessarily brings the two end-face sealing surfaces (discussed above with regard to wherein clauses (iii) and (iv)) of impulse line 3 and valve 7 together to make the seal. *Id.*

Additionally, PR08 provides sealing washer 6a/6b between nipple 5 of impulse line 3 and valve 7 and a POSITA would understand that sealing washer 6a/6b would inherently provide sealing between the end-face sealing surfaces of the first and second connecting devices, that is impulse line 3 and valve 7, when clamped together by screwing union nut 4 onto valve 7. *Id.* ¶[156].

Claim 1[wherein clause (viii)]

A POSITA would recognize that the outer flange (discussed above with regard to wherein clause (iii)) of nipple 5 of impulse line 3 (first connecting device) and the inner flange (discussed above regarding wherein clause (v)) of union nut 4 of PR08 are provided in an encompassing manner because each extends circumferentially around the first connecting device to accomplish the connection between nipple 5 of impulse line 3 and valve 7. *Id.* ¶[157].

Claim 1[wherein clause (ix)]

PR08 includes a sealing means, that is sealing washer 6a/6b. *See* Ex. 1006 at 37. A POSITA would understand that sealing washer 6a/6b of PR08 would be arranged between the end-face sealing surfaces of impulse line 3 and valve 7 (discussed above regarding wherein clauses (iii) and (iv)) to affect the sealing when union nut 4 is screwed onto valve 7, as discussed above regarding wherein clause (vii). Ex. 1002 ¶[158].

Claim 7

As discussed above regarding claim 1, limitation [d], the shutoff valve of valve 7 extends at a right angle to the longitudinal axis of the connecting apparatus of PR08.

D. Claims 1-7 are Invalid Under 35 U.S.C. § 103 and Thus Unpatentable

A claim is obvious when “the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains.” 35 U.S.C. §103. The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the level of ordinary skill in the art; (2) the scope and content of the prior art; (3) any differences between the claimed subject matter and

the prior art; and (4) objective evidence of nonobviousness. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007) (citing *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17-18 (1966)).

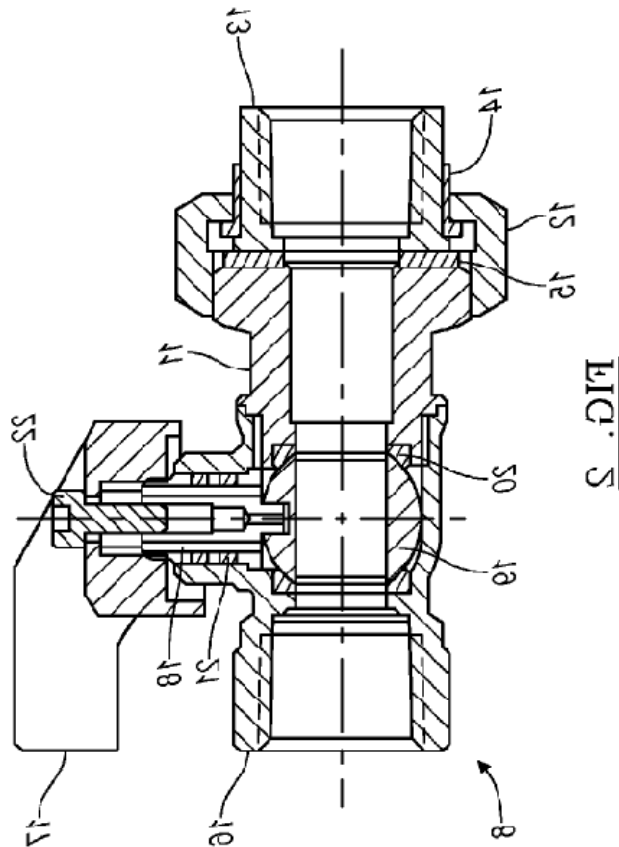
Ascertaining the differences between the prior art and the claimed subject matter entails determining “whether there was an apparent reason to combine the known [prior art] elements in the fashion claimed by the patent at issue.” *Id.* at 417-18. There are a number of rationales which can support a conclusion of obviousness, including: (1) some teaching, suggestion, or motivation in the prior art to modify or combine; (2) the combination of familiar elements according to known methods to yield predictable results; (3) simple substitution of one known element for another; (4) use of known technique to improve similar devices (methods, or products) in the same way; and (5) when there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, the combination may be “obvious to try.” *Id.* at 416-21; *see also* MPEP §2143.

Accordingly, the teachings of each prior art reference in relation to each element of Claims 1-7 are provided first and then the asserted grounds are explained including the rationales supporting the conclusions that the claims are obvious.

Ground 3 – Claims 1, 2, 6, and 7 are obvious under 35 U.S.C. §103 over Craig in view of the common knowledge of a POSITA.

As outlined above in Ground 1, Craig teaches each element of claims 1-7. To the extent that Craig is considered not to anticipate any element of these claims, Craig renders those elements obvious in view of the common knowledge of a POSITA and the known benefits thereof. For example, if it is considered that Craig requires the orientation of union valve 8 as specifically shown in Fig. 1 of Craig, which Petitioner does not believe it does, a POSITA would have understood that union valve 8 of Craig could be rotated 180° and still function in the same way and manner as required by Craig. Ex. 1002 ¶[160].

The union valve 8 of Craig is shown in Fig. 1 with union end 13 connected to regulator 7 and main valve body 16 connected to feed line 6. See Ex. 1005 at Fig. 1. Figure 2 shows that the orientation is not significant. The union valve 8 in Figure 2 is rotated clockwise 90° from what is shown in Figure 1 and is also flipped in the horizontal direction from Figure 1. To show the union valve 8 orientation as shown in Figure 1, in the view below Fig. 2 of Craig is rotated clockwise 90° and reversed or flipped horizontally. Ex. 1002 ¶[161]. A POSITA would recognize that the differences in vertical orientation and horizontal orientation between Figures 1 and 2 show that the specific orientation in Figure 1 is not important. *Id.*



Craig Fig. 2 (rotated 90° and flipped horizontally)

As seen in the view above, union end 13 (first connecting device) is shown located above end connection 11 (second connection device). A POSITA would have understood, however, that the specific orientation of the union valve 8 shown by Craig in Fig. 1 is simply a choice of the installer and would have no impact on the function of the union valve 8 to feed gas to the building. Ex. 1002 ¶[162]. In other words, a POSITA would recognize that union end 13 (first connecting device) could just as easily been connected to feed line 6 (instead of regulator 7) and main valve body 16 connected to regulator 7 (instead of feed line 6), such that

union end 13 is below end connection 11, and still operate in the same manner. *Id.*

Rationale For Obviousness

It would have been obvious to a POSITA to try the Craig union valve in the reverse orientation, because it is a basic connection mechanism, the only purpose of which is to connect two pipes, thus rendering the orientation of the union valve immaterial. *Id.* ¶[163]. Indeed, a POSITA would readily understand that the Craig union valve would work the same in either orientation because nothing about its function or the purpose of its use changes when it is oriented in any particular direction because fluid will flow through the valve when open and will not flow when closed and the union will allow the connection to be broken without needing to rotate one pipe with respect to the other. *Id.* Orienting the Craig union valve in a reverse orientation would lead to a predictable result and reasonable expectation of success because the tool is a simple connection device between two pipes, the orientation of which does not matter to its function or purpose. *Id.* A POSITA would have been motivated to use the Craig tool in the reverse orientation because its orientation is irrelevant to its use, and a POSITA knows by the simplicity of the design of the tool that it would be useful to connect devices in any orientation. *Id.* To a POSITA, the orientation is simply a matter of convenience in the application. *Id.*

Consequently, if Craig is not deemed to anticipate claim 1, then it would

have been obvious to a POSITA to arrange the union valve 8 in any chosen orientation, including an orientation where union end 13 is below end connection 11 and coupled to feed line 6. *Id.* ¶[164].

Grounds 4 or 5 - Claims 1, 2, and 4-7 are obvious under 35 U.S.C. §103 in view of Parker-1 or Parker-2 combined with the 2012 Accessories Catalog and the common knowledge of a POSITA

As explained below, claims 1, 2, and 4-7 are obvious over Parker-1/Parker-2 in view of the 2012 Accessories Catalog and the common knowledge of a POSITA at the time of the effective filing date of the application for the '030 patent. Briefly, Parker-1/Parker-2 disclose a connecting apparatus that comprises a “stabilized connector” (first connecting device), an “integral block valve” (second connecting device), and a “union nut” (connecting unit/nut) that sealingly connects the stabilized connector to the integral block valve, as recited in claim 1. *See* Ex. 1010 at 4-9; Ex. 1011. The stabilized connector mounts directly to a pipeline, the integral block valve sealingly connects to a pressure measuring instrument, and the union nut interconnects the first and second devices such that the sealing connection therebetween is created solely by rotating the nut without rotating the stabilized connector or the block valve, as recited in claim 1. *Id.*; Ex. 1002 ¶[165].

Although the union nut of Parker-1/Parker-2 provides a threaded engagement between the stabilized connector and the block valve (solely by

rotating the nut) like in claim 1, the union nut does not couple to each of the stabilized connector and the block valve in the identical manner to the connecting apparatus of claim 1 of the '030 patent. In short, the union nut of Parker-1/Parker-2 is reversed – it has outer/male threads rather than inner/female threads for engaging the second connecting device (i.e. the block valve). As such, it also does not have an inner flange that engages an outer flange of the first connecting device (i.e. the stabilized connector). However, it would have been obvious to a POSITA to modify the connecting apparatus of Parker-1/Parker-2 such that its union nut and the connection to the stabilized connector and the block valve thereof has the identical structure as in claim 1, as a mere design choice of known equivalents. Ex. 1002 ¶[166]. A POSITA would have recognized that such a modification of Parker-1/Parker-2 is a simple substitution of one known configuration for another, as discussed below, to obtain predictable results, i.e. of a union connection, and maintain the benefits thereof. *Id.*

Indeed, Patent Owner's own swivel gauge adaptor from its 2012 Accessories Catalog ("the Schneider Adaptor"), which similarly provides a union nut sealing connection for first and second connecting devices, has an inner flange that engages an outer flange of the first connecting device and has inner/ female threads for engaging the second connecting device, as claimed. *See* Ex. 1008 at 111. It would have been obvious to a POSITA to modify the connecting apparatus

of Parker-1/Parker-2 such that the union nut thereof has (a) inner threads, as taught by the Schneider Adaptor, instead of outer threads, that can engage outer/male threads, instead of inner threads, of the block valve, and (b) an inner flange, as taught by the Schneider adaptor, that can engage the outer flange of the stabilized connector, as a predictable variation based on a POSITA's design choice of known equivalents. Ex. 1002 ¶[167]. Such is a mere design choice to a POSITA given the union nut arrangement of Parker-1/Parker-2 and the Schneider Adaptor were well known equivalents for providing that same threaded engagement without having to rotate either of the first and second connecting devices. *Id.*

Claim 1 [preamble]

As mentioned above, Parker-1/Parker-2 disclose a connecting apparatus for connecting a “stabilized connector” (first connecting device) with “integral block valves” (second connecting device). *See* Ex. 1010 at 1; Ex. 1011.

Claim 1[a]

As seen in Figure 2 of Parker-1 (shown below with annotations), the “stabilized connector” (**green**) is a first connecting device that connects to an “orifice fitting” (or metering device) of a pipeline via a “stabilized connector nut” and a “stabilized connector foot”. *See* Ex. 1010 at 5-6.

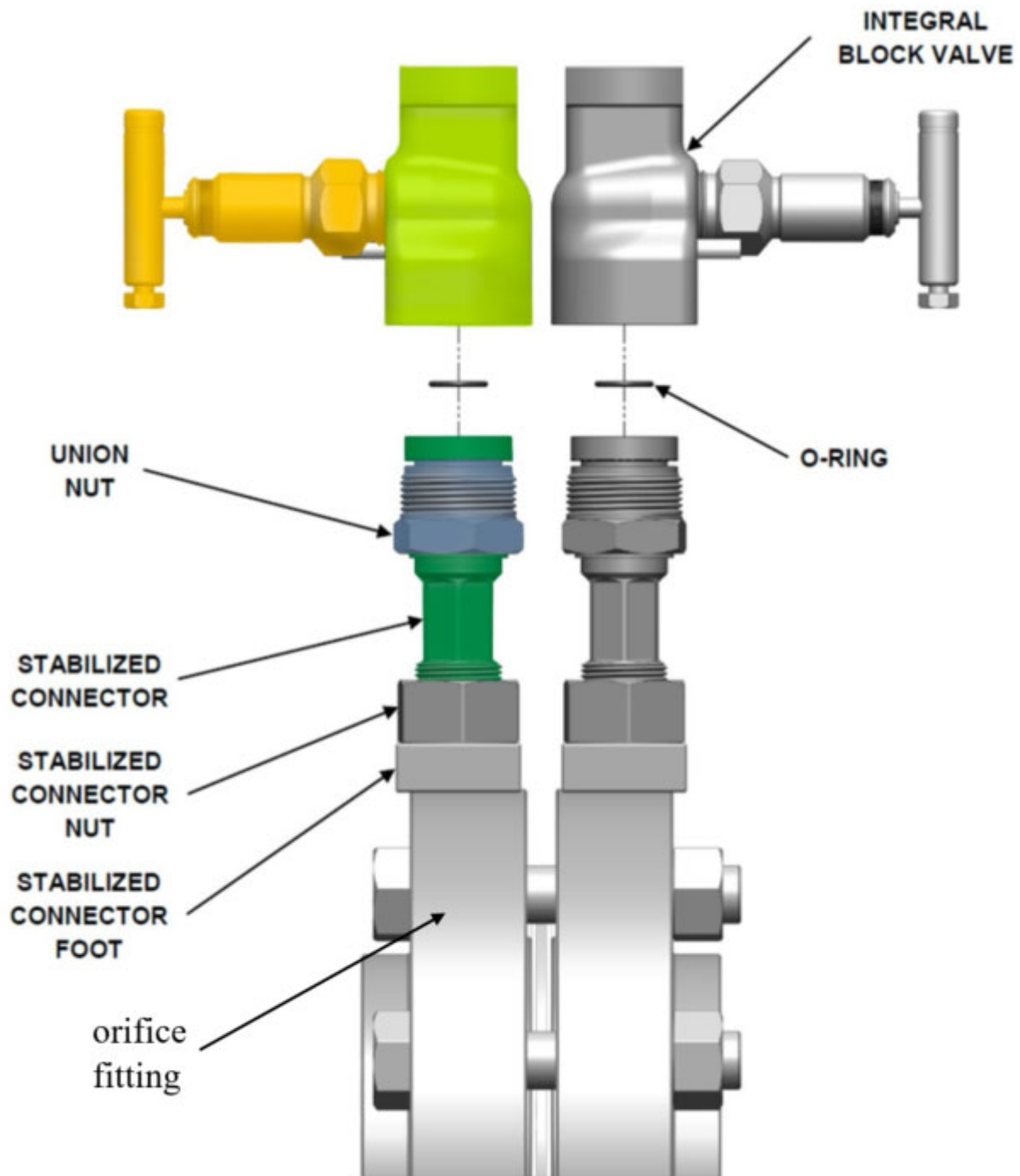


Figure 2

Parker-1 Figure 2 (annotated with color/text)

A POSITA would have recognized that the stabilized connector of Parker-1 necessarily has a longitudinal through-opening to allow a fluid connection to the “integral block valve” for measuring the differential pressure of the gas flow in the pipeline via the orifice fitting. Ex. 1002 ¶[170].

As shown below, the stabilized connector of Parker-1 is identical to the stabilized connector of Parker-2. Thus, the above-mapping is identical for each reference. Ex. 1002 ¶[170].

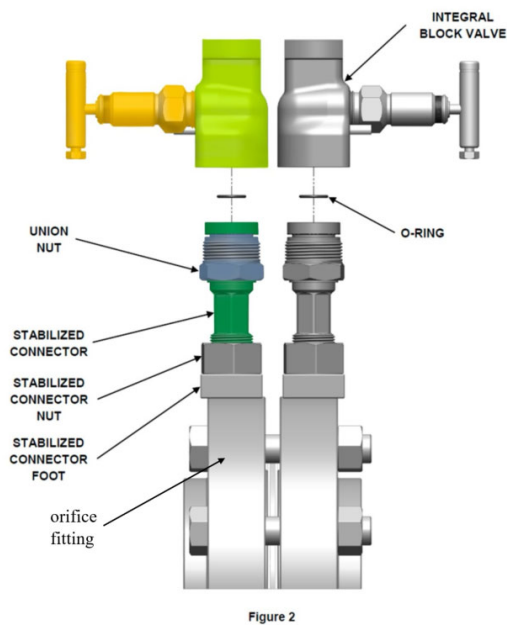
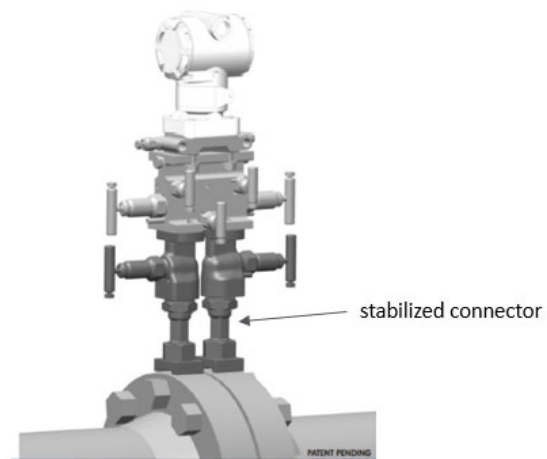


*Figure 2 of Parker-1
(annotated with color/text)*



*Parker-2
(annotated with text)*

Ex. 1010, Fig. 2; Ex. 1011 at 1.

Claim 1[b]

The “valve block” of Parker-1 is a second connecting device, shown in **lime** in annotated Figure 2 above. A POSITA would have understood that the valve block is a connecting device because it connects to a pressure measuring instrument via an outwardly pointing flange at its upper end, as identified in annotated Figure 4 of Parker-1, shown below. Ex. 1002 ¶[171].

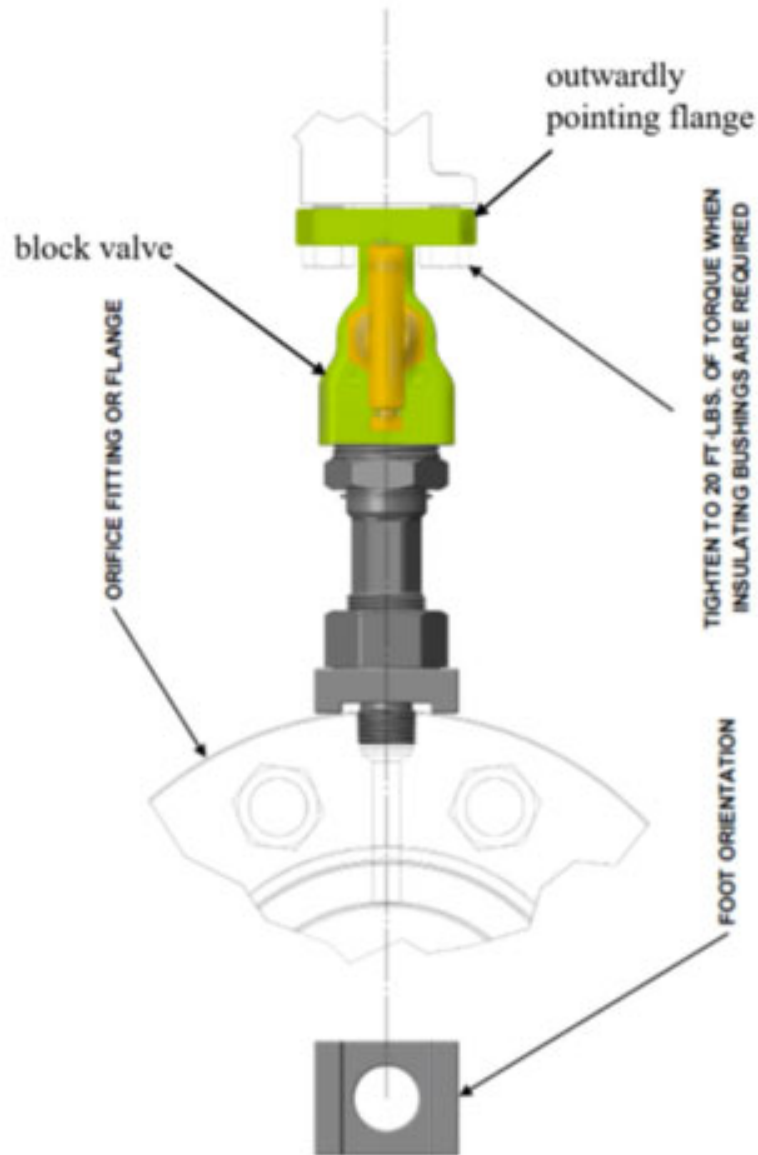


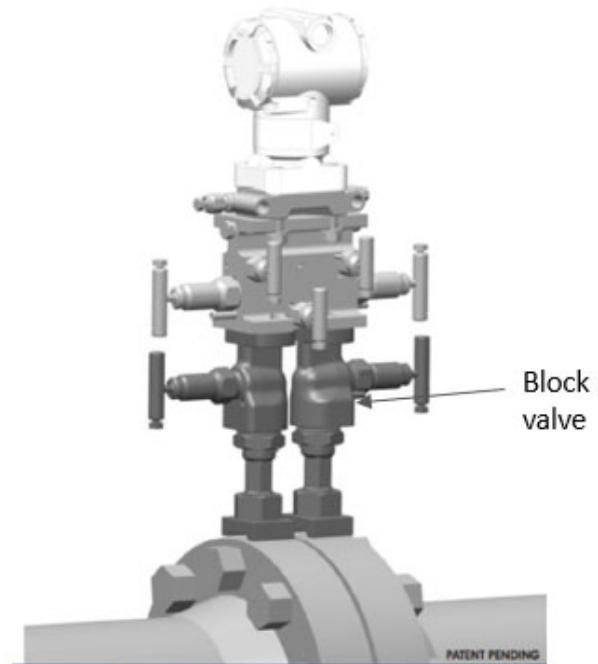
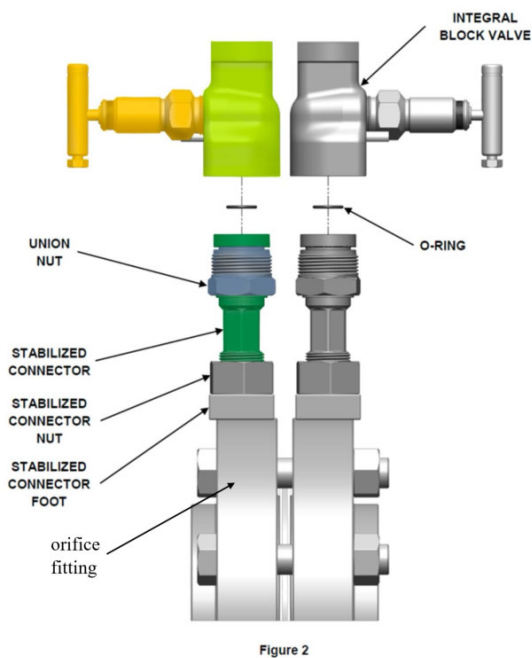
Figure 4

Parker-1 Figure 4 (annotated with text)

A POSITA would have also recognized that the block valve of Parker-1 necessarily has a longitudinal through-opening for maintaining the fluid connection to the pressuring measuring instrument from the orifice fitting of the

pipeline. *Id.* ¶[172]. The pressure in the pipeline could not be measured by the instrument without such a through-opening. *Id.*

As shown below, the block valve of Parker-1 is identical to the block valve of Parker-2. Thus, the above-mapping is identical for each reference. Ex. 1002 ¶[172].



*Parker-1 Figure 2 Parker 2
(annotated with color/text)*

(annotated with text)

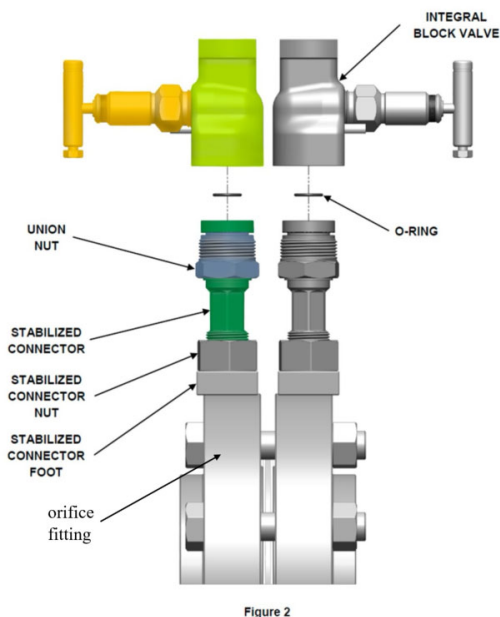
Ex. 1010, Fig. 2; Ex. 1011 at 1.

Claim 1[c]

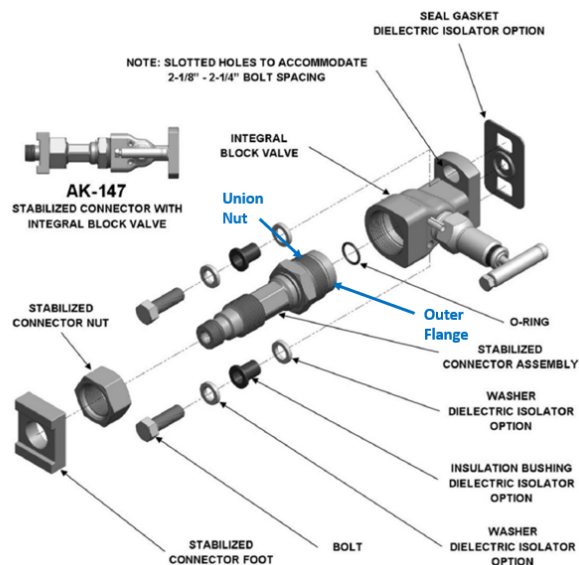
The “union nut” of Parker-1 (**blue** in Figure 2 above), is a connecting unit that interconnects the stabilized connector (first connecting device) with the block valve (second connecting device). *See* Ex. 1010 at 5-7. The union nut of Parker 1

provides a sealing connection to the stabilized connector and the block valve via an “o-ring”. *Id.* at Fig. 2. A POSITA would have understood that the o-ring would be clamped between the stabilized connector and the block valve when the union nut threadably engages the block valve upon installation to the block valve. *Id.* at 7 (“2.1.7 Install the valve bodies onto the stabilized connectors and tighten the unit nut per Figure 3”); Ex. 1002 ¶[173].

As shown below, the union nut of Parker 1 is identical to the union nut of Parker 2. Thus, the above-mapping is identical for each reference. Ex. 1002 ¶[173].



*Parker-1 Figure 2
(annotated with color/text)*

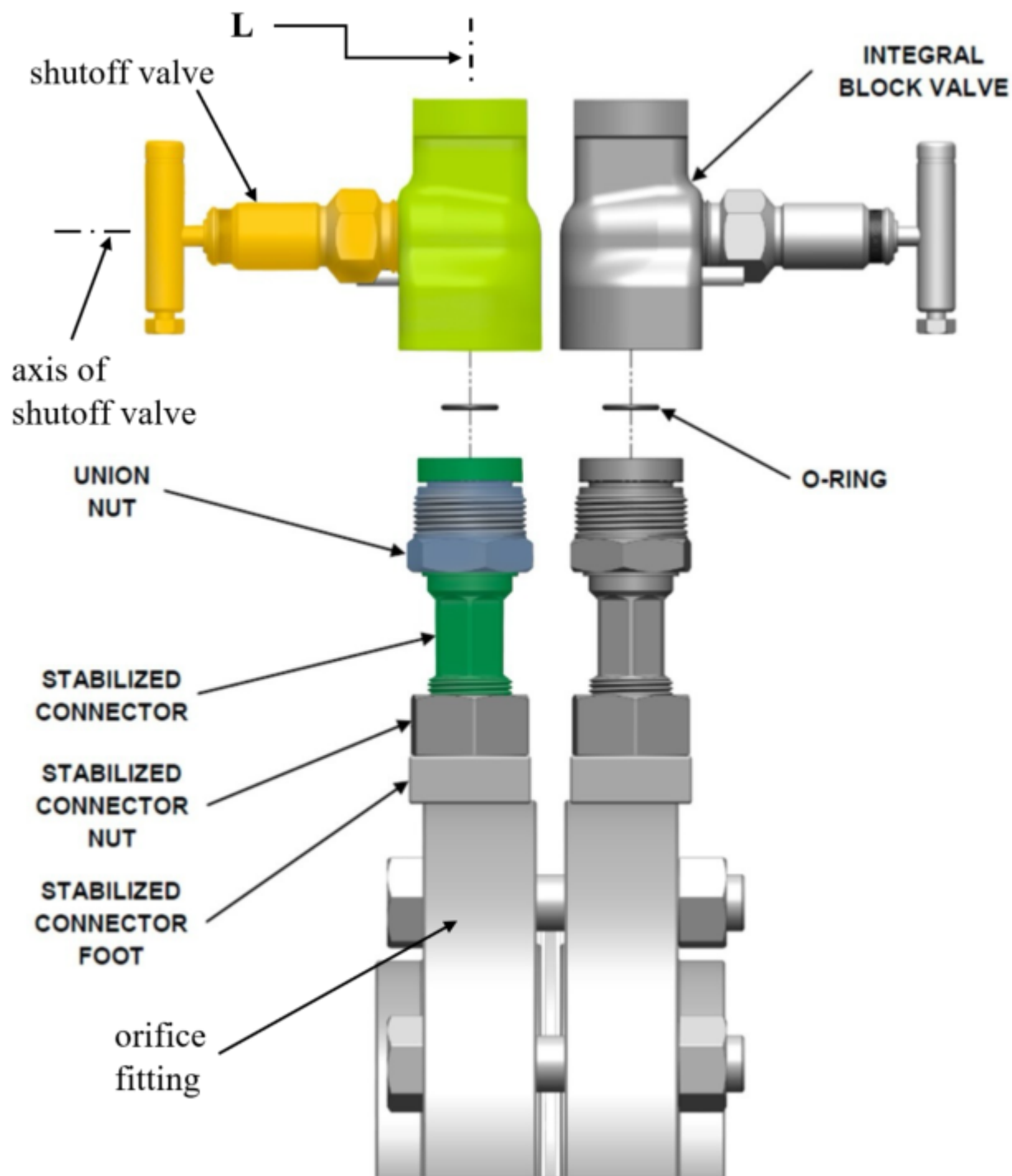


*Parker-2
(annotated with color/text)*

Ex.1010, Fig. 2; Ex. 1011 at 2.

Claim 1[d]

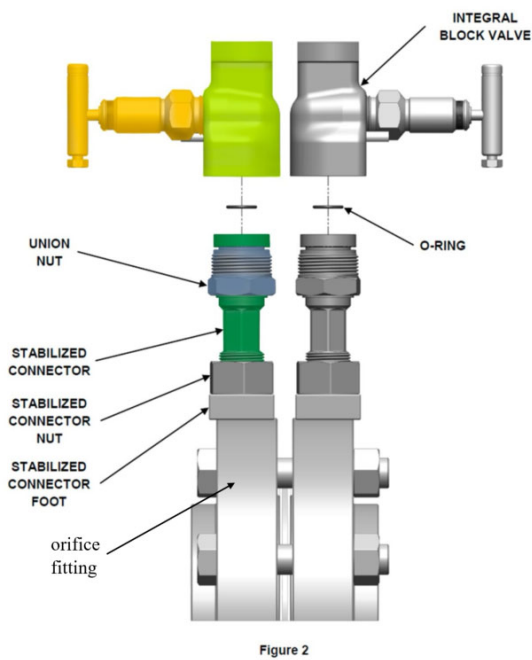
As seen in Figure 2 of Parker-1 (shown below with annotations), the block valve (second connecting device) (**lime**) has a shutoff valve (**orange**). *See* Ex. 1010 at 5.

**Figure 2**

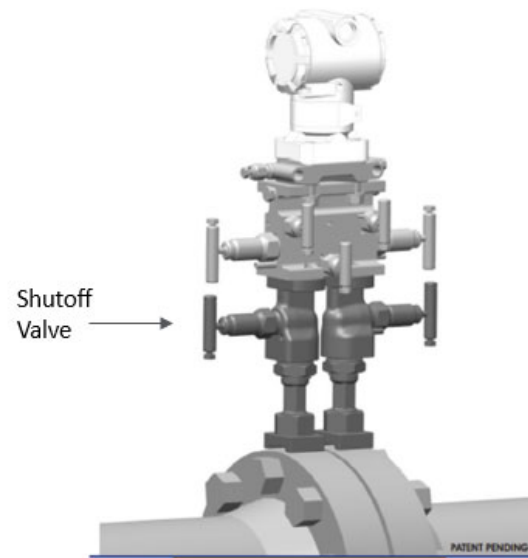
Parker-1 Figure 2 (annotated with color/text)

The axis of the shutoff valve extends obliquely, and specifically at a right angle, with respect to the longitudinal axis L of the connecting apparatus, as seen in the figure above.

As shown below, the shutoff valve of Parker-1 is identical to the shutoff valve of Parker-2. Thus, the above-mapping is identical for each reference. Ex. 1002 ¶[175].



*Parker-1 Figure 2
(annotated with color/text)*



*Parker-2
(annotated with text)*

Ex. 1010, Fig. 2; Ex. 1011 at 1.

Claim 1[wherein clause (i)]

A POSITA would have recognized that the union nut of Parker-1/Parker-2 (see element 1[c] above) interconnects the stabilized connector (first connecting device) and the block valve (second connecting device) with “sealing effect” via the o-ring that is arranged between them. Ex. 1002 ¶[176]. Indeed, the o-ring of Parker-1/Parker-2 is specifically positioned in grooves at the connection or end face of the stabilized connector to enable a face seal. *See* Ex. 1010 at 6 (“2.1.5 Insert the O-rings into the grooves on the stabilized connector according to Figure 2.”); Ex. 1011; Ex. 1002 ¶[176]. A POSITA would have understood that the o-ring of Parker-1/Parker-2 would provide a seal between the stabilized connector and the block valve when they are clamped together by tightening the union nut onto the valve block. *Id.*

Claim 1[wherein clause (ii)]

A POSITA would have recognized that the union nut of Parker-1/Parker-2 (see element 1[c] above) interconnects the stabilized connector (first connecting device) with the valve block (second connecting device) by rotating the union nut, that is by rotating the union nut to threadably engage the block valve without rotating either the stabilized connector or the block valve. Ex. 1002 ¶[175].

Claim 1 [wherein clause (iii)]

The stabilized connector (first connecting device) of Parker-1 has an

outwardly pointing outer flange at an upper edge region thereof, as seen in annotated Figure 2, shown below. *See* Ex. 1010 at 6, Fig. 2.

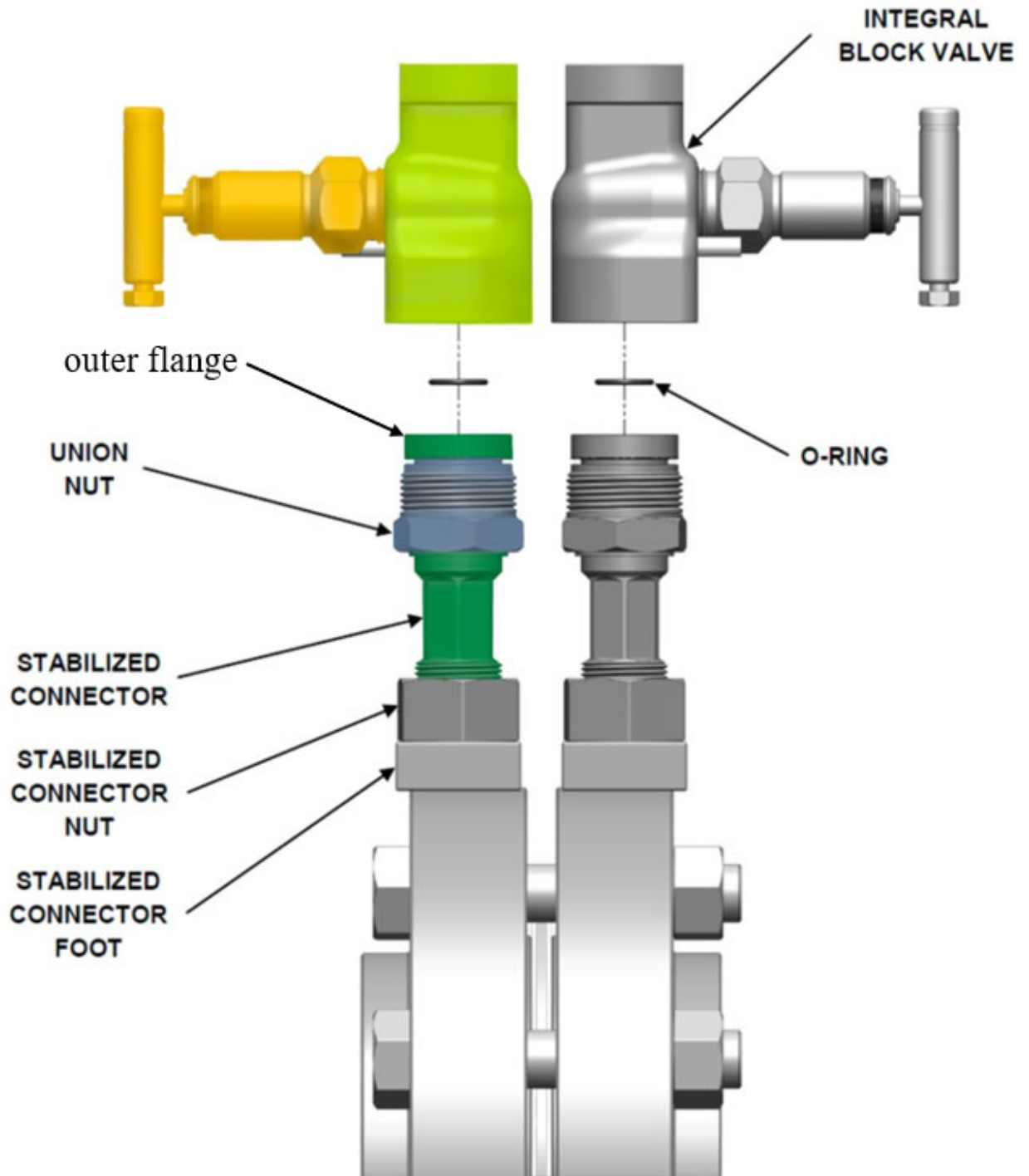


Figure 2

Parker 1- Figure 2 (annotated with color/text)

A POSITA would have recognized that the stabilized connector also has an end-face sealing surface which includes grooves for receiving one or more of the o-rings. *Id.* at 6 (“2.1.5 Insert the O-rings into the grooves on the stabilized connector according to Figure 2.”); Ex. 1002 ¶[179]. A POSITA would have understood that the o-ring of Parker-1 would provide a seal between the stabilized connector and the block valve when they are clamped together by tightening the union nut onto the valve block. *Id.* A POSITA would also understand that sealing washer 6a/6b provides sealing between those end-face sealing surfaces of impulse line 3 and valve 7, when they are clamped together by screwing union nut 4 onto valve 7. *Id.* ¶[180].

As shown below, the above-described flange of Parker-1 is identical to the flange of Parker-2. Thus, the above-mapping is identical for each reference. Ex. 1002 ¶[180].

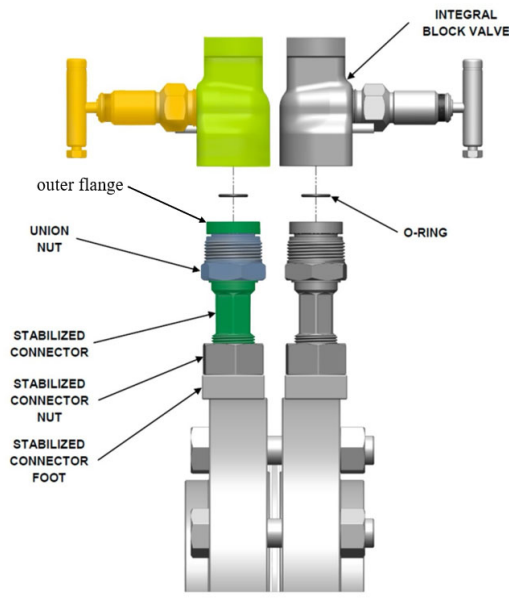
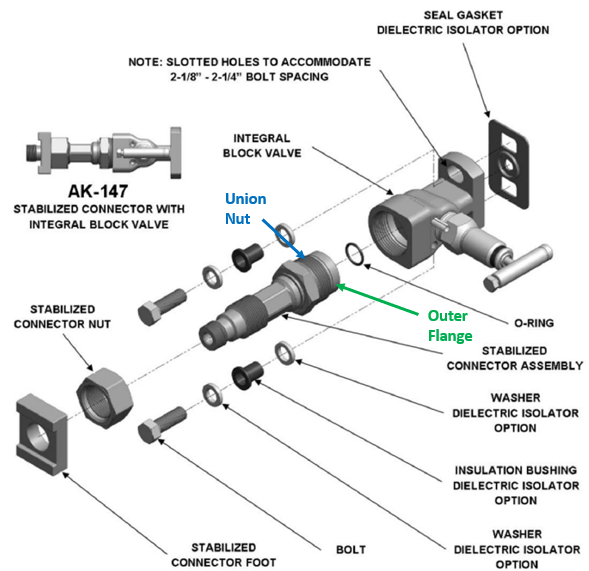


Figure 2

Parker-1 Figure 2
(annotated with color/text)



Parker-2
(annotated with color/text)

Ex. 1010, Fig. 2; Ex. 1011 at 2.**Claim 1 [wherein clause (iv)]**
thru [wherein clause (viii)]

For simplicity, the “wherein” clauses (iv) thru (viii) of claim 1 are grouped together because they are each directed to a conventional union connection. However, each specific wherein clause is identified in the detailed discussion below.

The Schneider Adaptor is a union connection that, similar to the connecting apparatus of Parker-1/Parker-2, includes a nut which interconnects first and second connecting devices such that they can be connected together without rotating either connecting device. See Ex. 1008 at 111 and the annotated figure below.

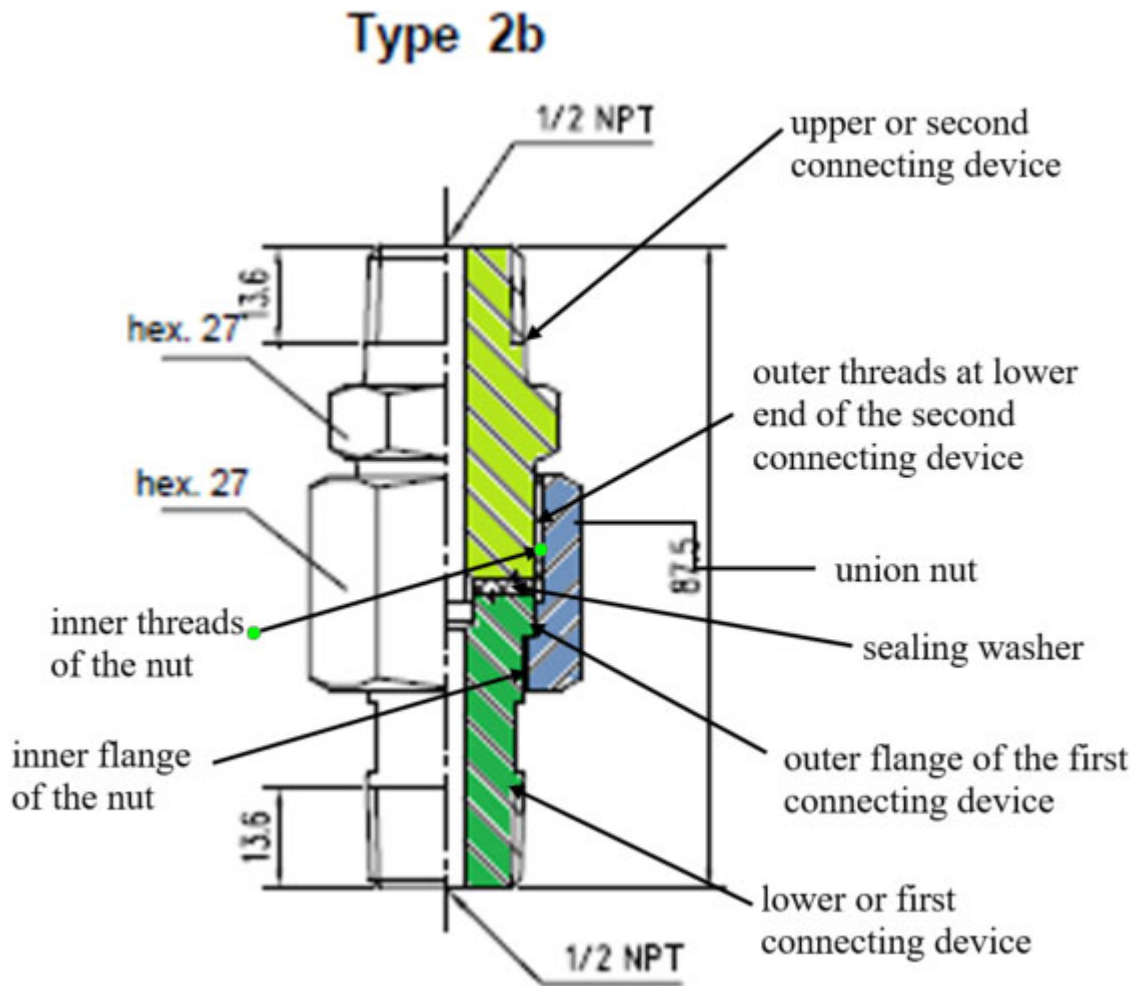
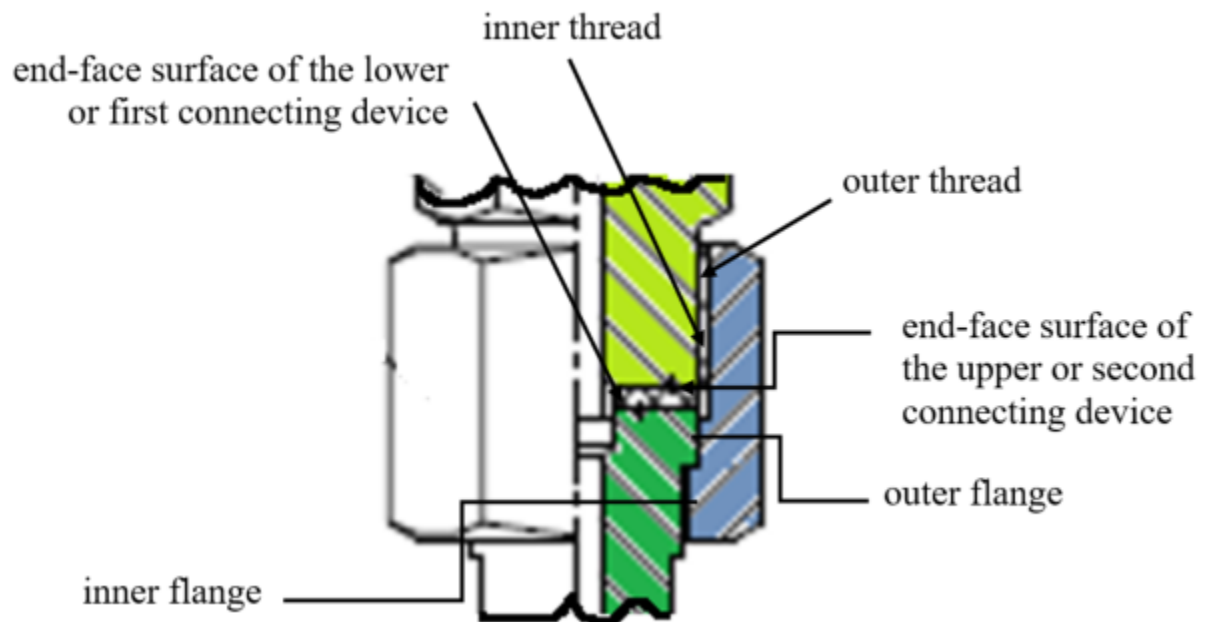


Figure of the Schneider Adaptor (annotated with color/text)

Like in the '030 patent, the Schneider Adaptor comprises a lower connection that can be a first connecting device (**green**), an upper connection that can be a second connecting device (**lime**), and a union nut (**blue**) interconnecting the two devices in a sealing manner. See Ex. 1008 at 111; Ex. 1002 ¶[182]. As seen above, the nut (**blue**) of the Schneider Adaptor has an inner surface with inner

or female threads and an inner flange at the lower edge region of the nut that points inwardly, as recited in wherein clause (v). Ex. 1002 ¶[182]. The inner flange is designed to engage an outer or outwardly pointing flange at the upper edge region of the first connecting device (**green**) in a manner such that, when assembled, the outer flange sits behind the inwardly pointing flange, as recited in wherein clause (vi). *Id.* Also, the inner/female threads of the nut (**blue**) of the Schneider Adaptor are designed to engage corresponding outer/male threads on the second connecting device (**lime**), as recited in wherein clauses (iv) and (vii), as seen in the annotated partial view below of the Schneider Adaptor. *Id.*



Partial view of the Schneider Adaptor (annotated with color/text)

Consequently, the connecting apparatus of Parker-1/Parker-2, as modified in view of the Schneider Adaptor meets each of the wherein clause (iv) thru (viii). A

POSITA would have recognized that the connecting apparatus of Parker-1/Parker-2, as modified in view of the Schneider Adaptor, would have a male thread on the valve block (second connecting device), instead of the female thread, and the male thread would be located at a lower edge region of the block valve, as recited in wherein clause (iv), in order to be in position to engage the union nut which is located below the block valve. *Id.* ¶[183]. To that end, the union nut of the connecting apparatus of Parker-1/Parker-2, as modified in view of the Schneider Adaptor, would have the corresponding inner/female thread for engaging the male thread of the modified valve block, as recited in wherein clause (v). *Id.* The modified union nut of Parker-1/Parker-2 would also have an inner flange arranged at a lower edge region thereof, as recited in wherein clause (v) such that the outer flange (see discussion above regarding wherein clause (iii)) of the stabilized connector (first connecting device) can fit behind the inner flange, as recited in wherein clauses (v) and (vi). *Id.* Moreover, a POSITA would have understood that the inner flange of the modified union nut would extend around the inner circumference of the nut's inner surface and thus would be provided in an encompassing manner, as recited in wherein clause (viii). *Id.* Likewise, a POSITA would have understood that the outer flange of the stabilized connector extends around the outer circumference of the stabilized connector and thus would be provided in an encompassing manner, as recited in wherein clause (viii). *Id.*

Furthermore, a POSITA would have understood that when the modified union nut of Parker-1/Parker-2 is screwed onto the modified block valve (second connecting device), that is when the inner and outer threads engage one another, the respective end-face surfaces of the stabilized connector and the block valve (see partial view above of the Schneider Adaptor) are clamped together via the inner and outer flanges to create a seal, therebetween, that is with “sealing effect”, as recited in wherein clauses (iv) and (vii), and seen in the view above. *Id.* ¶[184].

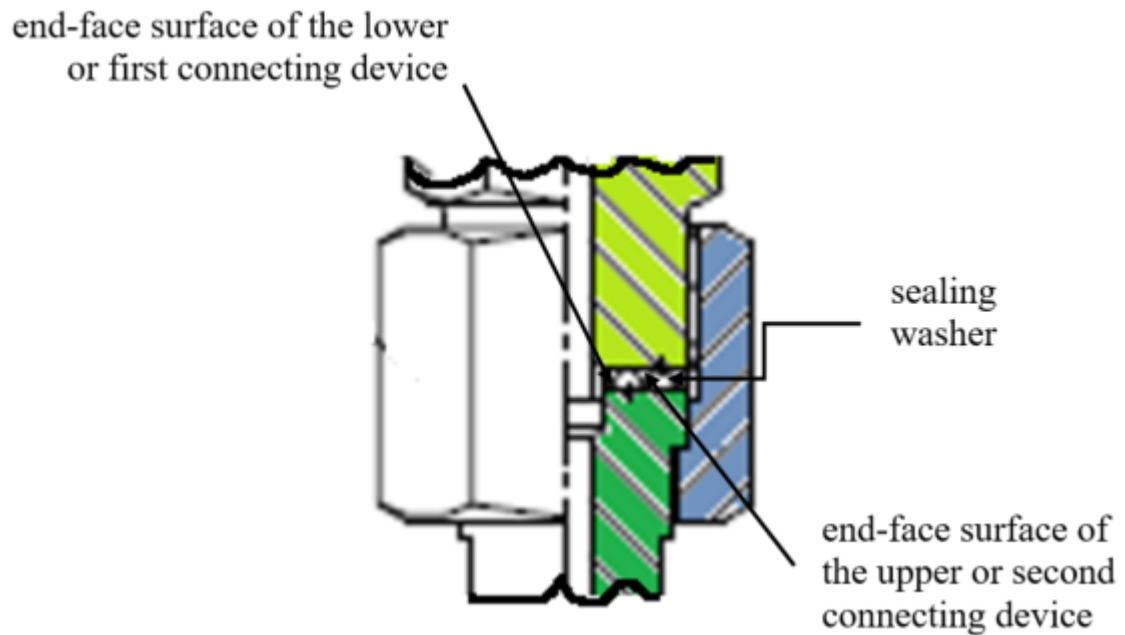
Rationale For Obviousness

It would have been obvious to a POSITA to modify Parker-1/Parker-2 to incorporate the union connection of the Schneider Adaptor. A POSITA understood that union nuts can have one of two different and basic configurations, i.e. a male thread configuration, as in Parker-1/Parker-2, or a female thread configuration, as in the Schneider Adaptor. This is a simple substitution of one union connection configuration (i.e. Parker-1/Parker-2) for another (i.e. the Schneider Adaptor) that would yield predictable results, i.e. of a union connection, and maintain the benefits thereof, such as connecting the first and second connecting devices without having to rotate either device. *Id.* ¶[185]. It would have been obvious to a POSITA to try the Schneider Adaptor in Parker-1/Parker-2, because, as stated above, there are a finite number of predictable solutions with a reasonable expectation of success. *Id.* ¶[186]. A POSITA would have understood

that a union nut with male threads and a union nut with female threads are no different in purpose, function, or utility as it relates to connecting pipes or device ends. *Id.* The union nuts work exactly the same way, regardless of the minor difference in thread orientation. *Id.* Nothing about their function or purpose is related to their male or female thread design. *Id.* The thread orientation is a mere design choice and a POSITA would be familiar with the fact that the female-style nut is much more common in the industry. *Id.* Using a female thread in place of a male thread would lead to a predictable result and reasonable expectation of success because the purpose of the threads is simply to mate the first and second connecting devices. *Id.* Furthermore, union nuts are simple hardware, and a POSITA would have chosen thread orientation based on economic factors such as cost or accessibility. *Id.* Thus, these finite variations in use are based on market forces and the uses are predictable to a POSITA. *Id.* Finally, there is a teaching, suggestion, or motivation to combine Parker-1/Parker-2 and Schneider Adaptor, because Parker-1/Parker-2 teaches using a union nut to connect process lines to a valve block, and the Schneider catalog teaches various types of hardware that can be substituted or adapted to tools in this industry for making connections especially for process line connections. *Id.*

Claim 1[wherein clause (ix)]

As discussed above regarding wherein clause (i), the connecting apparatus of Parker-1/Parker-2 includes a sealing means, that is the o-ring, which is arranged on the end face of the stabilized connector. The Schneider Adaptor also illustrates this common positioning of a sealing washer between end faces of the lower or first connecting device (**green**) and the upper or second connecting device (**lime**), as seen below. *See* Ex. 1008 at 111; Ex. 1002 ¶[187].



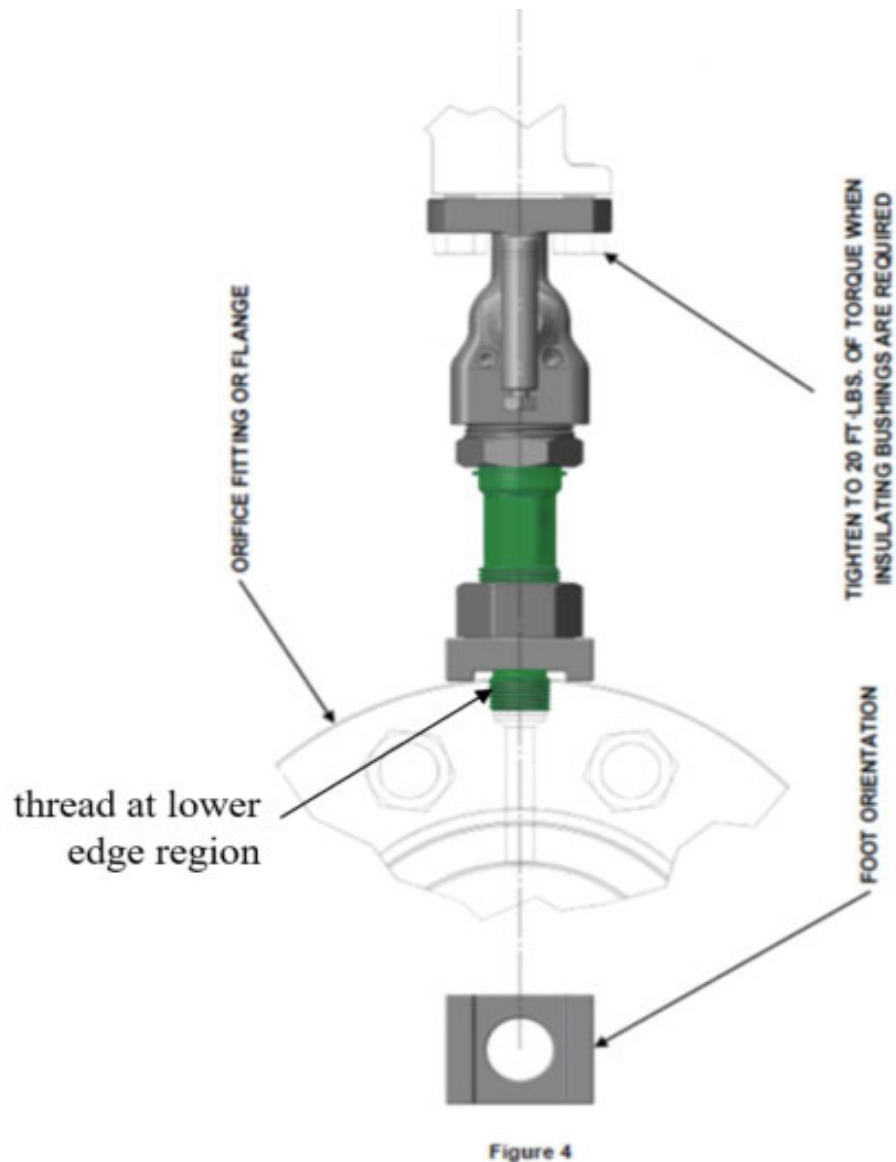
Partial view of the Schneider Adaptor (with annotations)

Therefore, a POSITA would have recognized that the sealing means provided by Parker-1/Parker-2 would be maintained if modified to incorporate the structure of the Schneider Adaptor, as described above. Ex. 1002 ¶[188].

Accordingly, any limitation of claim 1 not met by Parker-1/Parker-2 is taught by the Schneider Adaptor. A POSITA would also have a reasonable expectation of success in making the above modification of the connecting apparatus of Parker-1/Parker-2 because it merely involves choosing a known equivalent union connection, like the Schneider Adaptor, for the same intended purpose of allowing connection of two components without the need to rotate those components. *Id.* ¶[189]. Thus, the combination of Parker-1/Parker-2 and the Schneider Adaptor renders challenged claim 1 obvious and unpatentable. *Id.*

Claim 2

The stabilized connector or first connecting device (**green**) has a male thread in a lower edge region thereof, as seen in Figure 4 of Parker-1 (shown annotated below). *See* Ex. 1010 at 6, Fig. 4; Ex. 1002 ¶[190].



Parker-1 Figure 4 (annotated with text)

As shown below, the above-described lower thread of Parker-1 is identical to the lower thread of Parker-2. Thus, the above-mapping is identical for each reference. Ex. 1002 ¶[190].

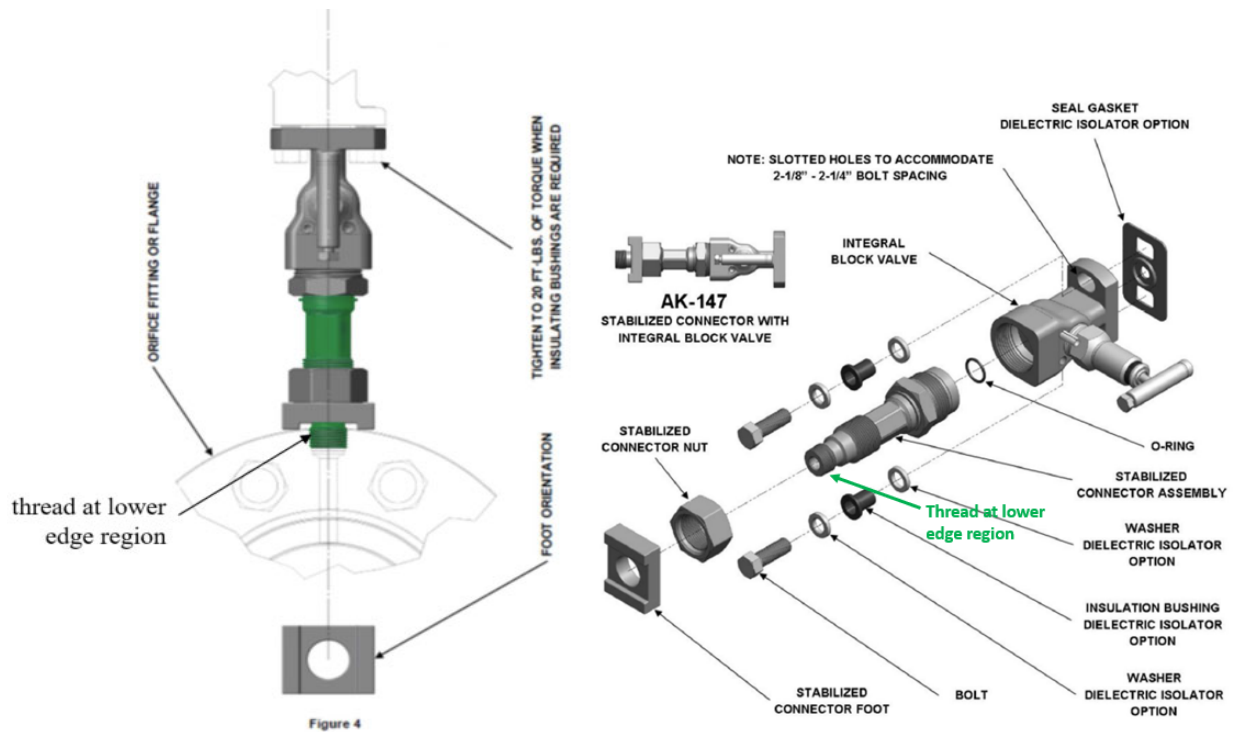


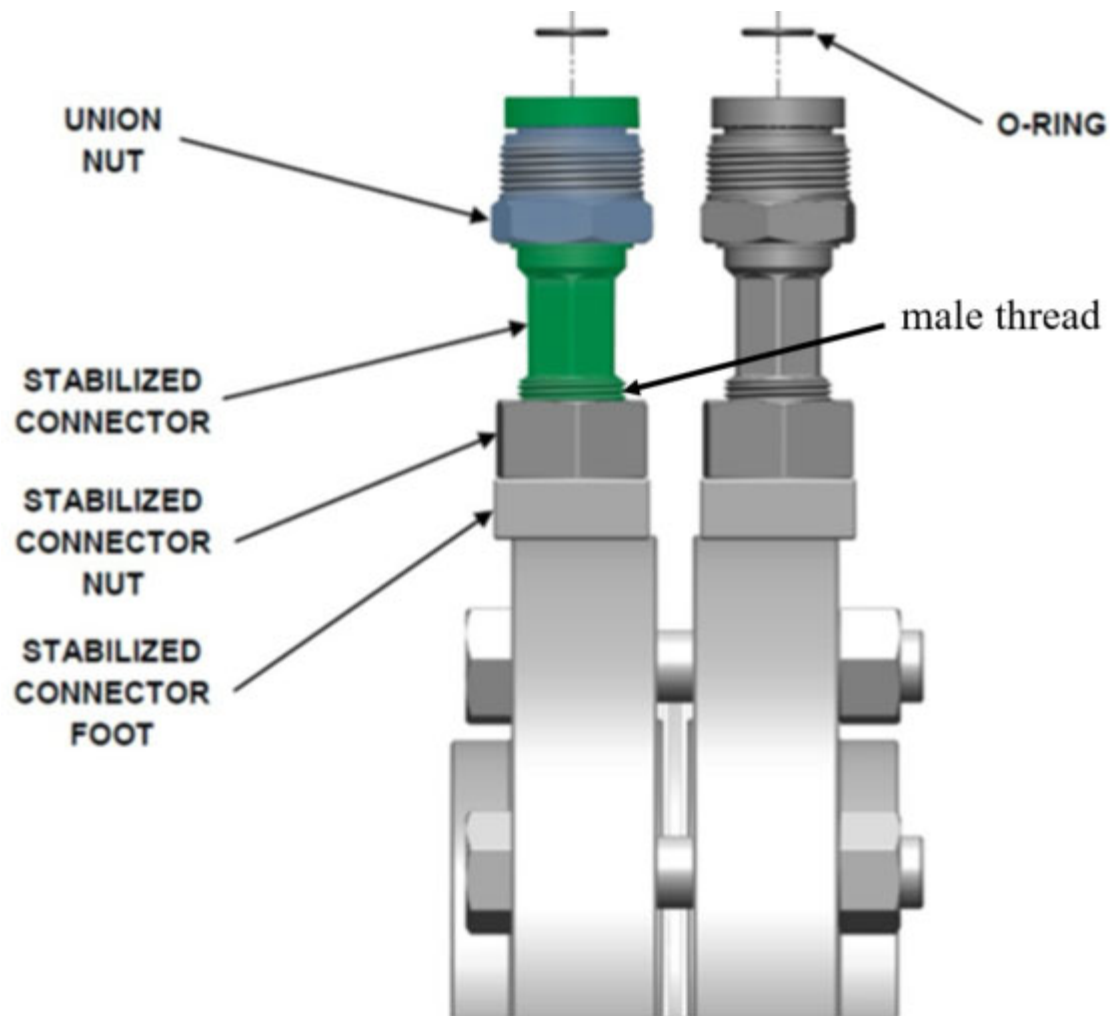
*Figure 2 of Parker-1
(annotated with color/text)*

*Parker-2
(annotated with color/text)*

Ex. 1010, Fig. 2; Ex. 1011 at 2.

Claim 4

The stabilized connector (first connecting device) of Parker-1 has a male thread, as seen in Figure 2 (shown annotated below). *See* Ex. 1010 at 5, Fig. 2; Ex. 1002 ¶[191]. As seen in Figure 2 below, a clamping nut or “stabilized connector nut” is screwed onto the male thread of the stabilized connector. *Id.*

**Figure 2**

Parker-1 Figure 2 (annotated)

As shown below, the above-described male thread and clamping nut of Parker-1 are identical to the male thread and clamping nut of Parker-2. Thus, the above-mapping is identical for each reference. Ex. 1002 ¶[191].

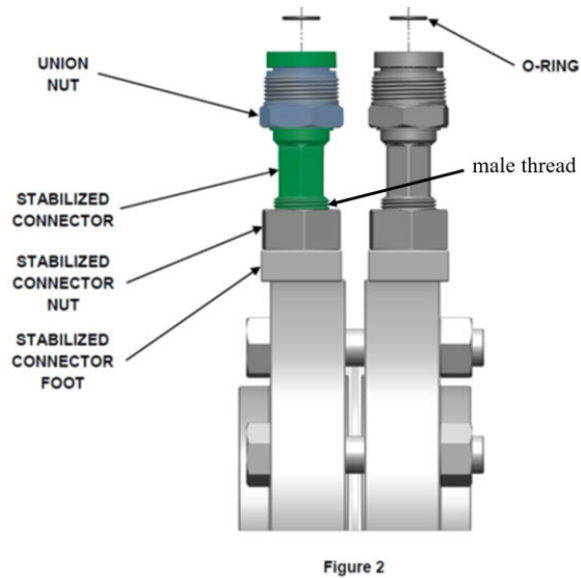
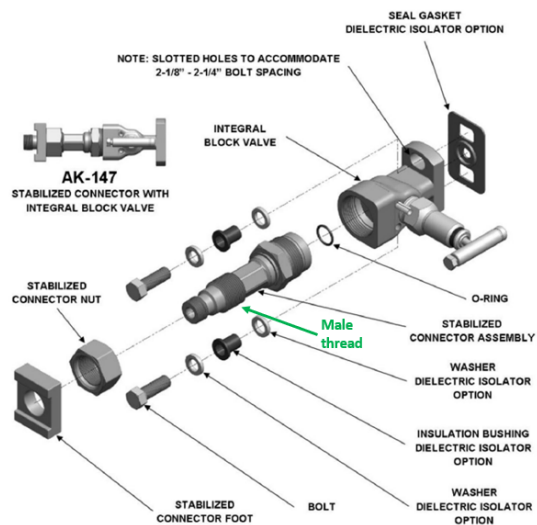


*Figure 2 of Parker-1
(annotated with color/text)*



*Parker-2
(annotated with color/text)*

Ex.1010, Fig. 2; Ex.1011 at 2.

Claim 5

The connecting apparatus of Parker-1 includes a baseplate or “stabilized connector foot”, as seen in annotated Figure 2 (shown above regarding claim 4), that has a through-opening through which the stabilized connector (first connecting device) passes in a longitudinal direction. *See* Ex. 1010 at 5, Fig. 2. A POSITA would have understood that the stabilized connector foot of Parker-1 is clamped by the clamping nut or “stabilized connector nut” (discussed above regarding claim 5) on the surface of the pipeline. Ex. 1002 ¶[192].

As shown below, the “stabilized connector foot” of Parker-1 is identical to the “stabilized connector foot” of Parker-2. Thus, the above-mapping is identical for each reference. Ex. 1002 ¶[192].

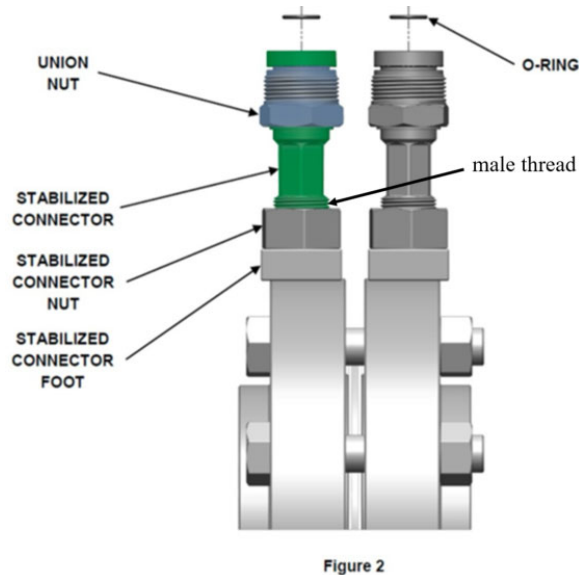
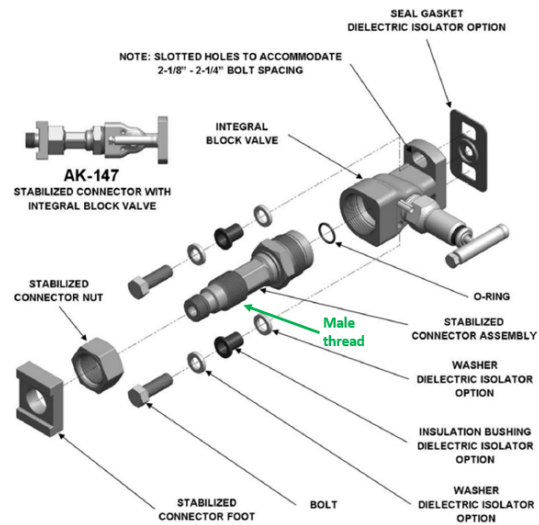


*Figure 2 of Parker-1
(annotated with color/text)*



*Parker-2
(annotated with color/text)*

Ex. 1010, Fig. 2; Ex. 1011 at 2.

Claim 6

The block valve (second connecting device) of Parker-1 has an outwardly pointing outer flange at its upper edge region for connecting to a measuring instrument, as seen in Figure 4 (shown annotated below). Ex. 1010 at 6, Fig. 4.

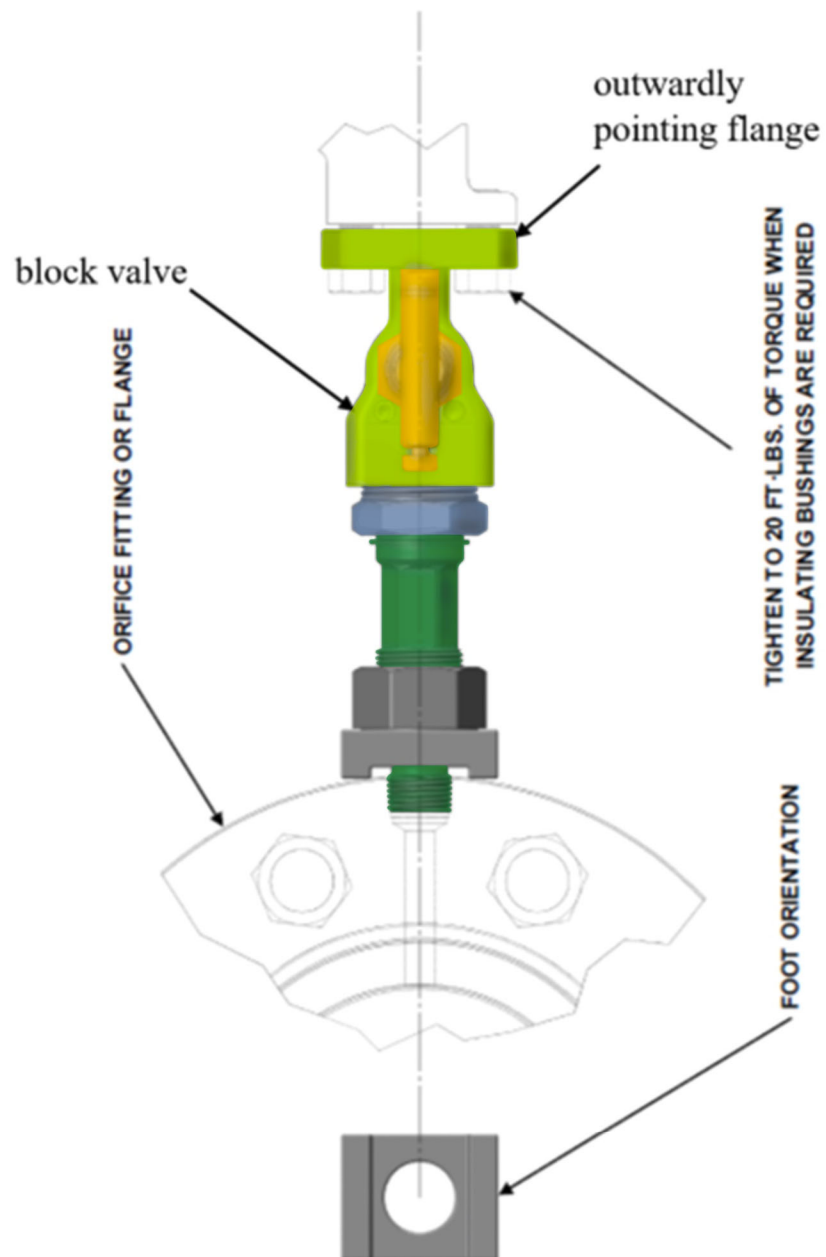
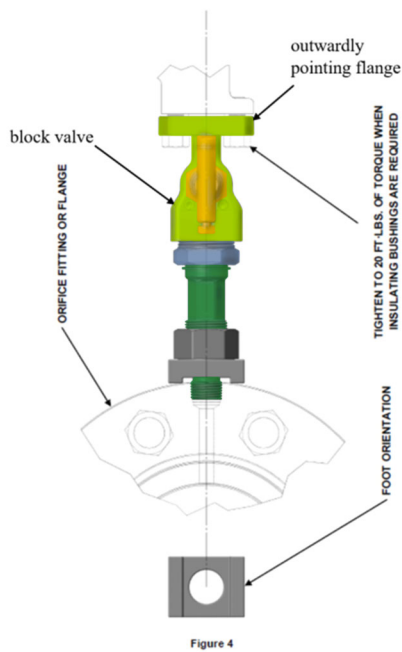


Figure 4

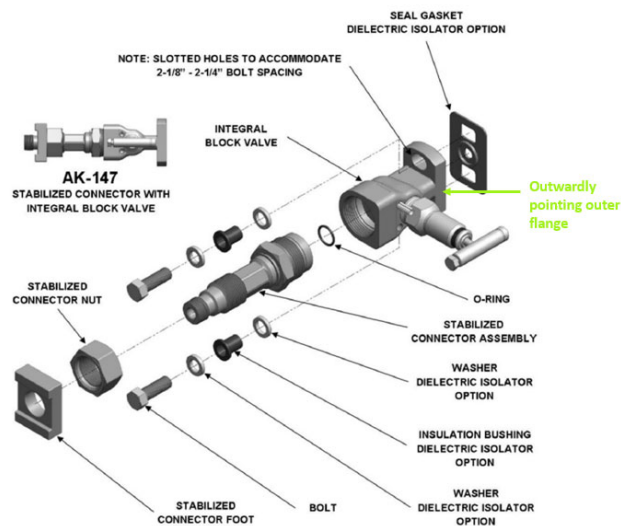
Parker-1 Figure 4 (annotated with text)

A POSITA would have recognized that the slotted holes of the flange are designed to receive bolts to attach the measuring instrument to the block valve, Ex. 1002 ¶[194].

As shown below, the outwardly pointing outer flange of Parker-1 is identical to the outwardly pointing outer flange of Parker-2. Thus, the above-mapping is identical for each reference. Ex. 1002 ¶[194].



*Parker-1 Figure 2
(annotated with color/text)*



*Parker-2
(annotated with color/text)*

Ex. 1010, Fig. 4; Ex. 1011 at 2.

Claim 7

As explained above regarding claim 1[d], the shutoff valve of the block valve (second connecting device) of Parker-1/Parker-2 has a longitudinal axis that extends at a right angle with respect to the longitudinal axis of the connecting apparatus.

Ground 6 - Claims 1, 2, 3, 6, and 7 are obvious under 35 U.S.C. §103 in view of the 2008 Hook-ups Catalog combined with the 2012 Accessories Catalog and the common knowledge of a POSITA

Claims 1, 2-3, and 6-7 are obvious over the 2008 Hook-ups Catalog in view of the 2012 Accessories Catalog and the common knowledge of a POSITA. Briefly, similar to the connecting apparatus of the '030 patent, DPD of the 2008 Hook-ups Catalog is for differential pressure instruments mounted directly to the process line (DPD). *See* Ex. 1006 at 51-52. DPD connects a first connecting device of the process line with a second connecting device of a pressure measuring instrument in a sealing manner, as recited in claim 1.

The only feature of claim 1 not found in DPD is a union nut connection between the first and second connecting devices. That feature, however, is taught by the Schneider Adaptor, which is structured as a conventional union connection. *See* Ex. 1008 at 111. As discussed above in Ground 3, such union connections and the benefits thereof were well known at the time of the filing of the application for

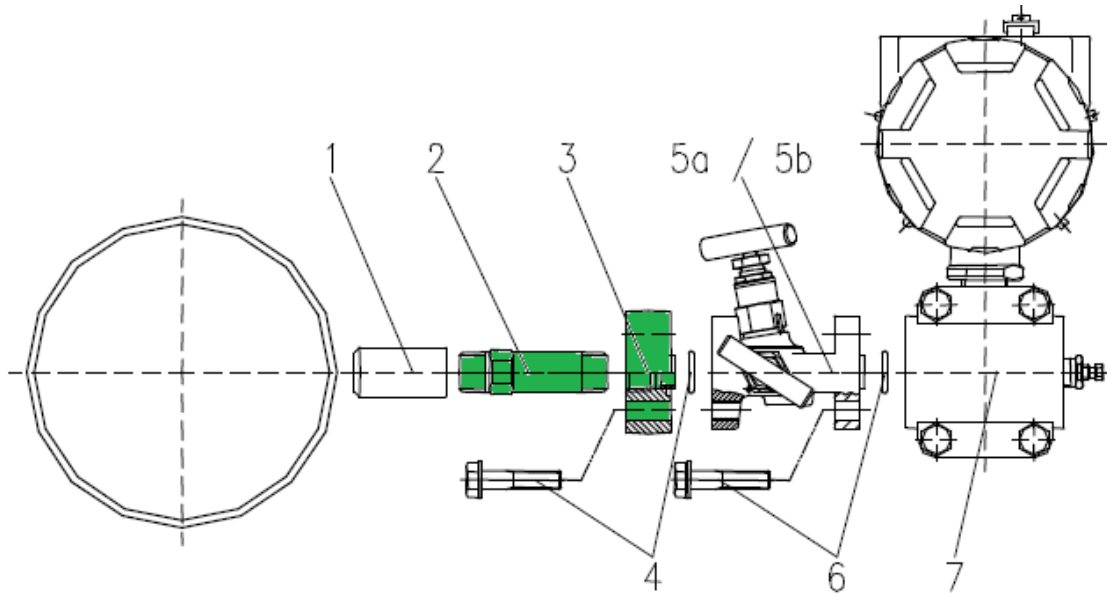
the '030 patent. Ex. 1002 ¶[197]. Thus, it would have been obvious to a POSITA to modify the connection between the first and second connecting devices of DPD to be the union connection of the Schneider Adaptor as combining prior art elements to yield predictable results of a sealed connection between the first and second connection devices without requiring rotation of either device. *Id.*

Claim 1 [preamble]

A POSITA would have recognized that DPD is a connecting apparatus because it is configured for directly mounting, i.e. connecting, an instrument for “differential pressure measurement” on a gas “process line.” *See* Ex. 1006 at 1, and 51-52; Ex. 1002 ¶[198].

Claim 1[a]

DPD includes a “hex nipple 2” (**green**) (and its associated flange 3) that connects with the process line, as shown in the annotated view below of DPD. *See* Ex. 1006 at 52.

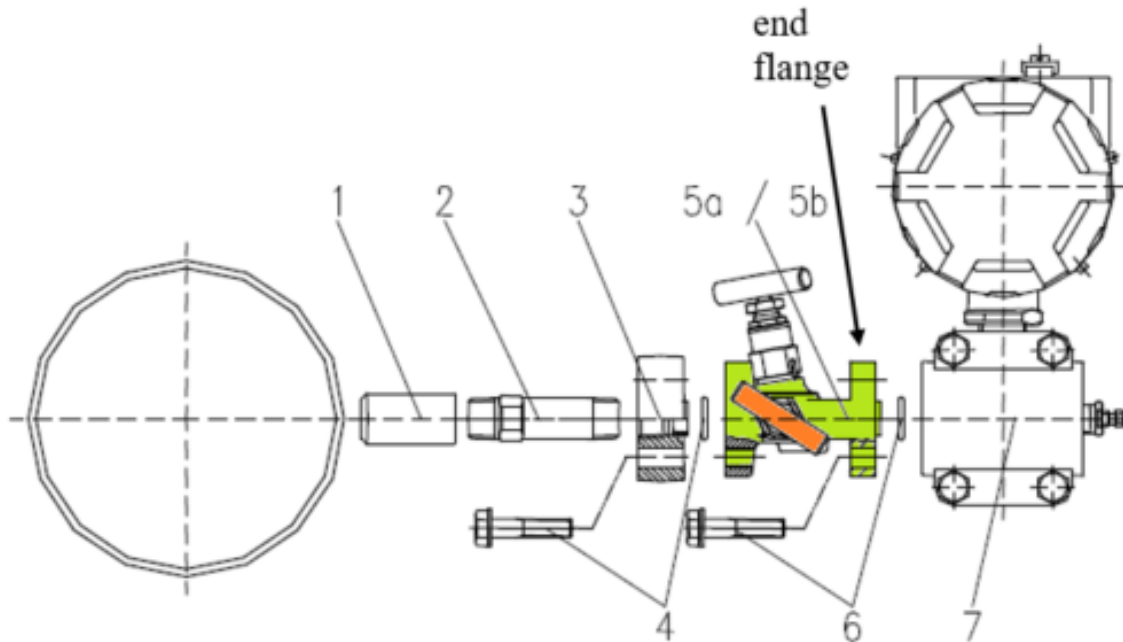


Exploded view of DPD (annotated with color)

A POSITA would have understood that hex nipple 2 of DPD is a connecting device because it connects to the process line. Ex. 1002 ¶[200]. A POSITA would have also understood that hex nipple 2 necessarily has a longitudinal through-opening to allow a fluid connection to the “instrument 7” for measuring the differential pressure of the gas flow in the process. *Id.*

Claim 1[b]

DPD includes a “valve manifold” 5a/5b (lime) that connects to instrument 7 in a sealing manner via a seal ring 6, as shown in the annotated exploded view below of DPD. See Ex. 1006 at 52.



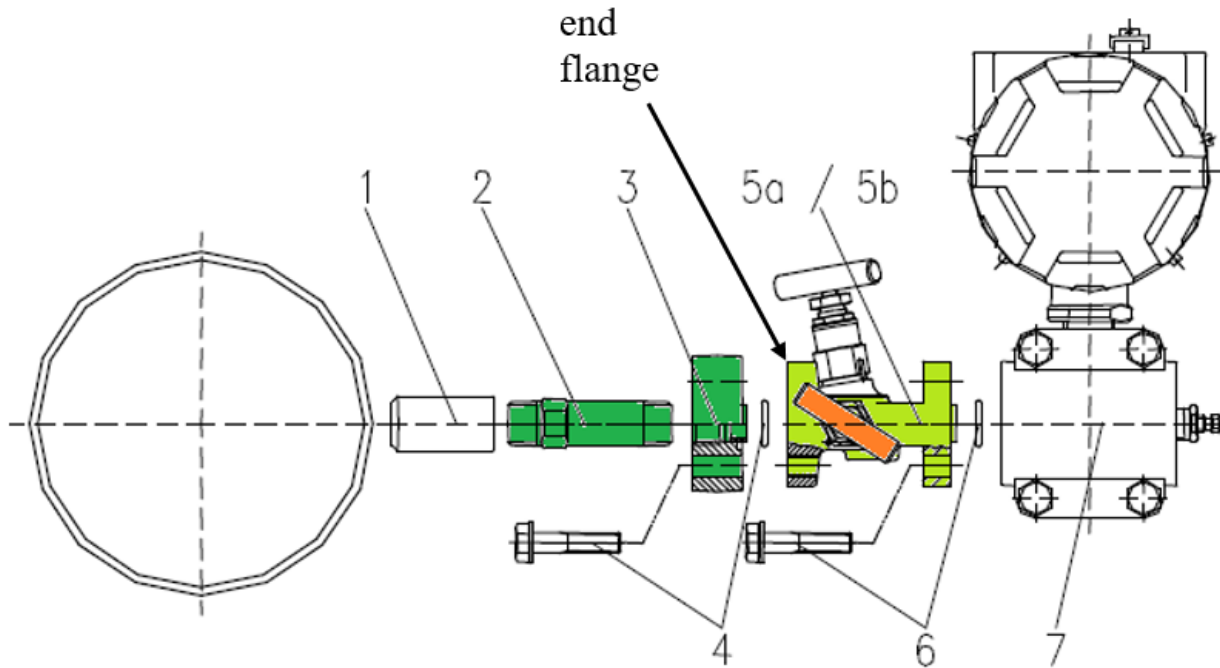
Exploded view of DPD (annotated with color/text)

A POSITA would have recognized that valve manifold 5a/5b is a connecting device because it connects to instrument 7 via an end flange thereof that is bolted to instrument 7, as seen above. Ex. 1002 ¶[202]. A POSITA would have also recognized that valve manifold 5a/5b of DPD necessarily has a longitudinal through-opening for maintaining the fluid connection to instrument 7 from the process line. *Id.* The pressure in the process line could not be measured by instrument 7 without such a through-opening. *Id.*

Claim 1[c]

DPD does not have a connecting unit that is specifically a nut connection. Instead, DPD employs a bolted flange connection. The bolted flange connection

of DPD includes an “oval flange 3” (**green**) of the hex nipple 2 (**green**) that is bolted to a corresponding end flange of valve manifold 5a/5b, as seen in the annotated view below. *See* Ex. 1006 at 52; Ex. 1002 ¶[203].



Exploded view of DPD (annotated with color/text)

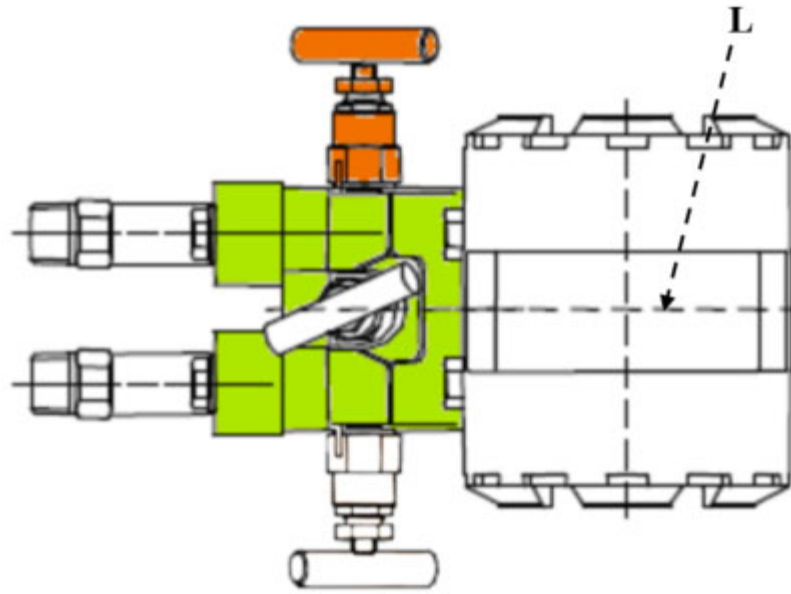
As explained above in Ground 3, union connections were well known in the art at the time of the filing of the '030 patent. Indeed, Patent Owner's own product, the Schneider Adaptor, is such a conventional union connection. *See* Ex. 1008 at 111; Ex. 1002 ¶[204]. A POSITA would have found it obvious to substitute the bolted flange connection of DPD with a conventional union connection, like the Schneider Adaptor, in view of the known benefits of a union connection, as outlined above in Ground 3. Ex. 1002 ¶[204]. Moreover, a

POSITA would have recognized that modifying DPD to incorporate its own Schneider Adaptor would have been a mere design choice with no impact on the operation of the hook-up. *Id.*

Other reasons a POSITA would prefer a conventional union connection, like the Schneider Adaptor, over the bolted flange connection of DPD include the ability to install two such units in close proximity without rotation of the shutoff valves which would otherwise interfere, the ability to maintain a close coupling environment, and the added tolerance and flexibility in connecting the instrument to the process line, as discussed in Ground 3 above. *Id.* ¶[205].

Claim 1[d]

A POSITA would have recognized that DPD includes two shutoff valves, one for each line. *Id.* ¶[206]. The shutoff valve is integrated into the valve block 5a/5b or second connecting device (**lime**), as seen in the view below of DPD (annotated to show the shutoff valve in **orange**).



Assembled elevational view of DPD (annotated with color/text)

As seen above, the shutoff valve is at a right angle to the longitudinal axis (designated as L) of DPD and thus extends obliquely.

Claim 1[wherein clause (i)]

The hex nipple 2 or first connecting device (**green**) and the valve manifold 5a/5b or second connecting device (**lime**) of DPD, as modified to incorporate the structure of the conventional union connection taught by the Schneider Adaptor (discussed in more detail below), would be connected with sealing effect. That is because they are clamped together with a seal ring 4 arranged therebetween when the union nut is rotated and screwed onto the valve manifold 5a/5b to pull the two connecting devices together. *Id.* ¶[208].

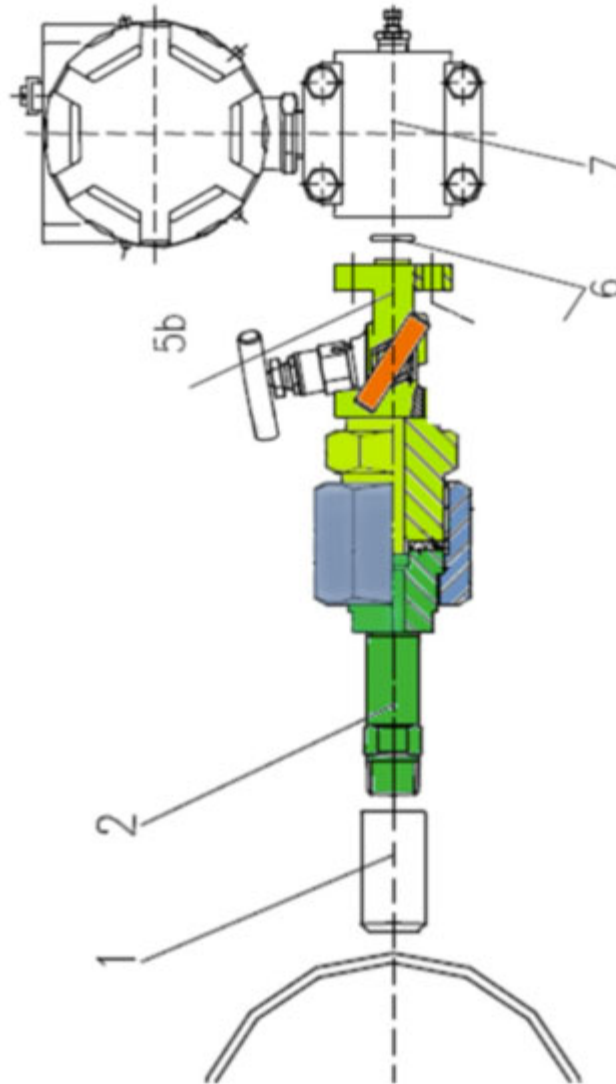
Claim 1[wherein clause (ii)]

A POSITA would have understood that DPD, as modified to incorporate the Schneider Adaptor, would maintain the seal between the first and second connecting devices (provided by seal ring 4) solely by rotating the union nut of the modified DPD and without rotating either of the first and second connecting devices. *Id.* ¶[209].

Claim 1 [wherein clause (iii)] thru [wherein clause (viii)]

For simplicity, the “wherein” clauses (iii) thru (viii) of claim 1 are grouped together because they are each directed to a conventional union connection. However, each specific wherein clause is identified in the detailed discussion below.

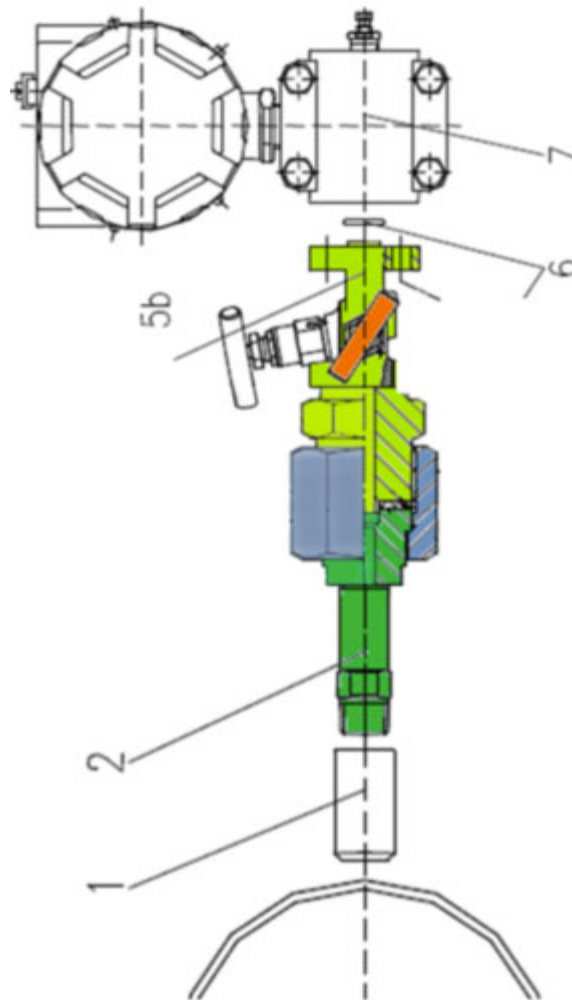
The Schneider Adaptor is a conventional union connection that includes a nut that interconnects first and second connecting devices. *See* Ex. 1008 at 111. To show this modification of DPD, Dr. Rodgers created the figure below by replacing the bolted flange connection of DPD with the union connection of the Schneider Adaptor.



The Schneider Adaptor and the union connection both allow two pressure lines to be connected together without rotating those lines. Ex. 1002 ¶[211]. The Schneider Adaptor is explained above in Ground 4 regarding wherein clauses [iii] thru [iv] and is therefore incorporated by reference here.

Moreover, although DPD is shown in the catalog in a horizontal orientation with respect to the process line, a POSITA would have understood that DPD could

have been mounted to the process line in any desired orientation based on the type of fluid in the pipeline, including a vertical orientation, as a matter of choice and without impacting the function of the hook-up. *Id.* ¶[216]. As such, if DPD was mounted vertically on the process line, then hex nipple 2 (first connecting device) thereof would be positioned below valve manifold 5a/5b (second connecting device) with the bolted flange connection being therebetween. *Id.* As such, DPD, as modified to replace the bolted flange connection with the Schneider Adaptor, would necessarily have the outer flange of the first connecting device (i.e. hex nipple 2) arranged at an upper edge region thereof, the male thread of the second connecting device (i.e. valve manifold 5a/5b) arranged at a lower edge region thereof, and the inner flange arranged at a lower edge region of the nut, as recited in wherein clauses (iii), (iv), and (v), and demonstrated in the figure below (created by Dr. Rodgers) showing DPD with the Schneider Adaptor. *Id.*



Rationale for Obviousness

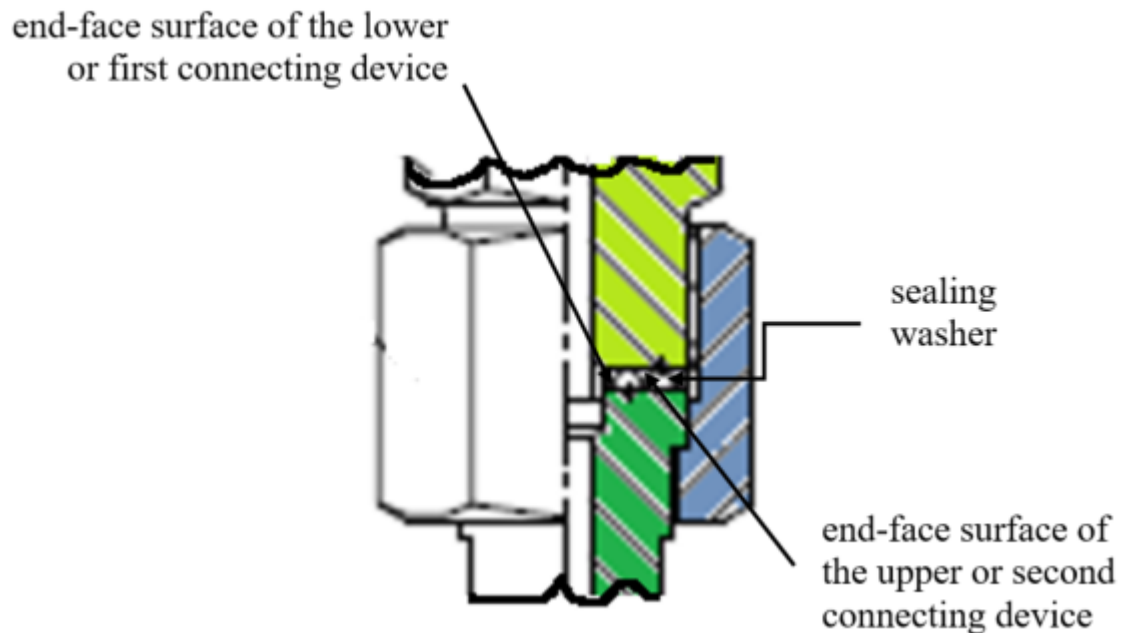
It would have been obvious to a POSITA to modify DPD to incorporate the union connection of the Schneider Adaptor. *Id.* ¶[217]. A POSITA understood that non-rotating connections can have one of two different and basic configurations, i.e. a bolted-flange configuration, as in DPD, or a union configuration, as in the Schneider Adaptor. *Id.* This is a simple substitution of one non-rotating connection configuration (i.e. DPD) for another (i.e. the

Schneider Adaptor) that would yield predictable results, i.e. of a union non-rotating connection, and maintain the benefits thereof, such as connecting the first and second connecting devices without having to rotate either device. *Id.* It would have been obvious to a POSITA to try the Schneider Adaptor in DPD, because, as stated above, there are a finite number of predictable solutions with a reasonable expectation of success. *Id.* A POSITA would have understood that bolted flange and a union are no different in purpose, function, or utility as it relates to connecting pipes or device ends. *Id.* To a POSITA, the non-rotating connection configuration is a mere design choice. *Id.* Using a union in place of a bolted flange would lead to a predictable result and reasonable expectation of success because the purpose of the threads is simply to mate the first and second connecting devices. *Id.* Furthermore, union nuts are simple hardware, and a POSITA would have chosen the union configuration based on economic factors such as cost or accessibility. *Id.* The union configuration also offers the advantage of being more compact and more forgiving for misalignments. *Id.* Thus, these finite variations in use are based on market forces and the uses are predictable to a POSITA. *Id.* Finally, there is a teaching, suggestion, or motivation to combine DPD and Schneider Adaptor, because DPD teaches using a non-rotating connection for connection process lines to a valve block, and the Schneider catalog teaches various types of hardware that can be substituted or adapted to tools in this

industry for making process line connections. *Id.*

Claim 1[wherein clause (ix)]

As discussed above, DPD includes a sealing means, that is seal ring 4, arranged between flange 3 of hex nipple 2 (first connecting device) and the corresponding flange of valve manifold 5a/5b (second connecting device), which are bolted together. *Id.* ¶[218]. Likewise, the Schneider Adaptor illustrates this common positioning of a sealing washer between end faces of the lower or first connecting device (**green**) and the upper or second connecting device (**lime**), as seen below. *See* Ex. 1008 at 111; Ex. 1002 ¶[218].



Partial view of the Schneider Adaptor (annotated with color/text)

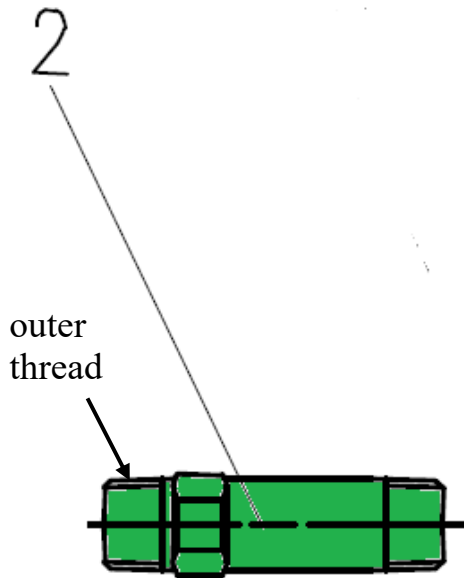
Consequently, a POSITA would have recognized that the sealing means provided by DPD would be maintained if modified to incorporate the connection taught by the Schneider Adaptor, as described above. Ex. 1002 ¶[219].

Thus, any limitation of claim 1 not met by DPD of the 2008 Hook-ups Catalog is shown in the 2012 Accessories Catalog, particularly with regards to the Schneider Adaptor. And the benefits of the Schneider Adaptor could be predictably applied to the bolted flange connection of DPD to yield the predictable result of a sealed union connection. *Id.* A POSITA would also have had a reasonable expectation of success in making that modification because it merely involves using a conventional union connection, like the Schneider Adaptor, for its intended purpose. *Id.* Moreover, all of the claimed elements were known in the prior art and a POSITA would have combined the elements as claimed by known methods, with no change in their respective functions. *Id.* ¶[220].

Consequently, the combination of DPD and the Schneider Adaptor renders challenged claim 1 obvious and unpatentable because it would have been obvious to substitute the known union nut connector for the bolt flange connector to obtain the known benefits of a conventional union connection, such as allowing connection of two components without the need to rotate those components. *Id.*

Claim 2

Hex nipple 2 or first connecting device (**green**) of DPD has a thread at its lower end, as seen in the view below. *Id.* ¶[221].



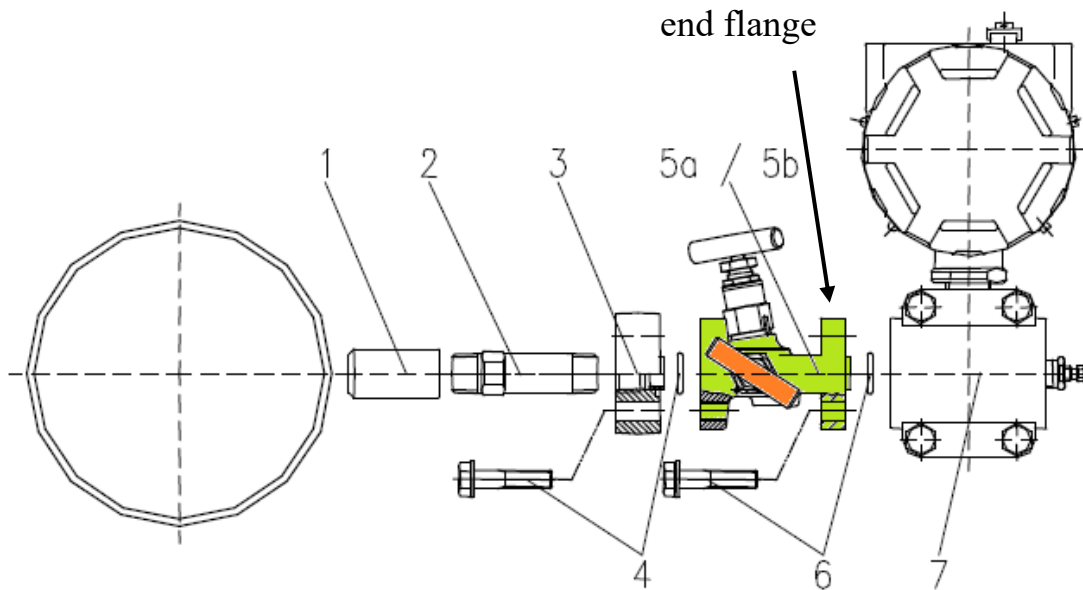
Partial exploded view of DPD (annotated with color/text)

Claim 3

The outer thread at the lower end of hex nipple 2 (first connecting device) of DPD has a conical shape, as seen in the view above regarding claim 2. A POSITA would recognize that the outer thread is an NPT which is commonly used in this art and is defined as a conical type of thread. *Id.* ¶[222].

Claim 6

Valve manifold 5a/5b or second connecting device (**lime**) of DPD has an outwardly pointing flange (identified as the “end flange” in the view below) that connects to measuring instrument 7, via bolts 6. *Id.* ¶[223].



Exploded view of DPD (annotated with color/text)

To the extent that DPD is considered to require the horizontal orientation shown, a POSITA would have understood that the specific orientation of DPD shown in the catalog is simply a choice of the installer and would have no impact on the function of the hook-up or pressure measurement. *Id.* ¶[224]. It would have been obvious to a POSITA to arrange DPD in any chosen orientation, including a vertical orientation, where hex nipple 2 would be below valve 5a/5b, as a predictable variation of DPD. *Id.* And in the vertical orientation, the outer

flange of valve manifold 5a/5b is at the upper edge region of the valve manifold 5a/5b, as claimed. *Id.*

Claim 7

As explained above regarding claim 1[d], the shutoff valve of DPD extends at a right angle with respect to the longitudinal axis of the apparatus.

VII. CONCLUSION

For the foregoing reasons, Petitioner respectfully requests trial be instituted and claims 1-7 of the '030 patent be cancelled.

Dated: April 25, 2024

Respectfully submitted,

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CERTIFICATE OF WORD COUNT

I hereby certify that the foregoing Petition complies with the type-volume limitation of 37 C.F. R. §42.24 and contains 13,952 words based on the word count indicated by the word processing system used to prepare this Petition, excluding those portions exempted by §42.24(a)(1). I also certify that the foregoing Petition complies with the general format requirements of 37 C.F.R. §42.6(c) and has been prepared using Microsoft® Word in 14-point, Times New Roman font.

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CERTIFICATE OF SERVICE

I hereby certify that on this 25th day of April 2024, a copy of this Petition for Inter Partes Review, Petitioner's Exhibits 1001–1013, were served by Federal Express on the following correspondence address of record for patent owner, pursuant to 37 C.F.R. § 42.105(a):

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