



(51) International Patent Classification:

B60T 15/02 (2006.01) B60T 15/56 (2006.01)
B60T 15/38 (2006.01) B60T 17/04 (2006.01)
B60T 15/48 (2006.01) B60T 17/06 (2006.01)
B60T 15/50 (2006.01) B60T 17/22 (2006.01)
B60T 15/52 (2006.01)

(21) International Application Number:

PCT/US2021/040416

(22) International Filing Date:

06 July 2021 (06.07.2021)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

16/925,913 10 July 2020 (10.07.2020) US

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, IT, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,

(54) Title: VALVE WITH FRANGIBLE FITTING

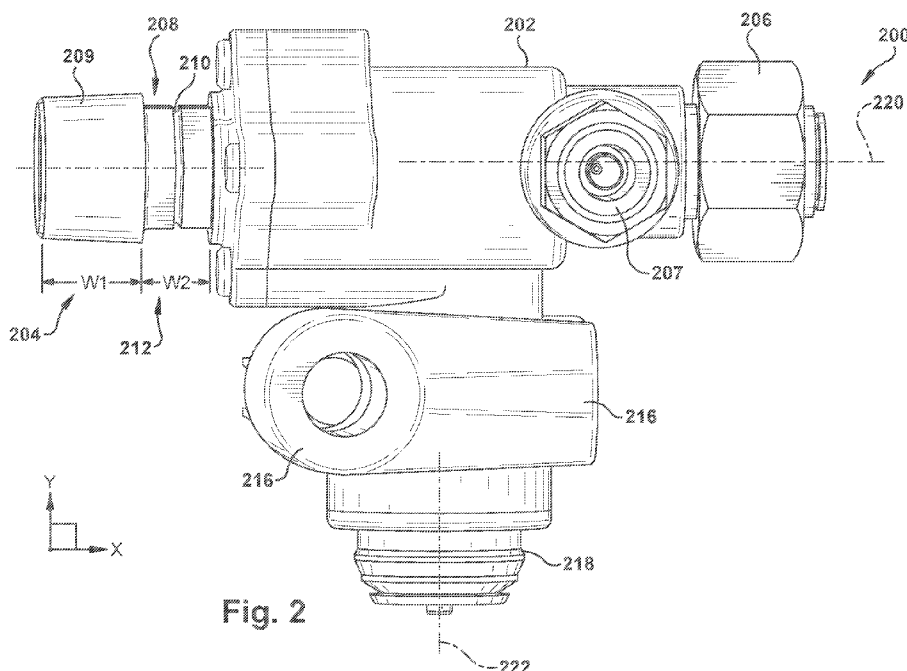


Fig. 2

(57) Abstract: A valve for an air brake system on a commercial vehicle comprises a body, an inlet port connected to the body and at least one delivery port connected to the body. The inlet port has a threaded portion distal to the body and a hex portion proximate to the body. The hex portion includes a frangible feature in substantially the mid-point of the hex portion such that the valve can easily be removed from an air brake reservoir when the valve is broken at the frangible feature.

TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

Published:

- *with international search report (Art. 21(3))*

VALVE WITH FRANGIBLE FITTING

Background

[0001] The present application relates to an air brake valve with a frangible fitting.

[0002] Air brake valves are used in commercial vehicle air brake systems. The valves may be mounted in various locations throughout the underside of the vehicle. Each valve works in the service brake or park brake system and responds to a control air signal. Some locations on the vehicle are more subject to damage due to debris impact while the vehicle is traveling or are mounted in locations with high vibration profiles. Valves that are damaged require removal from the vehicle and replacement. In extreme instances, the valve may be completely separated from its installation location on the vehicle. Ease of replacement of the valve is a necessity. Accordingly, those skilled in the art continue with research and development efforts in the field of valve designs to improve replacement of valves due to damage or failure.

Summary

[0003] In accordance with one embodiment, a valve for an air brake system on a commercial vehicle comprises a body, an inlet port connected to the body, and at least one delivery port connected to the body. The inlet port has a threaded portion, a hex portion and a frangible feature in substantially the mid- point of the hex portion.

[0004] In accordance with another embodiment, an assembly for an air brake system for a commercial vehicle comprises a reservoir having a receiving port and a valve for attachment to the reservoir. The valve comprises a body, an inlet port connected to the body, and at least one delivery port connected to the body. The inlet port has a threaded portion, a hex portion and a frangible feature in substantially the mid-point of the hex portion.

Brief Description of the Drawings

[0005] Figure 1 is a representation of a prior art valve.

[0006] Figure 2 is a representation of the present inventive valve depicting the frangible feature.

[0007] Figure 3 is a representation of the present inventive valve as installed on an air reservoir.

Detailed Description

[0008] Referring to **FIGURE 1**, a prior art valve **100** is illustrated. The prior art valve may be an SRC-7000™ trailer spring brake valve manufactured by Bendix Commercial Vehicle Systems LLC of Elyria, Ohio. The valve **100** is capable of being mounted to an air brake reservoir on a commercial vehicle. The valve **100** is configured, under certain conditions, to apply trailer spring brakes, protect trailer reservoir air pressure and provide anti-compounding between service brakes and parking brakes.

[0009] Valve **100** has a body **102**. The body **102** may be of metal or plastic material. The body **102** includes an inlet port **104**, a supply port **106**, a service port **107**, delivery ports **116** and an exhaust port **118**.

[0010] An axis **120** of the inlet port **104** is perpendicular to an axis **122** of the supply port **106** and exhaust port **118**.

[0011] The inlet port **104** is configured with an inlet fitting **108** having a threaded portion **109** used in threading valve **100** into the air brake reservoir. This attachment to the air brake reservoir serves as the mounting location for the valve **100**. Air is received into the valve **100** from the air brake reservoir through the inlet port **104**. The inlet fitting **108** has a hex portion **112**. The hex portion **112** has a larger diameter than the threaded portion **109** and is proximate to the body **102**. The width of the hex portion **112** is less than the width of the threaded portion **109**. The large diameter hex portion **112** requires special tools when used to rotate the valve **100** into the air brake reservoir. The hex portion **112** location makes it difficult to install valve **100** tight to the reservoir. The inlet fitting **108** may include an undercut **110** adjacent to the threaded portion **109**.

[0012] This prior art valve **100** may be forcibly removed from the air brake reservoir upon impact to the valve **100**. The undercut **110** is a weakened portion of the inlet fitting **108** where a breakaway may occur. The threaded portion **109** remains in the air brake reservoir after a substantial impact. The threaded portion **109** must be removed

before a new valve can be installed. However, the threaded portion **109** cannot be easily removed from the air brake reservoir since the likely irregularly broken undercut is proximate to the reservoir. In some instances, the entire air brake reservoir must be replaced due to the threaded portion remaining in the air brake reservoir.

[0013] **FIGURE 2** shows inventive valve **200**. The valve **200** operates as part of an air brake system for a vehicle including performing at least one of a quick release and a spring brake release function. While valve **200** is intended to be mounted in the same location on an air brake reservoir, it does not have the same limitations as valve **100**, as will be described.

[0014] Valve **200** has body **202**. The body **202** may be of metal or plastic material. The body **202** includes an inlet port **204**, a supply port **206**, a service port **207**, delivery ports **216** and an exhaust port **218**.

[0015] An axis **220** through the inlet port **204** is perpendicular to an axis **222** through the exhaust port **218**. Supply port **206** is on axis **224** (shown in Figure 3), which is parallel to axis **220**.

[0016] The inlet port **204** is configured with an inlet fitting **208**. The inlet fitting **208** may be secured to the body **202** via screws, bolts or other means. The inlet port **204** may be integral with the body **202** or separable from the body **202**. If separable from the body **202**, the inlet fitting **208** may be the same material as body **202** or may be a different material. In one example, the body **202** is a plastic material and the inlet fitting **208** is aluminum. In another example, the inlet fitting **208** is brass.

[0017] The inlet fitting **208** has a threaded portion **209** used in threading valve **200** into an air brake reservoir. The threaded portion **209** may be threaded on both the interior and exterior of the threaded portion **209** to facilitate multiple different methods of attaching to the air brake reservoir.

[0018] The inlet fitting **208** has a hex portion **212**. The width W_2 of the hex portion **212** is approximately the same as the width W_1 of the threaded portion **209**. In one example, the width W_2 is about 0.5 inches. The hex portion **212** has a smaller diameter than the threaded portion **209** and is proximate to the body **202**. In one embodiment, the hex portion **212** has a distance across the flats of the hex portion, or of

the diameter of an inscribed circle, of about 0.75 inches. The hex portion **212** receives a standard size tool for rotatably installing the valve **200** to the air brake reservoir.

[0019] The hex portion **212** includes a frangible feature **210** approximately in the mid-point of the width **W2** of the hex portion **212**. The frangible fuse **210** serves as a location where, upon substantial impact to the valve **220** or in response to extreme vibration, the inlet fitting **208** will break in two pieces. The width of the flats of the hex portion **212** is about 0.25 inches after breaking at the frangible feature **210**, which will accommodate a standard wrench width. By breaking in approximately the middle of the hex portion **212**, each of the broken piece and the remaining portion of the valve **200** will have a hex portion capable of receiving a tool.

[0020] Therefore, a valve for an air brake system on a commercial vehicle comprises a body, an inlet port connected to the body, and at least one delivery port connected to the body. The inlet port has a threaded portion distal to the body and a hex portion proximate to the body. The hex portion includes a frangible feature in substantially the mid- point of the hex portion.

[0021] **FIGURE 3** shows the air brake assembly **250**. The air brake assembly **250** includes air brake reservoir **252** and valve **200**. Valve **200** is shown as threadably installed in a receiving port **254** of air brake reservoir **252**. The receiving port may be a nipple mount or a bung. The threaded portion **209** of valve **200** may have an interior thread of about 0.25 inches for nipple mounting or may be threaded into a bung of the air brake reservoir as shown in Figure 3. The hex portion **212** is external to the receiving port **254** after installation.

[0022] The attachment of the threaded portion **209** to the air brake reservoir serves as the mounting location for the valve **200** on a vehicle. Air is received from the air brake reservoir through the inlet port **204**. Additional air fittings and hoses (not shown) are installed to the delivery ports **216** and supply port **206** after installation of the valve **200** to the air brake reservoir **252**.

[0023] Axis **220** of the inlet port and axis **224** of the delivery port are shown as parallel to each other. The configuration of the valve **200** in this manner promotes ease in assembling the valve **200** to the air brake reservoir **252** and connecting the valve **200** to

the rest of the air brake system while maintaining a center of gravity approximately at the midpoint of the intersection of the axes **220** and **222**.

[0024] Upon breakage at the frangible feature **210**, the broken inlet fitting **208** can be easily removed from the air brake reservoir **252** using the remaining hex portion. A new valve can then be installed on the receiving without any modification to the air brake reservoir **252**. The hexagonal feature of the valve **200** is sized to promote removal by standard tools available in any maintenance toolset. For example, after the breakage at the frangible feature **210**, a socket wrench can be used to remove the remaining portion of the inlet fitting **204** from the reservoir. The hex portion **212** also serves as a fail safe to prevent over torquing of the fitting **208** when being installed.

[0025] While the present invention performs the functions of a trailer spring brake valve, other valves intended for mounting on an air brake reservoir, such as quick release valves, can benefit by have an inlet port designed with a frangible feature, such as fitting **208**.

[0026] An assembly for an air brake system for a commercial vehicle comprises a reservoir having a receiving port and a valve for attachment to the reservoir. The valve comprises a body, an inlet port connected to the body, and at least one delivery port connected to the body. The inlet port has a threaded portion for mating with the receiving portion and a hex portion. The hex portion includes a frangible feature in substantially the mid- point of the hex portion.

[0027] While the present invention has been illustrated by the description of example processes and system components, and while the various processes and components have been described in detail, applicant does not intend to restrict or in any way limit the scope of the appended claims to such detail. Additional modifications will also readily appear to those skilled in the art. The invention in its broadest aspects is therefore not limited to the specific details, implementations, or illustrative examples shown and described. Accordingly, departures may be made from such details without departing from the spirit or scope of applicant's general inventive concept.

What is claimed is:

1. A valve for an air brake system on a commercial vehicle comprising:
 - a body;
 - an inlet port connected to the body, the inlet port having a threaded portion distal to the body and a hex portion proximate to the body, wherein the hex portion includes a frangible feature in substantially the mid-point of the hex portion; and
 - at least one delivery port connected to the body.
2. The valve as in claim 1, wherein the inlet port is separable from the body.
3. The valve as in claim 2, wherein the inlet port is a material different than the material of the body.
4. The valve as in claim 3, wherein the inlet port is a metal material and the body is a plastic material.
5. The valve as in claim 1, wherein the inlet port threaded portion includes internal threads and external threads.
6. The valve as in claim 1, wherein the threaded portion of the inlet port has a larger diameter than the hex portion.
7. The valve as in claim 6, wherein the hex portion has a distance across flats of the hex portion of about 0.75 inches.
8. The valve as in claim 1, wherein the hex portion has a width of about 0.5 inches.
9. The valve as in claim 1, further comprising:
 - a supply port connected to the body having an axis parallel to an axis of the air inlet port; and
 - an exhaust port connected to the body having an axis perpendicular to both the supply port axis and the air inlet port axis.
10. The valve as in claim 1, wherein the valve performs at least one of a quick release and a spring brake release function.
11. An assembly for an air brake system for a commercial vehicle comprising:
 - a reservoir having a receiving port;
 - a valve for attachment to the reservoir;

- a body;
 - an inlet port connected to the body, the inlet port having a threaded portion for mating with the receiving port and a hex portion, wherein the hex portion includes a frangible feature in substantially the mid-point of the hex portion; and
 - at least one delivery port connected to the body.
- 12. The assembly as in claim 11, wherein the hex portion of the valve does not extend into the receiving port of the reservoir when the valve is installed on the reservoir.
- 13. The assembly as in claim 11, wherein the valve further comprises:
 - a supply port connected to the body having an axis parallel to an axis of the air inlet port; and
 - an exhaust port connected to the body having an axis perpendicular to both the supply port axis and the air inlet port axis, wherein the air inlet port axis is perpendicular to a surface of the reservoir when the valve is mated to the receiving port.
- 14. The assembly as in claim 11, wherein the valve performs at least one of a quick release and a spring brake release function.
- 15. The assembly as in claim 11, wherein the reservoir receiving port is at least one of a nipple fitting and a bung fitting.

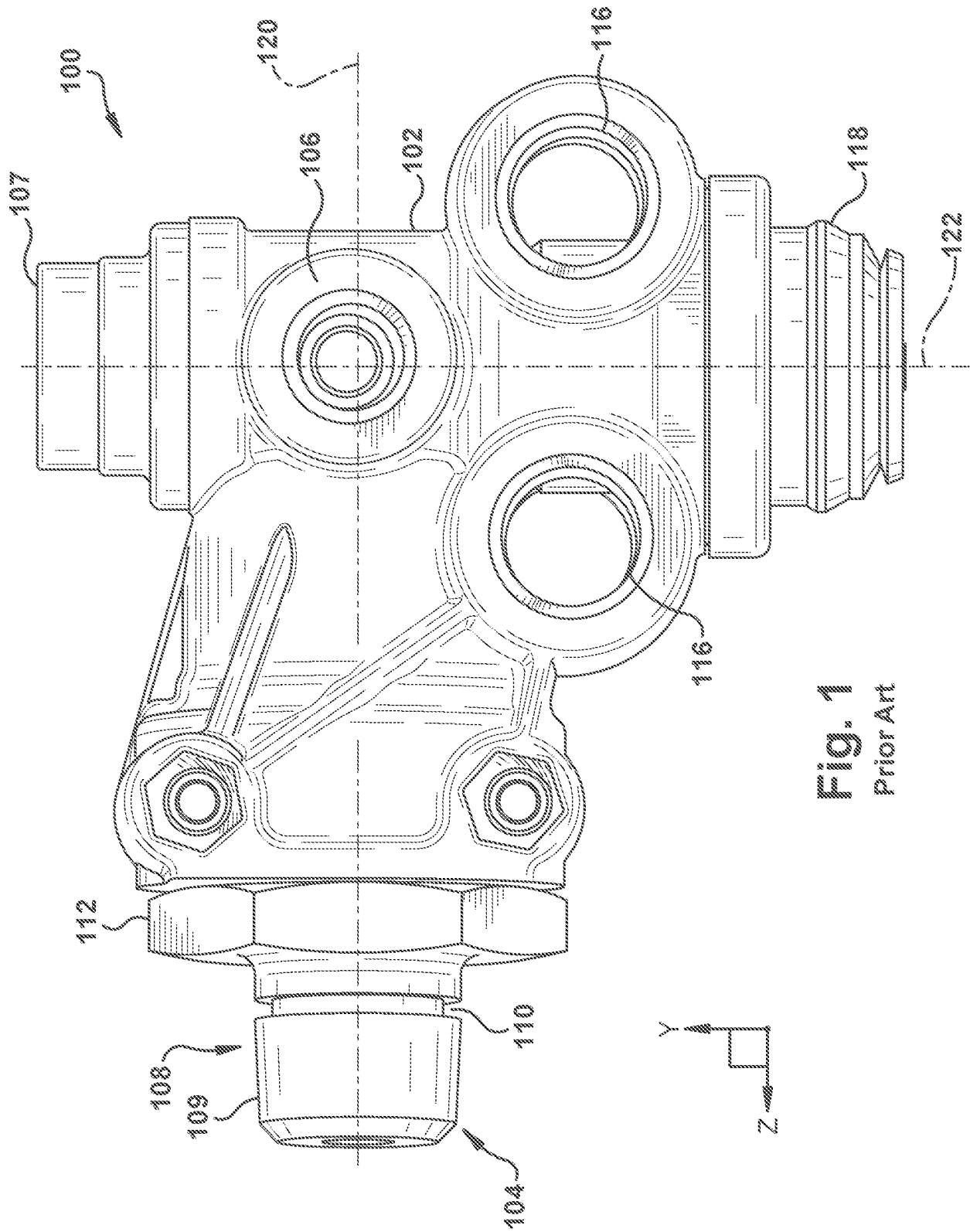


Fig. 1
Prior Art

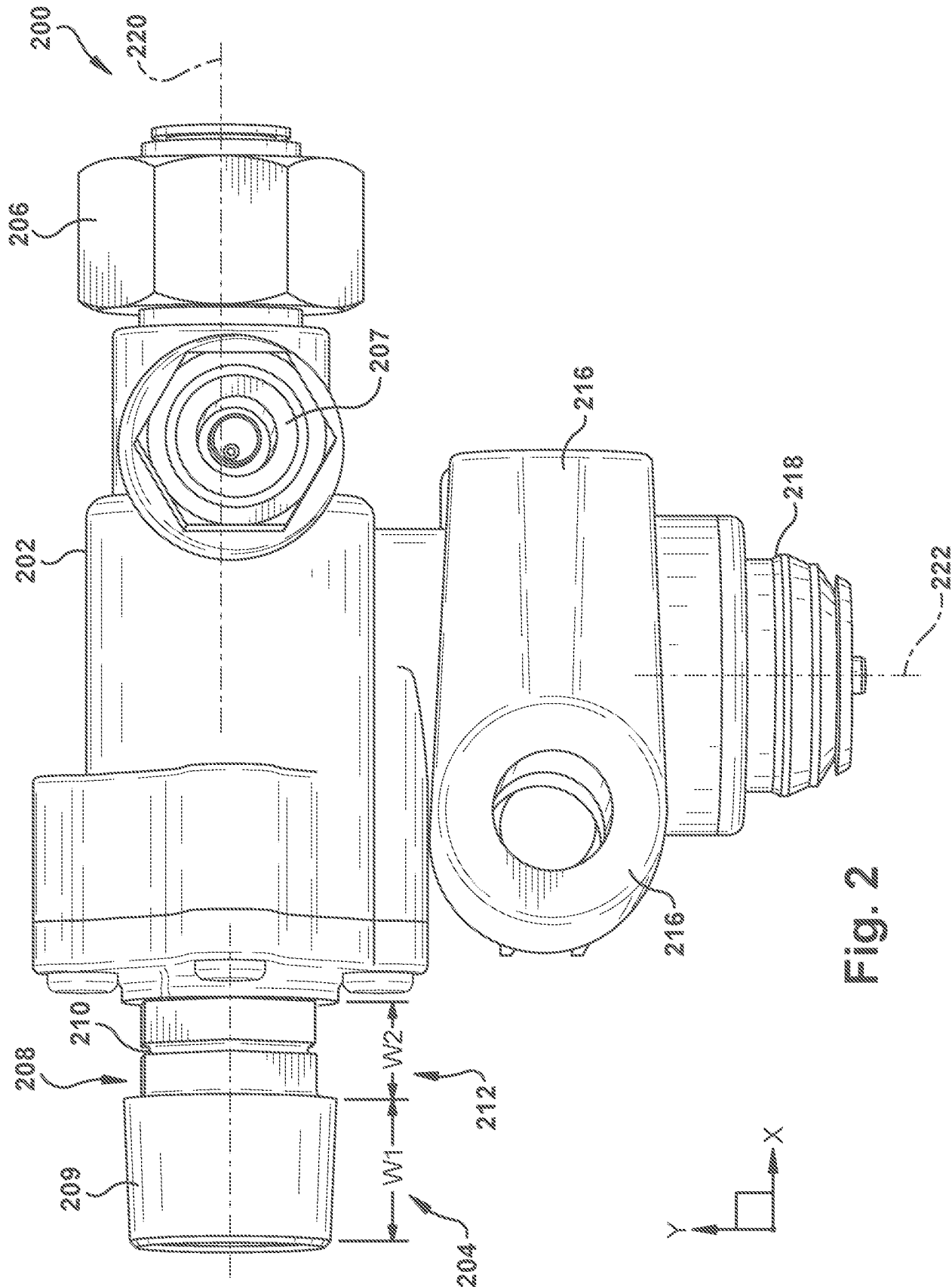


Fig. 2

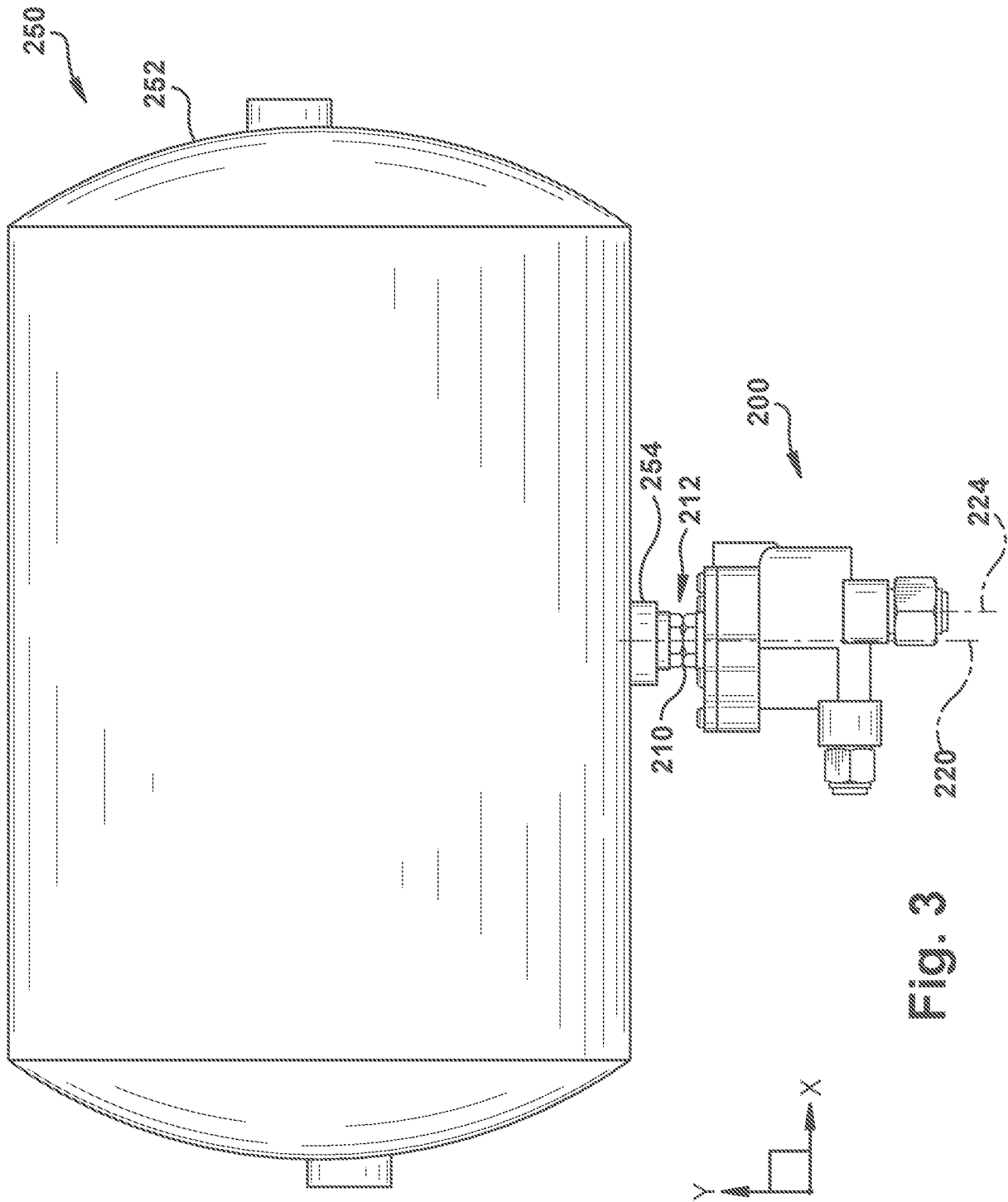


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2021/040416

A. CLASSIFICATION OF SUBJECT MATTER INV. B60T15/02 B60T15/38 B60T15/48 B60T15/50 B60T15/52 B60T15/56 B60T17/04 B60T17/06 B60T17/22 ADD.		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) B60T		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal, WPI Data		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 872 471 A (SCHNEIDER PETER J [US]) 10 October 1989 (1989-10-10) figure 2, 3, 14 and 15 -----	1-15
A	US 6 802 332 B1 (STUART GRAHAM M [GB]) 12 October 2004 (2004-10-12) the whole document -----	1-15
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☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
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"A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 8 October 2021	Date of mailing of the international search report 20/10/2021	
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Ranieri, Sebastiano	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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