



(51) International Patent Classification:

F16N 21/04 (2006.01) F16N 3/12 (2006.01)

(21) International Application Number:

PCT/AU2018/050651

(22) International Filing Date:

27 June 2018 (27.06.2018)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

2017902478 27 June 2017 (27.06.2017) AU

(71) Applicant: MACNAUGHT PTY LTD [AU/AU]; 41-49 Henderson Street, Turrella, New South Wales 2205 (AU).

(72) Inventors: UCCELLANI, Marco; 41-49 Henderson Street, Turrella, New South Wales 2205 (AU). SINGH, Prabhjot; 41-49 Henderson Street, Turrella, New South Wales 2205 (AU).

(74) Agent: WULFF, Steven; K&L Gates, Level 25 South Tower, 525 Collins Street, Melbourne, Victoria 3000 (AU).

(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, 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, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, 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, 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).

Published:

— with international search report (Art. 21(3))

(54) Title: GREASE COUPLER

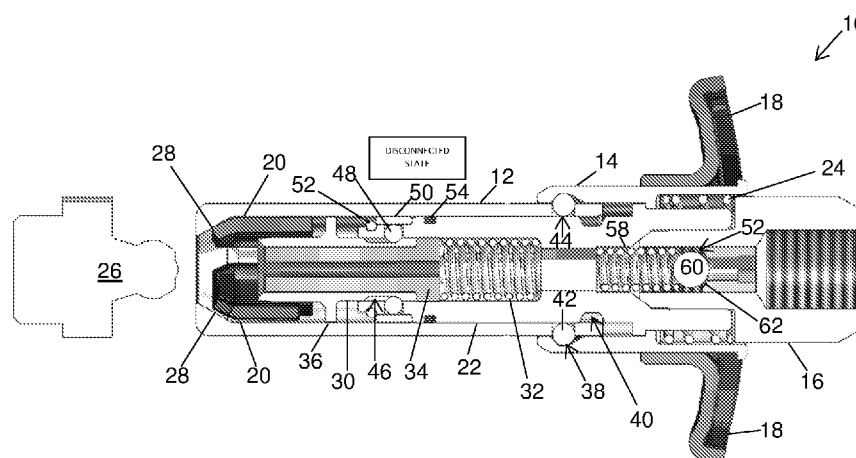


Figure 3

(57) Abstract: A grease coupler, comprising: an outer sleeve; an inner sleeve; a connection body; a collar; a collar spring; jaws to lock and unlock with a grease nipple; a nozzle; a nozzle spring; a collar ball groove; and an inner ball groove; sleeve locking balls; a nozzle ball groove; and nozzle locking balls.



GREASE COUPLER

Field

[0001] The present invention relates to grease couplers.

Background

[0002] Grease couplers connect a grease nipple to pressurised grease from a grease gun.

[0003] Conventional couplers suffer from several drawbacks. It is difficult to positively couple and uncouple the coupler and the nipple, particularly under high grease pressure. This requires noticeable physical effort and also leads to wear and tear, or even failure of the components. The lack of positive coupling and uncoupling also leads to leaking of grease, or even spurting of high pressure grease back onto an operator. Furthermore, build-up of back pressure inside the coupler can lead to the formation of hydraulic lock which prevents positive uncoupling of the coupler and the nipple. Most conventional quick-release couplers are bulky which poses problems of access to tight greasing points.

[0004] In this context, there is a need for improved grease couplers.

Summary

[0005] According to the present invention, there is provided a grease coupler, comprising:

- an outer sleeve axially movable on an inner sleeve, each of which has an inlet end and an outlet end;

- a connection body connected to the inlet end of the inner sleeve;

- a collar axially movable on the outer sleeve between the connection body and the inlet end of the outer sleeve;

- a collar spring on the inlet end of the inner sleeve between the collar and the connection body to axially bias the collar toward the outlet end of the outer sleeve;

- jaws axially and radially movable in the outlet end of the outer sleeve to lock and unlock with a grease nipple;

a nozzle axially movable in the outlet end of the outer sleeve between the jaws and the outlet end of the inner sleeve;

a nozzle spring in the inner sleeve between the nozzle and the connection body;

a collar ball groove in the collar and a corresponding inner ball groove in the inner sleeve;

sleeve locking balls axially and radially movable between the collar ball groove and the inner ball groove via ball holes in the outer sleeve;

a nozzle ball groove in the nozzle; and

nozzle locking balls in the outlet end of the inner sleeve and axially movable within a limited axial distance defined by the nozzle ball groove;

wherein a first retraction of the collar axially away from the outlet end of the outer sleeve pre-arms the grease coupler for coupling to the grease nipple by axially and radially moving the sleeve locking balls from the collar ball groove to the inner ball groove to lock the outer sleeve and the inner sleeve to one another to thereby permit relative axial movement between the outer sleeve and the nozzle to lock the jaws;

wherein pushing the grease nipple inside the outlet end of the outer sleeve initially moves the nozzle axially away from the jaws to unlock the jaws and compress the nozzle spring, and subsequently moves the nozzle axially toward the grease nipple under spring pressure by the nozzle spring to thereby relock the jaws and positively couple the nozzle to the grease nipple; and

wherein a second retraction of the collar axially away from the outlet end of the outer sleeve moves the sleeve locking balls from the inner ball groove to the collar ball groove to unlock the outer sleeve and the inner sleeve from one another to thereby permit relative axial movement between the outer sleeve and the nozzle to thereby unlock the jaws from the grease nipple, while relative axial movement between the nozzle and the inner sleeve is limited by axial movement of the nozzle locking balls within the limited axial distance defined by the nozzle ball groove to thereby positively uncouple the nozzle from the grease nipple.

[0006] The outlet end of the outer sleeve may have an inwardly inclined lip, wherein the jaws are axially and radially movable against the inwardly inclined lip to lock and unlock with the grease nipple.

[0007] A nozzle flange may extend radially from the nozzle to axially move the jaws toward the inwardly inclined lip at the outlet end of the outer sleeve.

[0008] A pair of finger grips may extend radially from the collar to axially move the collar axially away from the outlet end of the outer sleeve.

[0009] A ball check valve may be provided in the connection body.

[0010] The ball check valve may be an adjustable ball check valve.

[0011] The present invention also provides a method, comprising positively coupling and uncoupling a grease nipple to pressurised grease from a grease gun using the grease coupler described above.

Brief Description of Drawings

[0012] Embodiments of the invention will now be described by way of example only with reference to the accompanying drawings, in which:

Figures 1 and 2 are perspective front and rear views of a grease coupler according to an embodiment of the present invention;

Figure 3 is a section view of the grease coupler in an uncoupled state;

Figures 4 to 6 are sequential section views showing pre-arming of the grease coupler for coupling with a grease nipple;

Figures 7 to 9 are sequential section views showing positive coupling of the grease coupler to the grease nipple; and

Figures 10 to 13 are sequential section views showing positive uncoupling of the grease coupler from the grease nipple.

Description of Embodiments

[0013] Referring to Figures 1 and 2, a grease coupler 10 according to an embodiment of the present invention may generally comprise an outer sleeve 12, an actuation collar 14, and a connection body 16. A pair of finger grips 18 may extend radially from the collar 14 to axially move the collar 14 axially away from an outlet end of the outer sleeve 12. The connection body 16 may be threadingly connectable to a grease gun hose (not shown). Clamping jaws 20 may be provided in an outlet end of the outer sleeve 12 to lock and unlock with a grease nipple, for example, a Zerk nipple (not shown). The finger grips 18 may be a moulding of suitable plastics materials, while the remaining

components may be formed from suitable metals or metal alloys unless stated otherwise.

[0014] Referring to Figure 3, the outer sleeve 12 may be axially movable on an inner sleeve 22. The outer sleeve 12 and the inner sleeve 22 may each have an inlet end and an outlet end. The connection body 16 may be threadingly connected to the inlet end of the inner sleeve 22. The collar 14 may be axially movable on the outer sleeve 12 between the connection body 16 and the inlet end of the outer sleeve 12. A collar spring 24 may be provided on the inlet end of the inner sleeve 22 between the collar 14 and the connection body 16 to axially bias the collar 14 toward the outlet end of the outer sleeve 22.

[0015] The jaws 20 may be axially and radially movable in the outlet end of the outer sleeve 12 to lock and unlock with a grease nipple 26. The outlet end of the outer sleeve 12 may have an inwardly inclined lip 28, and the jaws 20 may be axially and radially movable against the inwardly inclined lip 28 to lock and unlock with the grease nipple 26. The jaws 20 may comprise three jaws 20 spaced circumferentially around 120° from one another each other in a floating configuration for gripping the grease nipple 26. This configuration advantageously provides maximum grip surface, and lower and more even contact stress on grease nipples 26 to avoid damaging them. In comparison to four jaws spaced circumferentially around 90° from one another, the three-floating configuration of the jaws 20 is more versatile and conforms better to standardised shapes, sizes and tolerances of grease nipples 26 (eg, SAE J534, BS1486 and DIN71412 applicable standards). This is advantageous as grease nipples 26 are no longer machined for cost reasons, and hence are not as dimensionally accurate and consistent as they used to be.

[0016] A nozzle 30 may be axially movable in the outlet end of the outer sleeve 12 between the jaws 20 and the outlet end of the inner sleeve 22. The connection body 16, the inner sleeve 22, the outer sleeve 12, the nozzle 30 may collectively define a flow passage for pressurised grease from the grease gun hose to the grease nipple 26. A nozzle spring 32 may be provided in the inner sleeve 22 between the nozzle 30 and the connection body 16. A rubber nozzle seal 34 may be provided in the nozzle 30. A nozzle flange 36 may extend radially from the nozzle 30 to axially move the jaws 20 toward the inwardly inclined lip 28 at the outlet end of the outer sleeve 12.

[0017] A collar ball groove 38 may be formed in the collar 14, and a corresponding inner ball groove 40 may be formed in the inner sleeve 22. Sleeve locking balls 42 may be axially and radially movable between the collar ball groove 38 and the inner ball groove 40 via ball holes 44 formed in the outer sleeve 12.

[0018] A nozzle ball groove 46 defining a limited axial distance may be formed in the nozzle 30. Nozzle locking balls 48 may be provided in the outlet end of the inner sleeve 22 to be axially movable within the limited axial distance defined by the nozzle ball groove 46. The nozzle locking balls 48 may be axially retained by a retaining ring 50 and a snap ring (or circlip) 52. An O-ring 54 may be provided in an O-ring groove on the inner sleeve 22 axially inward of the nozzle.

[0019] A ball check valve 56 may be provided in the connection body 16. The ball check valves 56 may comprise a valve spring 58, a valve ball 60 and an adjustable valve seat ring 62 that provides selectively adjustable limitation of pressurised grease flow from the grease gun hose after disconnection.

[0020] Referring to Figure 4, a first retraction of the collar 14 axially away from the outlet end of the outer sleeve 12 pre-arms the grease coupler 10 for coupling to the grease nipple 26 by axially and radially moving the sleeve locking balls 42 from the collar ball groove 38 to the inner ball groove 40 to lock the outer sleeve 12 and the inner sleeve 22 to one another to thereby permit relative axial movement between the outer sleeve 12 and the nozzle 30 to lock the jaws 20. As illustrated in Figure 5, after the first retraction, the collar 14 is axially biased back toward the outlet end of the outer sleeve 12 by the collar spring 24. This leaves the grease collar 10 pre-armed and ready to positively couple to the grease nipple 26, as illustrated in Figure 6.

[0021] Referring to Figure 7, pushing the grease nipple 26 inside the outlet end of the outer sleeve 12 initially moves the nozzle 30 axially away from the jaws 20 to unlock the jaws 20 and compress the nozzle spring 32. As illustrated in Figure 8, the nozzle 30 is subsequently moved axially toward the grease nipple 26 under spring pressure by the nozzle spring 32 to thereby relock the jaws 20 and positively couple the nozzle 30 to the grease nipple 26. This leaves the grease coupler 10 in a positively coupled state with the grease nipple, as illustrated in Figure 9, to allow pressurised grease to be supplied from the grease gun hose to the grease nipple 26.

[0022] Referring to Figures 10 to 13, a second retraction of the collar 14 axially away from the outlet end of the outer sleeve 12 moves the sleeve locking balls 42 from the inner ball groove 40 back into the collar ball groove 38 to unlock the outer sleeve 12 and the inner sleeve 22 from one another to thereby permit relative axial movement between the outer sleeve 12 and the nozzle 30 to unlock the jaws 20 from the grease nipple 26, while relative axial movement between the nozzle 30 and the inner sleeve 22 is limited by the nozzle locking balls 48 axially moving within the limited axial distance defined by the nozzle ball groove 46 to positively uncouple the nozzle 30 from the grease nipple 26. The positive nozzle retention provided by the nozzle ball groove 46 and the nozzle locking balls 48 during uncoupling may overcome any hydraulic lock between the grease nipple 26 and the nozzle 30 from build-up of back pressure inside the grease coupler 10.

[0023] Embodiments of the present invention provide grease couplers that are useful for positively coupling and uncoupling grease nipples to pressurised grease from grease guns, while avoiding or minimising leaking or back spurting of grease.

[0024] For the purpose of this specification, the word "comprising" means "including but not limited to," and the word "comprises" has a corresponding meaning.

[0025] The above embodiments have been described by way of example only and modifications are possible within the scope of the claims that follow.

Claims

1. A grease coupler, comprising:

an outer sleeve axially movable on an inner sleeve, each of which has an inlet end and an outlet end;

a connection body connected to the inlet end of the inner sleeve;

a collar axially movable on the outer sleeve between the connection body and the inlet end of the outer sleeve;

a collar spring on the inlet end of the inner sleeve between the collar and the connection body to axially bias the collar toward the outlet end of the outer sleeve;

jaws axially and radially movable in the outlet end of the outer sleeve to lock and unlock with a grease nipple;

a nozzle axially movable in the outlet end of the inner sleeve between the jaws and the outlet end of the inner sleeve;

a nozzle spring in the inner sleeve between the nozzle and the connection body;

a collar ball groove in the collar and a corresponding inner ball groove in the inner sleeve;

sleeve locking balls axially and radially movable between the collar ball groove and the inner ball groove via ball holes in the outer sleeve;

a nozzle ball groove in the nozzle; and

nozzle locking balls in the outlet end of the inner sleeve and axially movable within a limited axial distance defined by the nozzle ball groove;

wherein a first retraction of the collar axially away from the outlet end of the outer sleeve pre-arms the grease coupler for coupling to the grease nipple by axially and radially moving the sleeve locking balls from the collar ball groove to the inner ball groove to lock the outer sleeve and the inner sleeve to one another to thereby permit relative axial movement between the outer sleeve and the nozzle to lock the jaws;

wherein pushing the grease nipple inside the outlet end of the outer sleeve initially moves the nozzle axially away from the jaws to unlock the jaws and compress the nozzle spring, and subsequently moves the nozzle axially toward the grease nipple under spring pressure by the nozzle spring to thereby relock the jaws and positively couple the nozzle to the grease nipple; and

wherein a second retraction of the collar axially away from the outlet end of the outer sleeve moves the sleeve locking balls from the inner ball groove to the collar ball groove to unlock the outer sleeve and the inner sleeve from one another to thereby permit relative axial movement between the outer sleeve and the nozzle to thereby

unlock the jaws from the grease nipple, while relative axial movement between the nozzle and the inner sleeve is limited by axial movement of the nozzle locking balls within the limited axial distance defined by the nozzle ball groove to thereby positively uncouple the nozzle from the grease nipple.

2. The coupler of claim 1, wherein the outlet end of the outer sleeve has an inwardly inclined lip, and wherein the jaws arranged in a floating configuration are axially and radially movable against the inwardly inclined lip to lock and unlock with the grease nipple.

3. The coupler of claim 2, wherein a nozzle flange may extend radially from the nozzle to axially move the jaws toward the inwardly inclined lip at the outlet end of the outer sleeve.

4. The coupler of claim 1, wherein a pair of finger grips extend radially from the collar to axially move the collar axially away from the outlet end of the outer sleeve.

5. The coupler of claim 1, wherein a ball check valve is provided in the connection body.

6. The coupler of claim 5, wherein the ball check valve is an adjustable ball check valve.

7. A method, comprising positively coupling and uncoupling a grease nipple to pressurised grease from a grease gun using the grease coupler of claim 1.

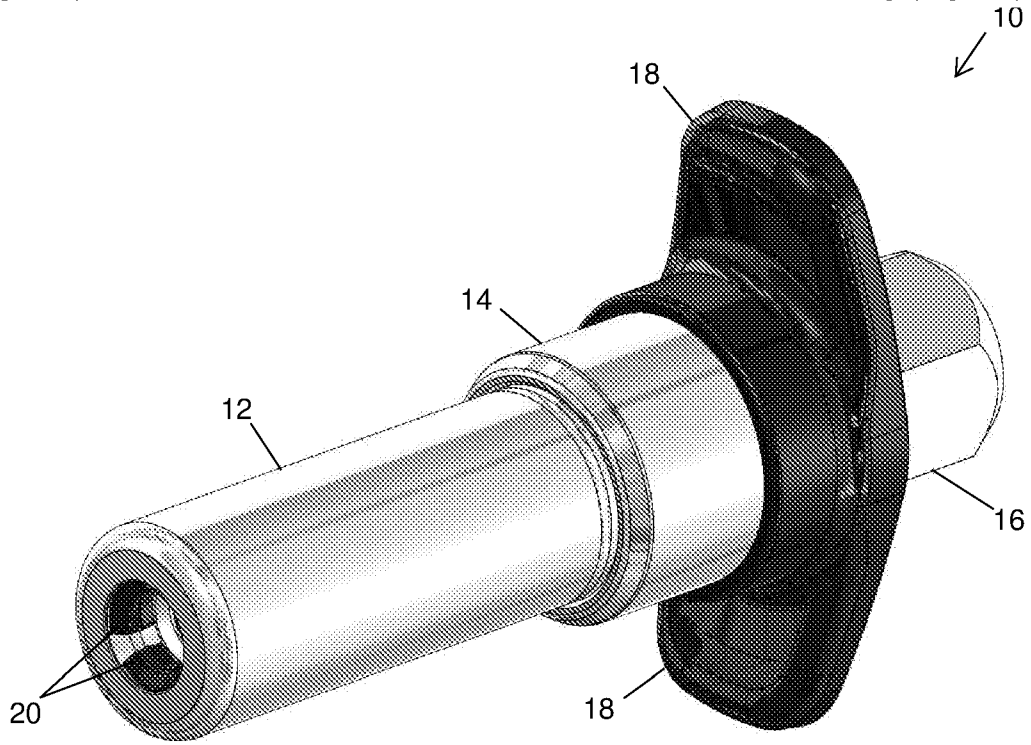


Figure 1

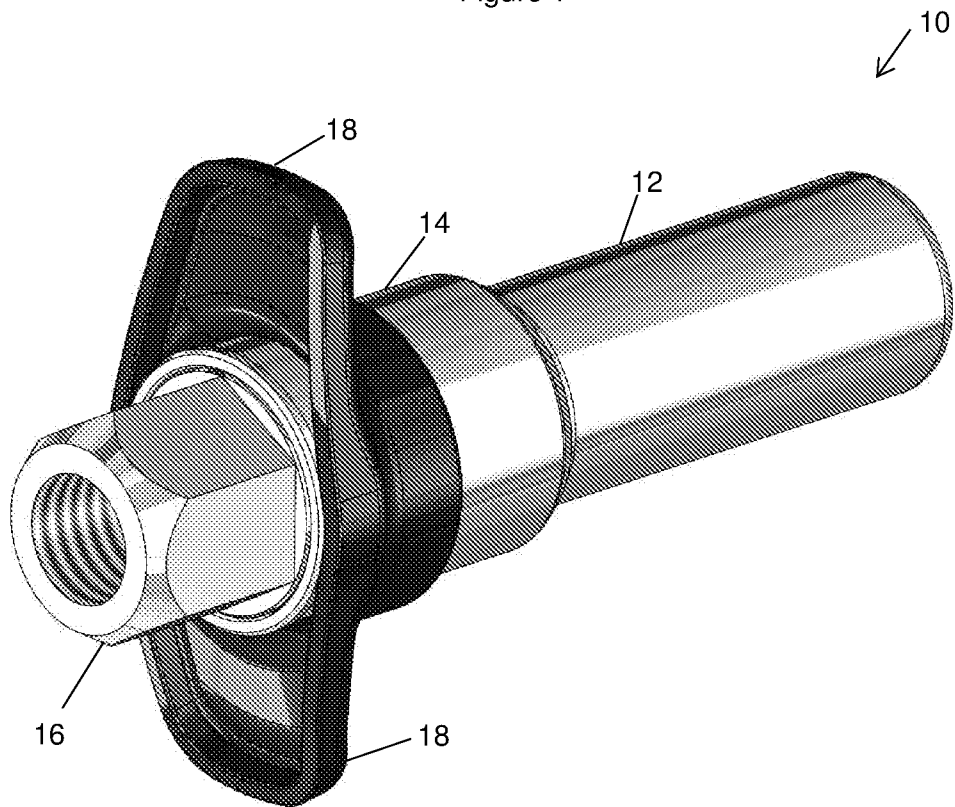


Figure 2

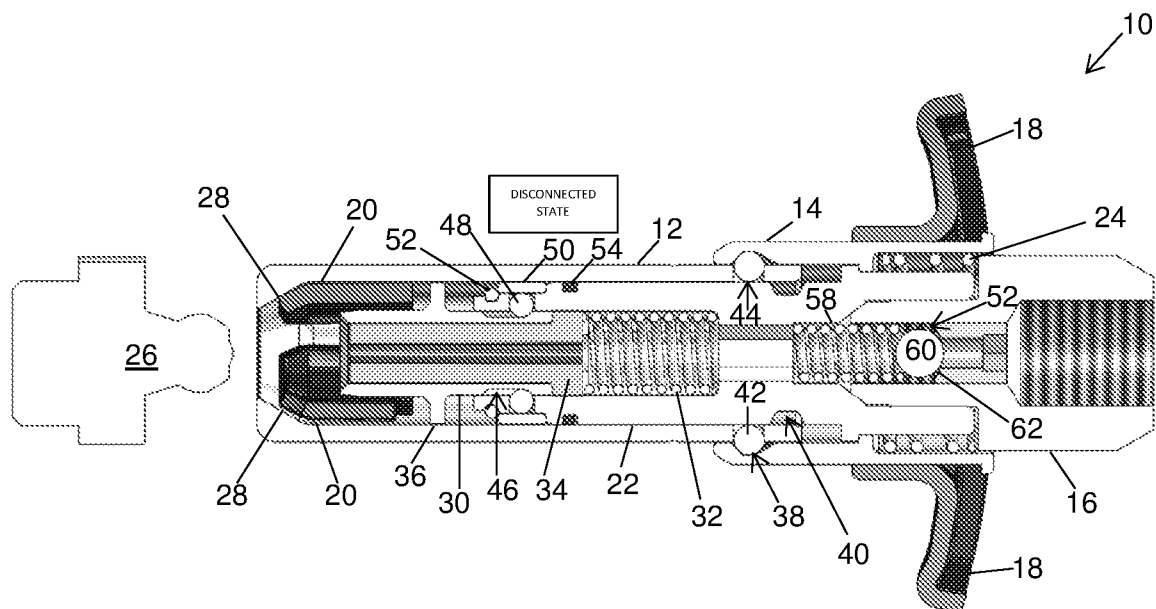


Figure 3

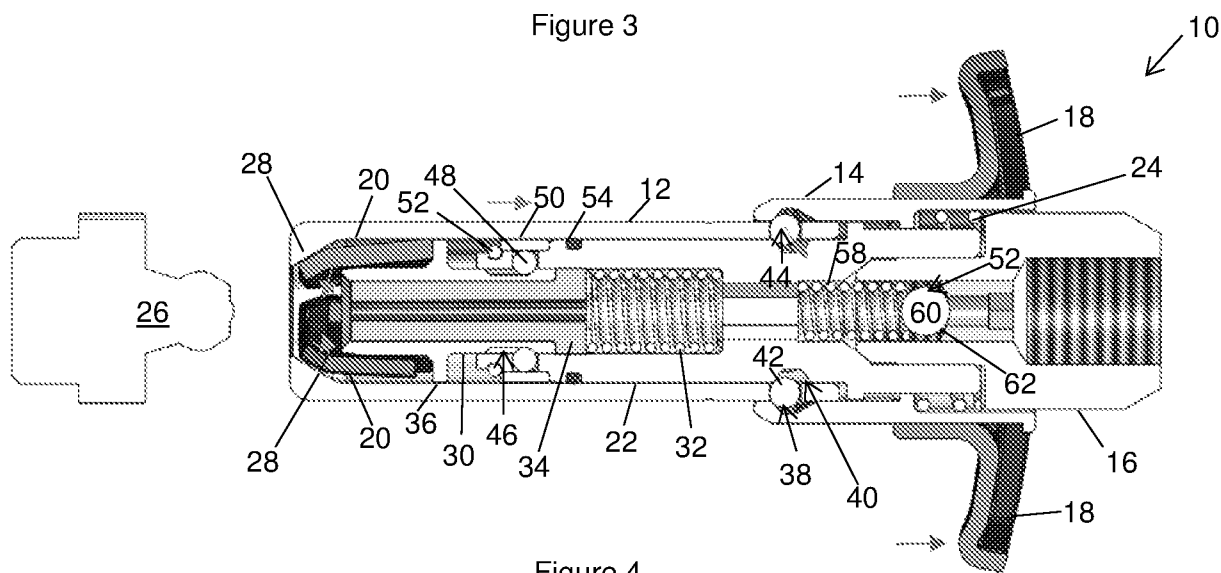


Figure 4

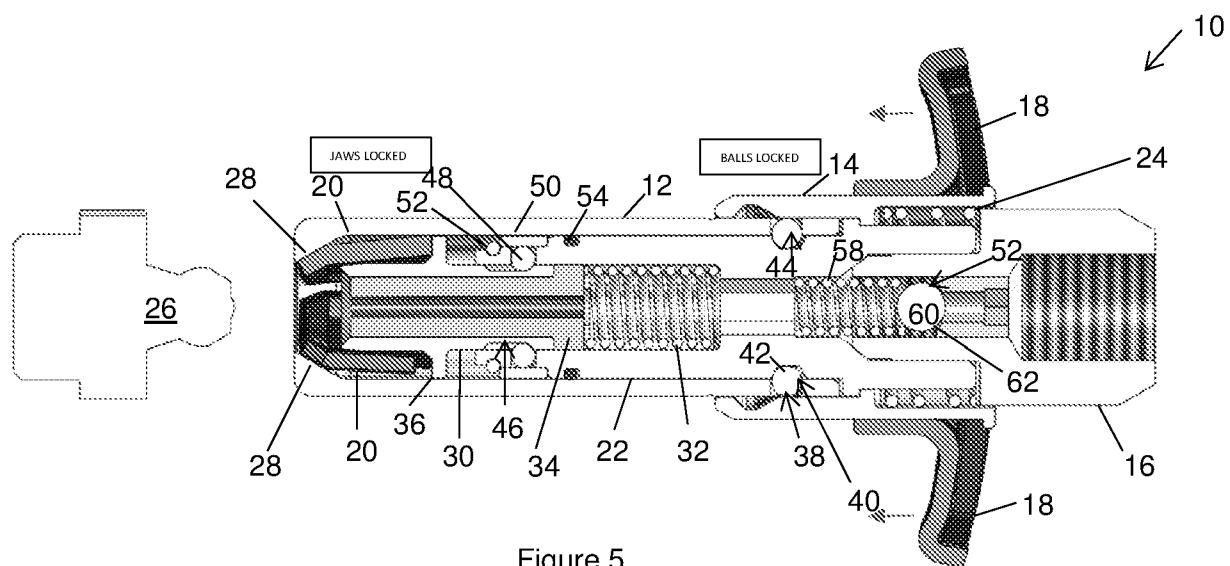


Figure 5

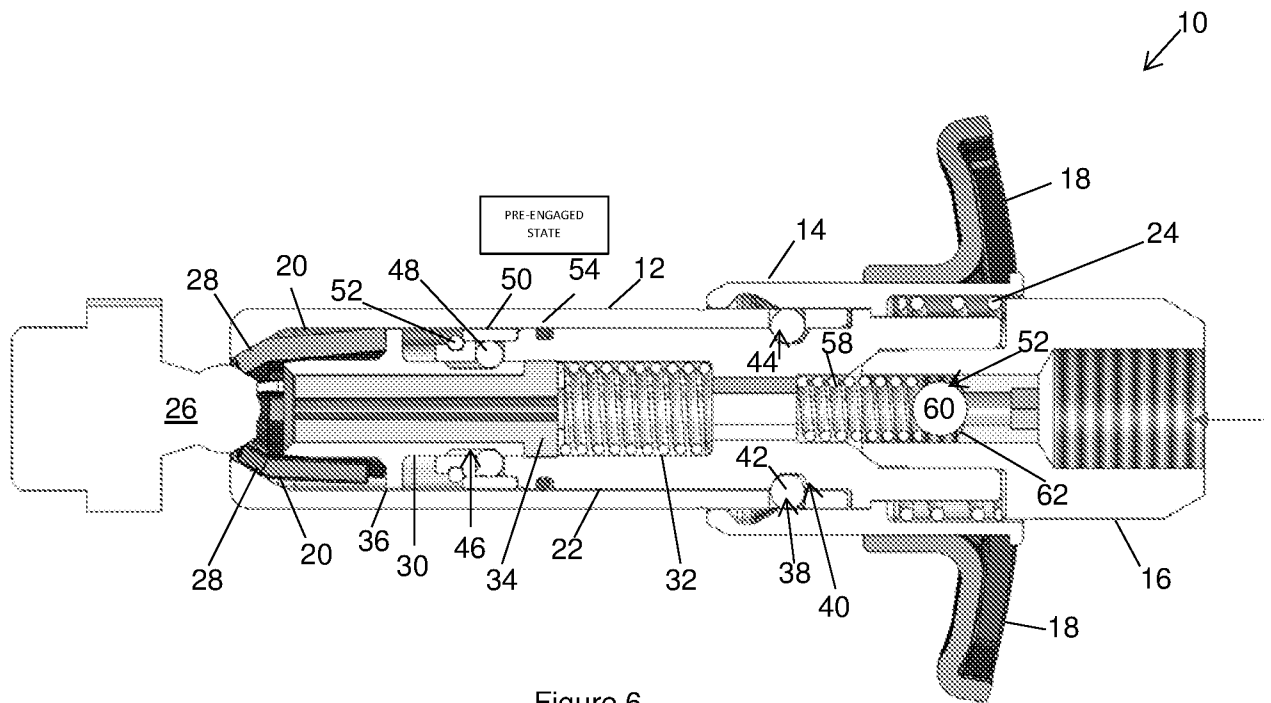


Figure 6

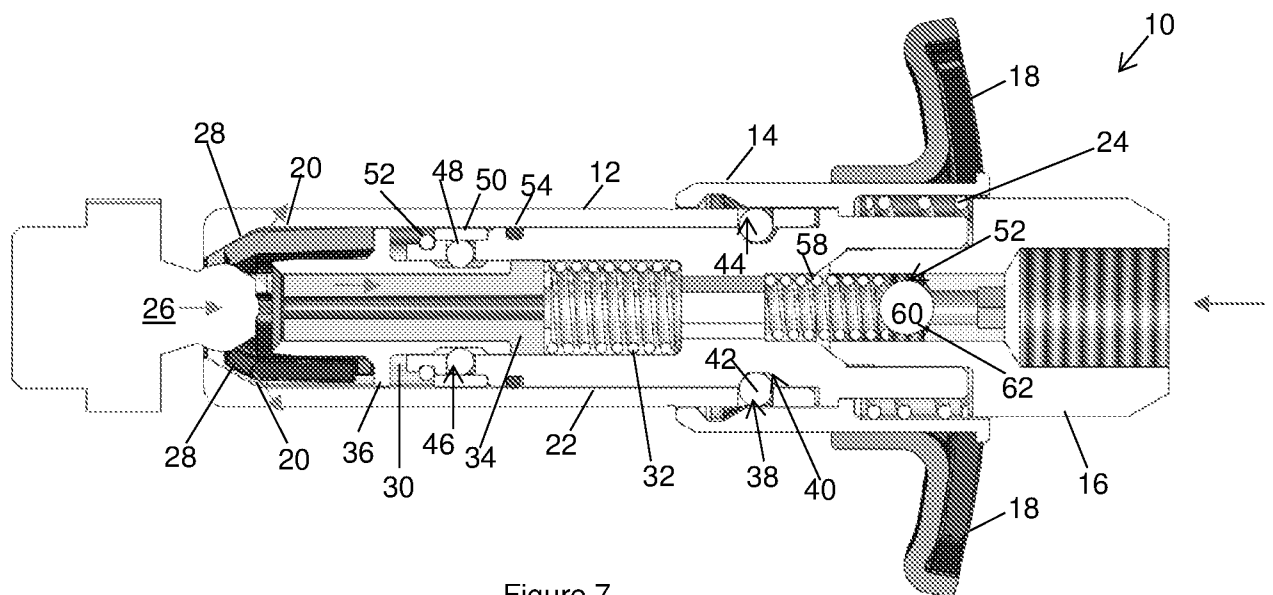


Figure 7

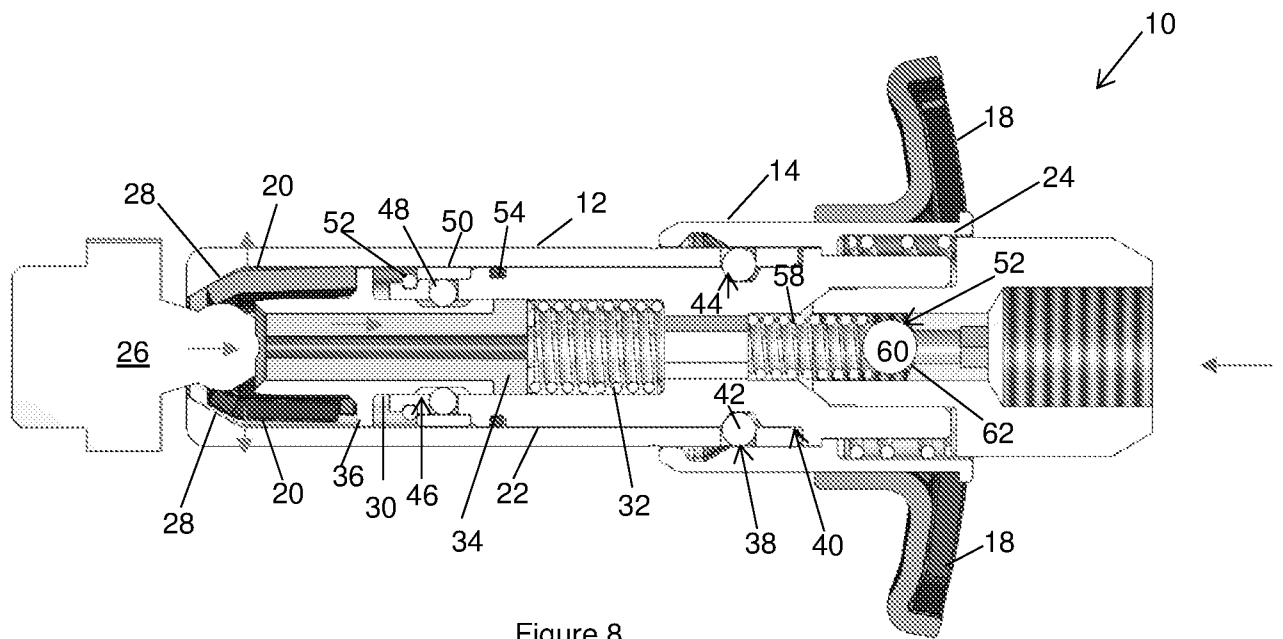


Figure 8

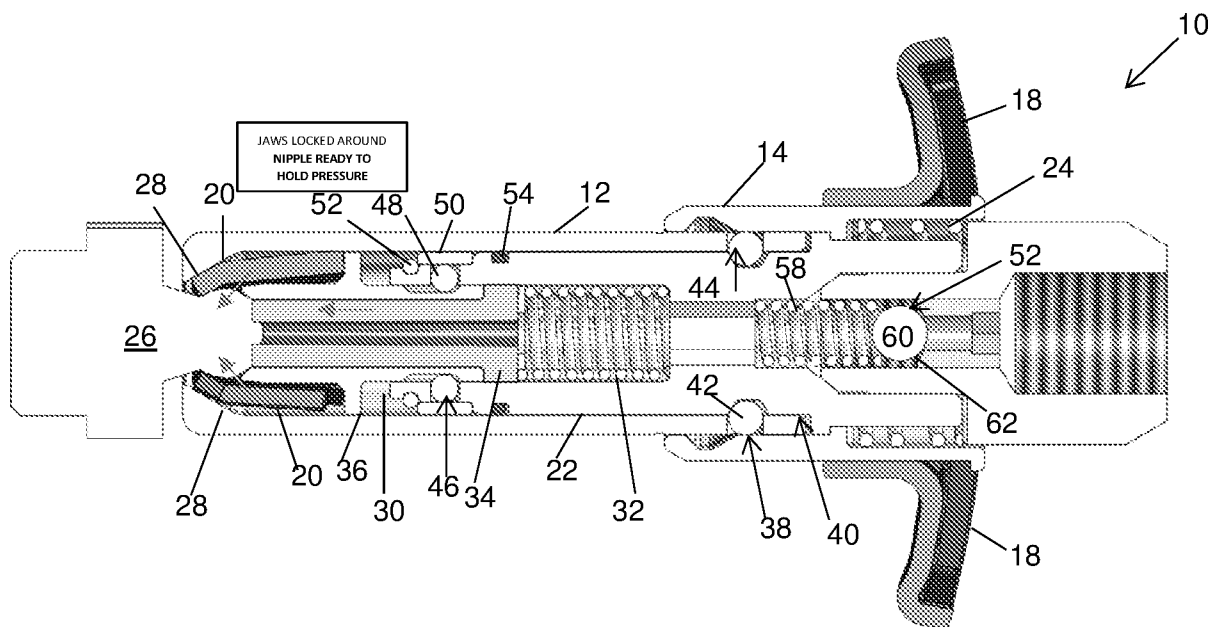


Figure 9

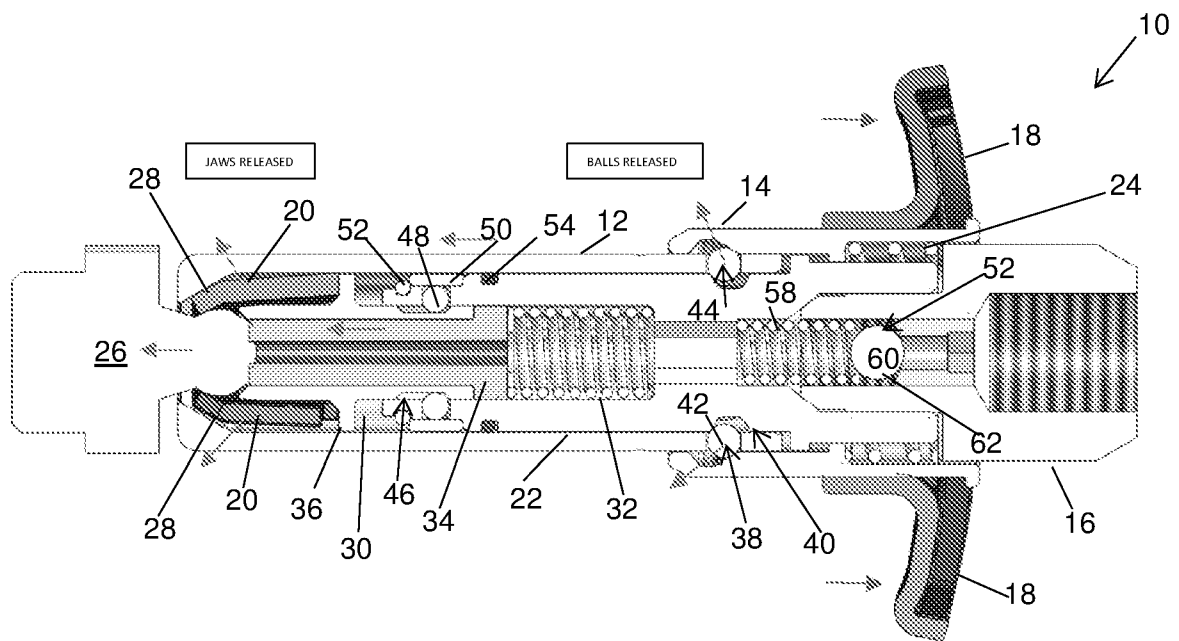


Figure 10

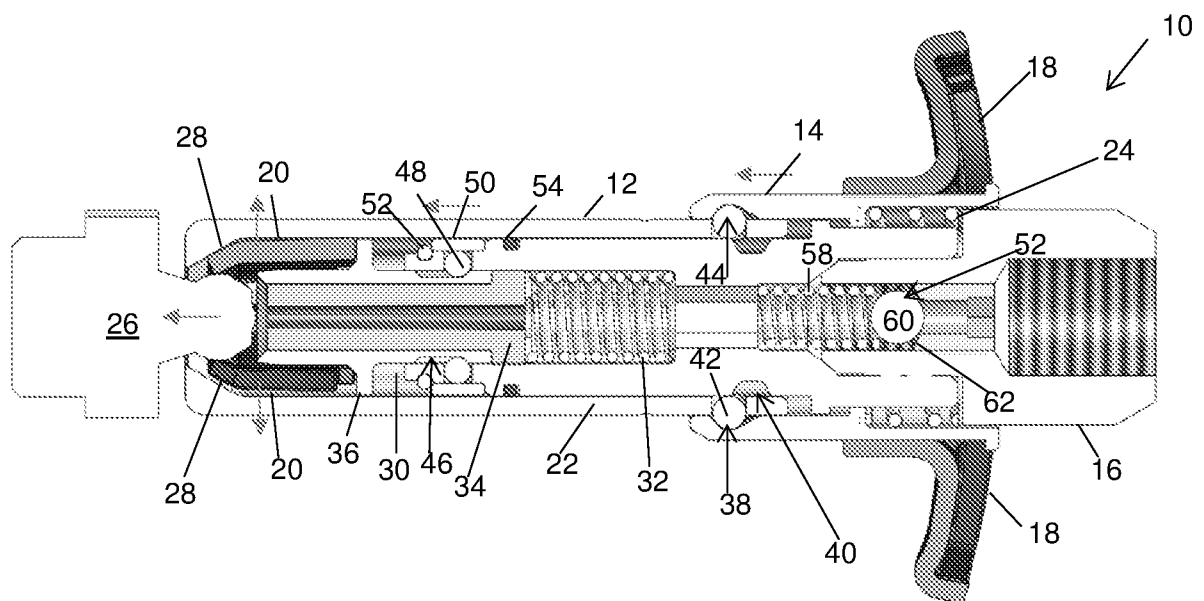


Figure 11

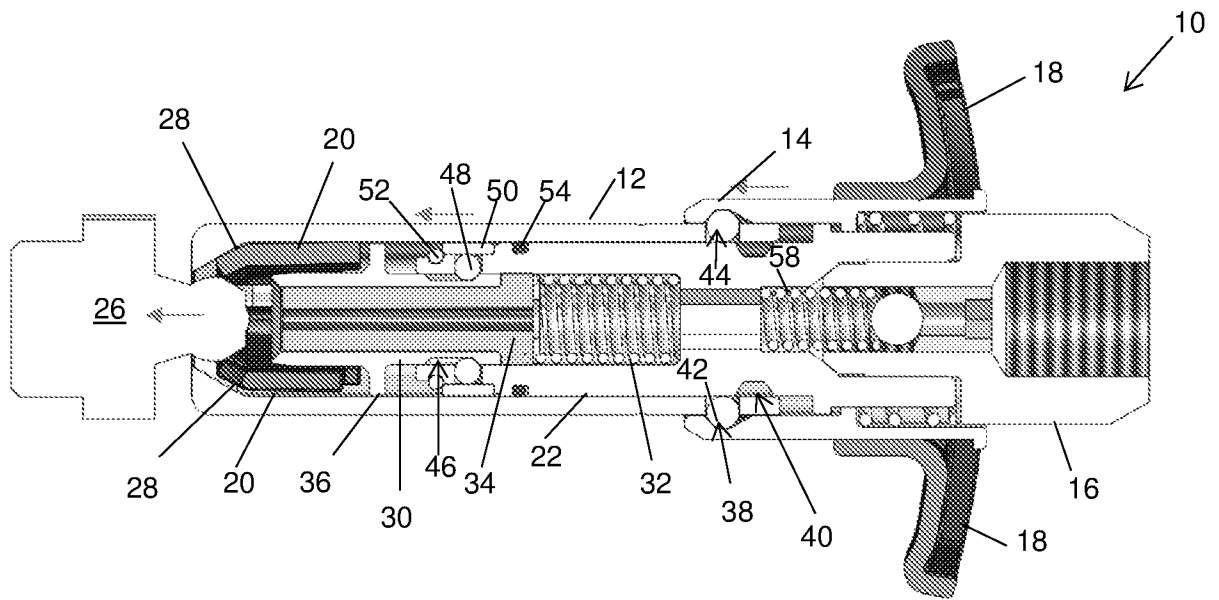


Figure 12

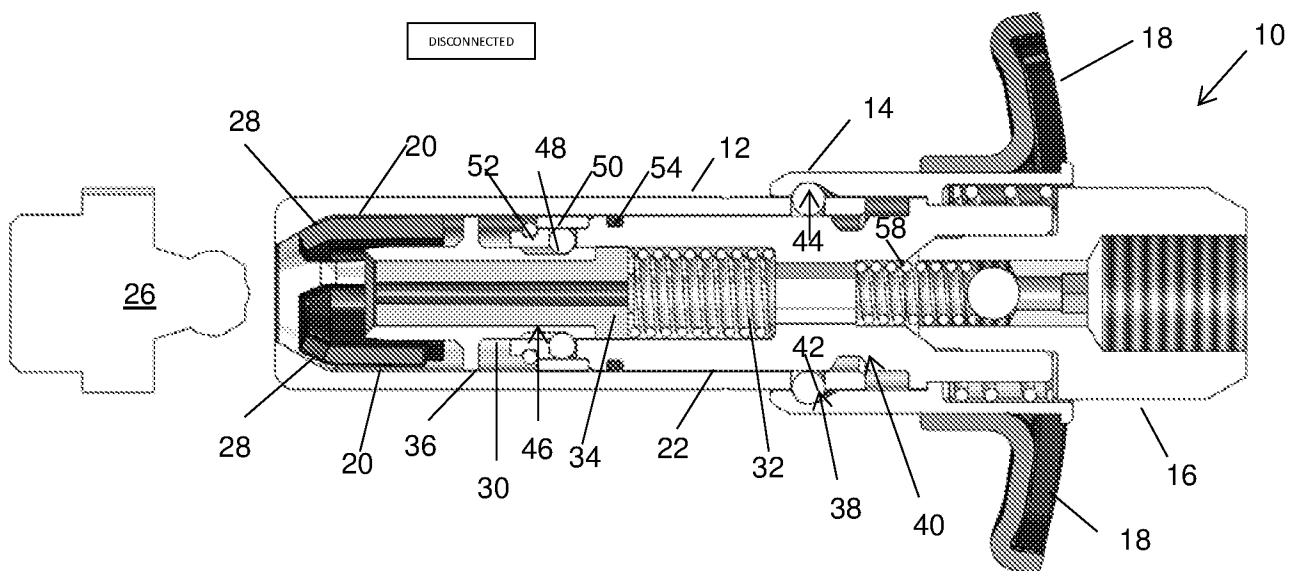


Figure 13

INTERNATIONAL SEARCH REPORT

 International application No.
PCT/AU2018/050651

A. CLASSIFICATION OF SUBJECT MATTER

F16N 21/04 (2006.01) F16N 3/12 (2006.01)

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)

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)

EPOQUE: PATENW: CPC/IPC Symbols: F16L37/36, F16L37/084, F16L37/23, F16L37/407, F16L37/138, F16N3/12, F16N5/02, F16N21/04, F16N21/00, F16L37/00, F16N3/00, F16N5/00 . **Keywords:** retract, slide, handle, grip, quick connect, radial, surround, jaw, clamp, grease, nipple, gun and similar terms and/or combinations.

Google/Google Patent/Espacenet: CPC/IPC Symbols: F16L37/36, F16L37/084, F16N3/12, F16N5/02, F16N21/04, F16L37/23 . **Keywords:** grease, nipple, coupler, retract, handle, alemlube, quick release and similar terms and/or combinations.

Applicant(s)/Inventor(s) name searched in Espacenet, AusPat and internal databases provided by IP Australia.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	



Further documents are listed in the continuation of Box C



See patent family annex

* "A"	Special categories of cited documents: document defining the general state of the art which is not considered to be of particular relevance	"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
"E"	earlier application or patent but published on or after the international filing date	"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
"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)	"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
"O"	document referring to an oral disclosure, use, exhibition or other means	"&"	document member of the same patent family
"P"	document published prior to the international filing date but later than the priority date claimed		
Date of the actual completion of the international search 5 September 2018		Date of mailing of the international search report 05 September 2018	
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA Email address: pct@ipaustalia.gov.au		Authorised officer Daniel Gugger AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No. 0262832074	

INTERNATIONAL SEARCH REPORT		International application No.
C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		PCT/AU2018/050651
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2011/069172 A1 (GURNEY) 09 June 2011 Abstract, Fig. 1-2, Pg. 6 ln 24-Pg. 7 ln 10	1-7
A	US 4195812 A (NORCROSS) 01 April 1980 Abstract, Fig. 1, Fig. 10	1-7
A	GB 695656 A (TECALEMIT LTD) 12 August 1953 Abstract, Fig. 1-2	1-7

Form PCT/ISA/210 (fifth sheet) (January 2015)

INTERNATIONAL SEARCH REPORT		International application No.	
Information on patent family members		PCT/AU2018/050651	
This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.			
Patent Document/s Cited in Search Report		Patent Family Member/s	
Publication Number	Publication Date	Publication Number	Publication Date
WO 2011/069172 A1	09 June 2011	WO 2011069172 A1	09 Jun 2011
		BR 112012013213 A2	01 Mar 2016
		CA 2782350 A1	09 Jun 2011
		CN 102639916 A	15 Aug 2012
		CN 102639916 B	15 Apr 2015
		EP 2531766 A1	12 Dec 2012
		EP 2531766 B1	09 Nov 2016
		MX 2012006160 A	29 Nov 2012
		MX 338955 B	06 May 2016
		RU 2012122330 A	20 Jan 2014
		US 2012267890 A1	25 Oct 2012
		US 8955544 B2	17 Feb 2015
US 4195812 A	01 April 1980	US 4195812 A	01 Apr 1980
GB 695656 A	12 August 1953	GB 695656 A	12 Aug 1953
End of Annex			