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- (71) Applicant: **BAKER HUGHES INCORPORATED**
[US/US]; P.O. Box 4740, Houston, Texas 77210-4740 (US).
- (72) Inventors: **CARREJO, Nicholas**; 2929 Allen Parkway, Suite 2100, Houston, TX 77019-2118 (US). **JOHNSON,**

Michael H.; 2929 Allen Parkway, Suite 2100, Houston, TX 77019-2118 (US). **KELLOGG, Bradley R.**; 2929 Allen Parkway, Suite 2100, Houston, TX 77019-2118 (US).

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[Continued on next page]

(54) Title: INFLOW CONTROL DEVICE

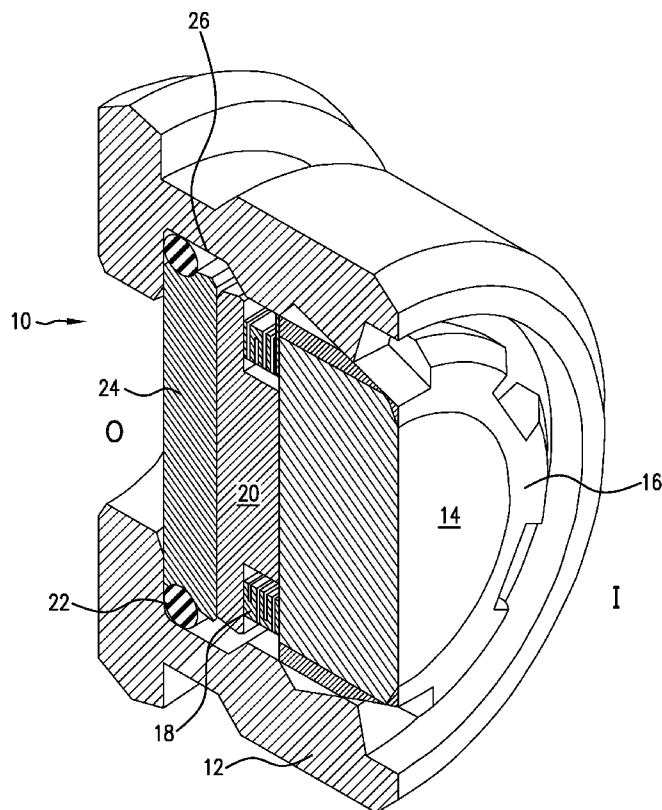


FIG. 1

(57) Abstract: A inflow control device includes a housing. A filter media disposed in the housing. A closure member; and a spring disposed between the closure member and the filter media. A method for controlling fluid loss for a period of time.



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).

— *as to the applicant's entitlement to claim the priority of
the earlier application (Rule 4.17(iii))*

Published:

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

Declarations under Rule 4.17:

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

INFLOW CONTROL DEVICE

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Application No. 14/698275, filed on April 28, 2015, which is incorporated herein by reference in its entirety.

BACKGROUND

[0002] In the drilling and completion industry, it is often desirable to both reduce fluid loss during a part of an operation and allow fluid movement for production during another part of an operation through the same port structure. Strong and robust configurations are important and growing more so as downhole operations are carried out in increasingly difficult environments. Therefore the art will well receive new configurations for such devices that may perform better in certain applications than existing technologies.

BRIEF DESCRIPTION

[0003] An inflow control device includes a housing; a filter media disposed in the housing; a closure member; and a spring disposed between the closure member and the filter media.

[0004] A method for controlling fluid loss for a period of time includes plugging an inflow control device including an inflow control device including a housing; a filter media disposed in the housing; a closure member; and a spring disposed between the closure member and the filter media with a barrier; exposing the barrier to a fluid that dissolves or disintegrates the barrier; and dissolving or disintegrating the barrier.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] The following descriptions should not be considered limiting in any way. With reference to the accompanying drawings, like elements are numbered alike:

[0006] FIG. 1 is a perspective cross section view of an inflow control device;

[0007] FIG. 2 is a perspective cross section view of a filter media portion of the inflow control device of FIG 1;

[0008] FIG 3 is a perspective view of a spring element of the device of FIG 1.

DETAILED DESCRIPTION

[0009] A detailed description of one or more embodiments of the disclosed apparatus and method are presented herein by way of exemplification and not limitation with reference to the Figures.

[0010] Referring to Figure 1, an embodiment of the inflow control device 10 as disclosed herein, which may in some embodiments be a sand control device, is illustrated in perspective cross section. The device includes a housing 12 within which is a filtration media 14. The housing 12 is in general known in the art as a plug due to commercialization of the housing for other operation. Some modifications of the interior structure of the plug are illustrated. The right side of the figure “I” is to be understood to be toward an inside of a tubular in which the housing is installed and the left side of the figure “O” is to be understood to be at an outside surface of a tubular in which the housing is installed. The tubular is not shown because as noted, the overall housing configuration by itself has been used commercially and is known to those of skill in the art. The media 14 may be any type of filtration media that will adequately filter fines expected in the environment in which the device 10 is intended for use. In one iteration the filtration media is a bead pack and in others it is a foam. The illustration is intended to convey any type of filtration material. The filtration media 14 may be mounted in the housing 12 in any number of known ways including having its own filtration media holder 16 that is configured to engage the housing 12 and maintain its position therein. In such situation, the holder 16 may include profiles 28 (see FIG 2) to help install the filtration media 14 in the housing 12. The filtration media 14 is toward an inside of the tubular as illustrated in the housing in Figure 1. The filtration media 14 may also be formed in the housing or bonded therein by suitable adherent such as an adhesive or braze, or may be threadably disposed in the housing, etc.

[0011] Immediately outwardly of the filtration media 14 is a compression spring 18. The spring is visible in FIG 1 but better seen in FIG 3, which is dedicated to one embodiment of the spring 18. The spring 18 functions to urge a closure member 20 toward the end O of the housing 12 to prevent fluid flow from end I to end O while allowing fluid to flow in the opposite direction providing there is a pressure head sufficient to unseat the closure member 20 through pressure based compression of the spring 18. The spring may be constructed of any material that has sufficient resilience to function as stated. Two non-limiting examples are polymer springs and metallic springs. Flow around the closure member when not seated is assisted by a recess 26 in the housing. Closure is assisted by a seal 22 such as an O-ring. In

some embodiments, there need be no other components where the spring is hearty enough to prevent fluid loss by itself.

[0012] In other embodiments and as illustrated in FIG 1, an additional barrier 24 is employed. This barrier is intended to be removable. In one embodiment, the barrier 24 is a dissolvable, degradable or disintegrable material such as a bio polymer or a controlled electrolytic metallic material (commercially available from Baker Hughes Incorporated Houston Texas under the trade name Intallictm). In embodiments that use the barrier, it ensures a leak tight seal against fluid loss until the barrier 24 is removed. Where removal is by dissolution, degradation or disintegration, it may be by exposure to normally downhole fluids or other fluids specially introduced to the downhole environment for the purpose of removing the barrier, such as acid. After removal of the barrier, the device will operate as discussed for the embodiments that do not include a barrier.

[0013] Further contemplated is a method for controlling fluid loss and inflow control the method comprising holding fluid against loss to a formation for a period of time, removing a barrier and producing a target fluid through a device as disclosed above.

[0014] The use of the terms “a” and “an” and “the” and similar referents in the context of describing the invention (especially in the context of the following claims) are to be construed to cover both the singular and the plural, unless otherwise indicated herein or clearly contradicted by context. Further, it should further be noted that the terms “first,” “second,” and the like herein do not denote any order, quantity, or importance, but rather are used to distinguish one element from another. The modifier “about” used in connection with a quantity is inclusive of the stated value and has the meaning dictated by the context (e.g., it includes the degree of error associated with measurement of the particular quantity).

[0015] While the invention has been described with reference to an exemplary embodiment or embodiments, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the scope of the invention. In addition, many modifications may be made to adapt a particular situation or material to the teachings of the invention without departing from the essential scope thereof. Therefore, it is intended that the invention not be limited to the particular embodiment disclosed as the best mode contemplated for carrying out this invention, but that the invention will include all embodiments falling within the scope of the claims. Also, in the drawings and the description, there have been disclosed exemplary embodiments of the invention and, although specific terms may have been employed, they

are unless otherwise stated used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention therefore not being so limited.

CLAIMS

What is claimed is:

1. An inflow control device (10) comprising:
a housing (12);
a filter media (14) disposed in the housing (12);
a closure member (20); and
a spring disposed between the closure member (20) and the filter media (14).
- 2 The inflow control device (10) as claimed in claim 1 wherein the housing (12) includes a recess (26) that promotes flow around the closure member (20) when the closure member (20) is not seated.
- 3 The inflow control device (10) as claimed in claim 1 further comprising a dissolvable, degradable or disintegrable barrier (24) disposed adjacent the closure member (20).
- 4 The inflow control device (10) as claimed in claim 3 wherein the barrier (24) is a controlled electrolytic metallic material.
- 5 The inflow control device (10) as claimed in claim 3 wherein the barrier (24) is a biopolymer.
- 5 The inflow control device (10) as claimed in claim 1 wherein the filter media (14) is a bead pack.
- 6 The inflow control device (10) as claimed in claim 1 wherein the filter media (14) is a foam.
- 7 The inflow control device (10) as claimed in claim 1 wherein the closure member (20) seals against an O-ring (22).
- 8 The inflow control device (10) as claimed in claim 1 wherein the spring is a compression spring (18).
- 9 The inflow control device (10) as claimed in claim 1 wherein the spring is a polymer.
- 10 The inflow control device (10) as claimed in claim 1 wherein the spring is metallic.
- 11 A method for controlling fluid loss for a period of time comprising:
plugging an inflow control device (10) as claimed in claim 1 with a barrier (24);
exposing the barrier (24) to a fluid that dissolves or disintegrates the barrier (24); and
dissolving or disintegrating the barrier (24).

12 The method as claimed in claim 11 further comprising producing fluid through the device upon a pressure differential across the closure member (20) exceeding a spring force of the spring.

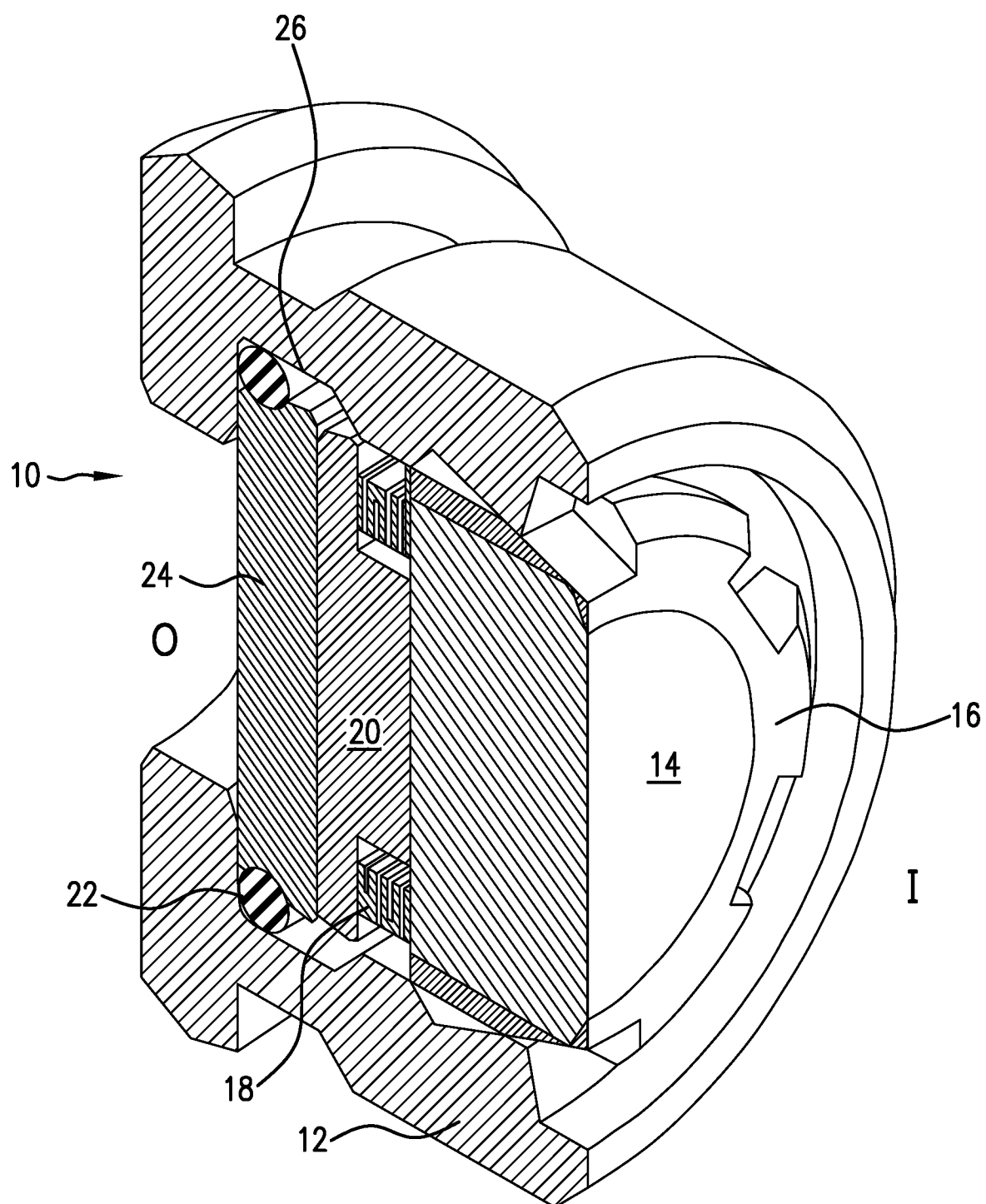


FIG. 1

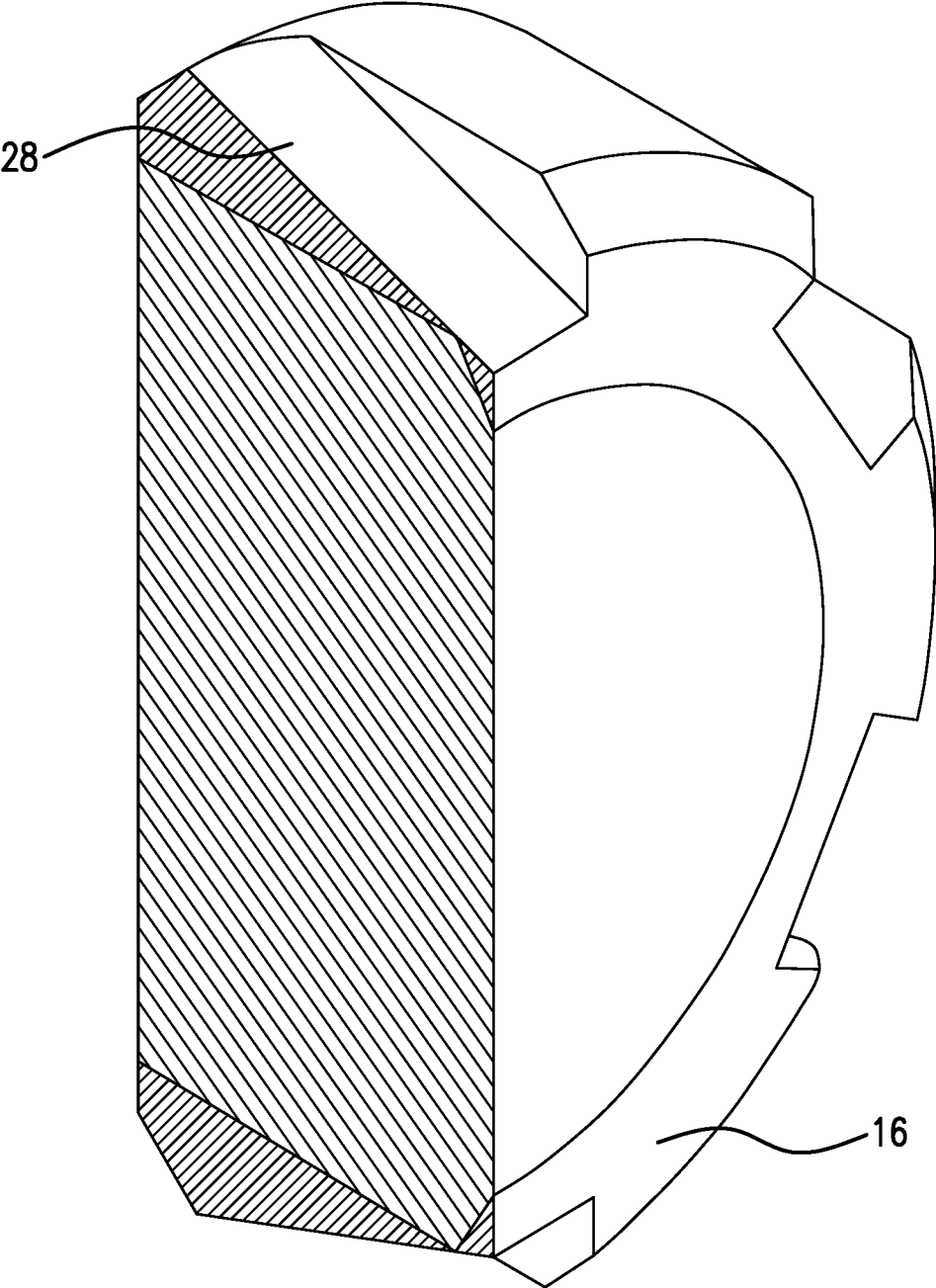


FIG. 2

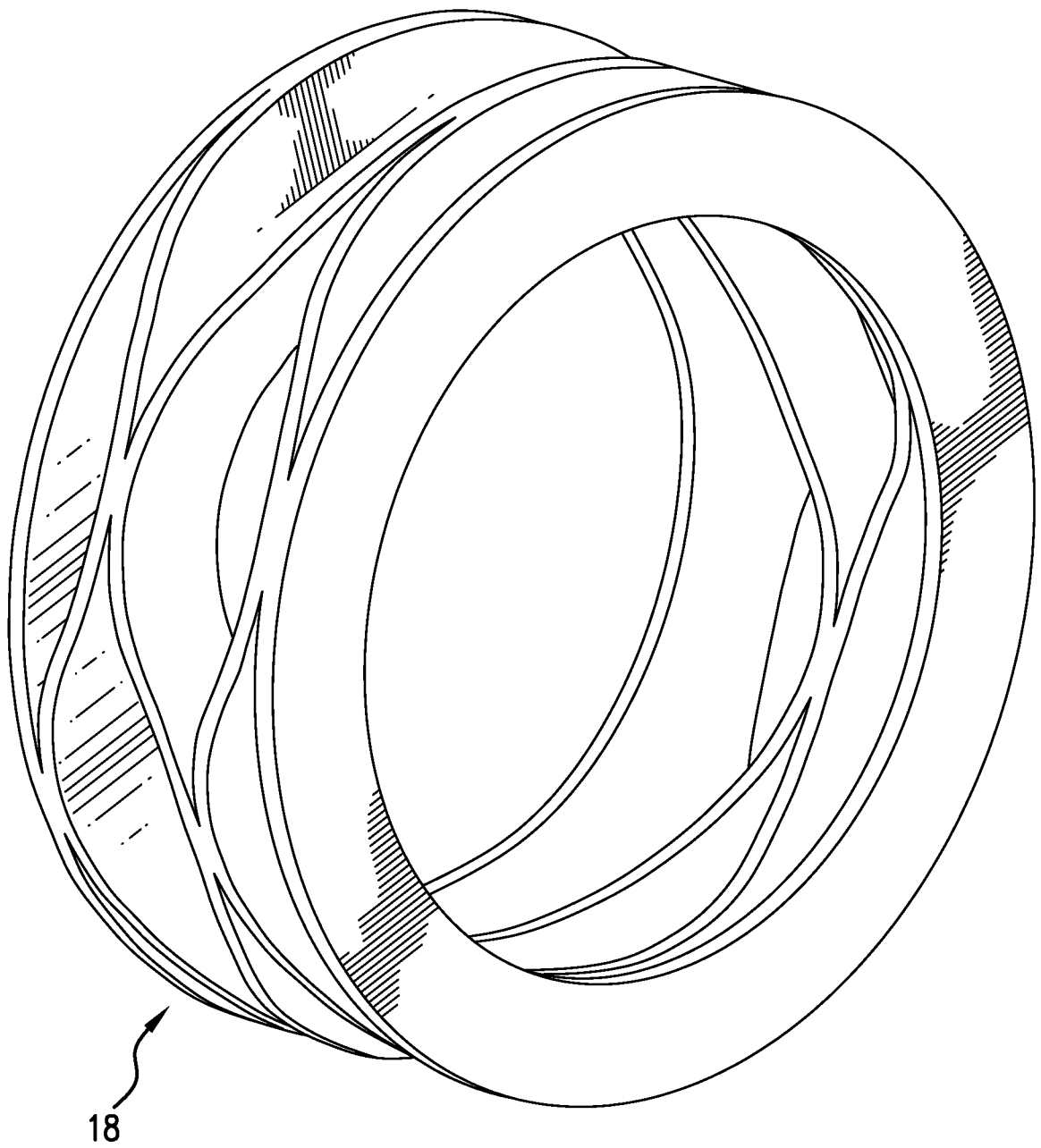


FIG.3

A. CLASSIFICATION OF SUBJECT MATTER**E21B 43/08(2006.01)i, E21B 43/12(2006.01)i, E21B 34/06(2006.01)i**

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)

E21B 43/08; E21B 43/04; F16K 17/38; E21B 43/112; F16K 17/04; E21B 43/16; E21B 43/12; E21B 34/06

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: inflow control device, valve, housing, filter media, closure member, and spring

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 7225830 B1 (KERSHAW, CHARLES H.) 05 June 2007 See column 4, line 40 - column 6, line 34 and figures 1-2.	1-5,5(1),6-12
Y	US 2008-0099194 A1 (CLEM, NICHOLAS J.) 01 May 2008 See paragraph [0010] and figure 3.	1-5,5(1),6-12
Y	US 2013-0180725 A1 (RICHARD et al.) 18 July 2013 See paragraphs [0011]-[0013] and figures 1-2.	3-5,11-12
A	US 2007-0034377 A1 (MOYES, PETER BARNES) 15 February 2007 See paragraphs [0023]-[0028] and figures 1-2.	1-5,5(1),6-12
A	US 2011-0290326 A1 (ØVLAND, SIGBJØRN) 01 December 2011 See paragraph [0038] and figure 6. Note: For the claim 5(1), the claim was renumbered by this authority because the claim 5 was found twice.	1-5,5(1),6-12



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"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

23 June 2016 (23.06.2016)

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Name and mailing address of the ISA/KR

International Application Division

Korean Intellectual Property Office

189 Cheongsa-ro, Seo-gu, Daejeon, 35208, Republic of Korea

Facsimile No. +82-42-481-8578

Authorized officer

RHEE, Jun Ho

Telephone No. +82-42-481-8288



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2016/024679

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