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(54) Title: CENTRALIZER

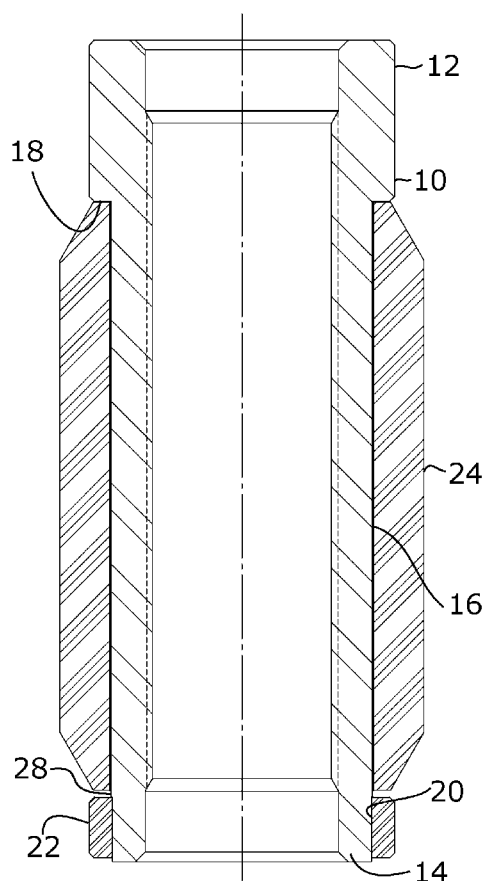


Fig. 1

(57) Abstract: A simple centralizer, comprising a mandrel extending between box couplings, a rotor receiving surface between the box couplings, a shoulder on the mandrel defining a first end of the rotor receiving surface; and a collar receiving surface on a second end of the rotor receiving surface. The collar receiving surface may be un-threaded. In use, a collar is press fit on to the collar receiving surface.



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CENTRALIZER

TECHNICAL FIELD

[0001] Centralizers for downhole strings.

BACKGROUND

[0002] Centralizers are used to prevent downhole strings contacting interior well surfaces and thus reduce wear on the strings. Lower cost centralizers are desirable.

SUMMARY

[0003] There is disclosed a simple centralizer, comprising a mandrel extending between box couplings, a rotor receiving surface between the box couplings, a shoulder on the mandrel defining a first end of the rotor receiving surface; and a collar receiving surface on a second end of the rotor receiving surface. The collar receiving surface may be unthreaded. In use, a collar is press fit on to the collar receiving surface, and a rotor is provided on the rotor receiving surface.

BRIEF DESCRIPTION OF THE FIGURES

[0004] Embodiments will now be described with reference to the figures, in which like reference characters denote like elements, by way of example, and in which:

[0005] Fig. 1 shows section through a centralizer;

[0006] Fig. 2 shows a side view of the centralizer of Fig. 1;

[0007] Fig. 3 is a perspective view of the centralizer of Fig. 1 and

[0008] Fig. 4 is an end view of the centralizer of Fig. 1.

DETAILED DESCRIPTION

[0009] Immaterial modifications may be made to the embodiments described here without departing from what is covered by the claims. In the claims, the word “comprising” is used in its inclusive sense and does not exclude other elements being present. The

indefinite articles “a” and “an” before a claim feature do not exclude more than one of the feature being present. Each one of the individual features described here may be used in one or more embodiments and is not, by virtue only of being described here, to be construed as essential to all embodiments as defined by the claims.

[0010] Referring to the figures, there is shown a centralizer formed of a mandrel 10 that extends between couplings 12, 14, both or either of which may be box couplings or pin couplings, but preferably box couplings. A rotor receiving surface 16 is provided between the box couplings 12, 14. A shoulder 18 on the mandrel defines a first end of the rotor receiving surface 16. A collar receiving surface 20 is at a second end of the rotor receiving surface 16. The mandrel 10 is a separate unit that may be manufactured as a single unit. In use, a collar 22 may be press fit on to the collar receiving surface 20, and a rotor 24 provided on the rotor receiving surface 16. To enhance the press fit, the collar receiving surface 20 may be smooth. The collar receiving surface 20 may have uniform outer diameter. The collar receiving surface 20 may be unthreaded. The internal diameter of the collar 22 may be very close to the outer diameter of the collar receiving surface 20 to form a press fit. A press fit is formed when pressure is required to cause the collar 22 to fit on to the collar receiving surface 20. If the internal diameter of the collar 22 is too much less than the outer diameter of the collar receiving surface 20, depending on the difference between the two diameters, the collar 22 may need to be heated and expanded to be fit on to the collar receiving surface.

[0011] The rotor 24 may have various finishes or surface configurations such as vanes 26. The rotor 24 is loosely fit on the rotor receiving surface 16 for rotation on the mandrel. The collar 22 has an interior diameter closely matching the outer diameter of the collar receiving surface so that the press or interference fit holds the collar 22 on the mandrel 10 with sufficient strength to prevent loosening due to normal downhole forces on the rotor 24. The rotor receiving surface 16 may be very slightly larger than the collar receiving surface 20 with a bevel, taper or rise 28 in the mandrel surface between the surfaces 16 and 20. Thus, the collar receiving surface has an outer diameter A, the rotor receiving surface has an outer diameter B and A is less than B

[0012] Box coupling 12 may be uniform in outer diameter and have a greater outer diameter than box coupling 14 in order to form shoulder 18. The centralizer rotor 24 may be

a tubular sleeve formed of non-metallic soft resilient abrasion-resistant material, such as polyurethane or high temperature nylon, and fits loosely upon the cylindrical surface of the mandrel. The mandrel 10 and collar 22 may be made of any suitable material such as steel suitable for downhole use. The centralizer has particular use for rod strings, illustrated schematically at 34 in Fig. 3.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A centralizer, comprising:
a mandrel extending between couplings;
a rotor receiving surface between the couplings;
a shoulder on the mandrel defining a first end of the rotor receiving surface; and
a collar receiving surface at a second end of the rotor receiving surface, the collar receiving surface providing a surface suitable for a press fit.
2. The centralizer of claim 1 further comprising a collar press fit on to the collar receiving surface, and a rotor on the rotor receiving surface.
3. The centralizer of claim 1 or 2 in which one or both couplings is or are a box coupling.
4. The centralizer of claim 1, 2 or 3 in which the collar receiving surface is smooth.
5. The centralizer of claim 1, 2 or 3 in which the collar receiving surface has uniform outer diameter.
6. The centralizer of claim 1, 2 or 3 in which the collar receiving surface is unthreaded.
7. The centralizer of any one of claims 1-6 in which the collar receiving surface has an outer diameter A and the rotor receiving surface has an outer diameter B and A is less than B.

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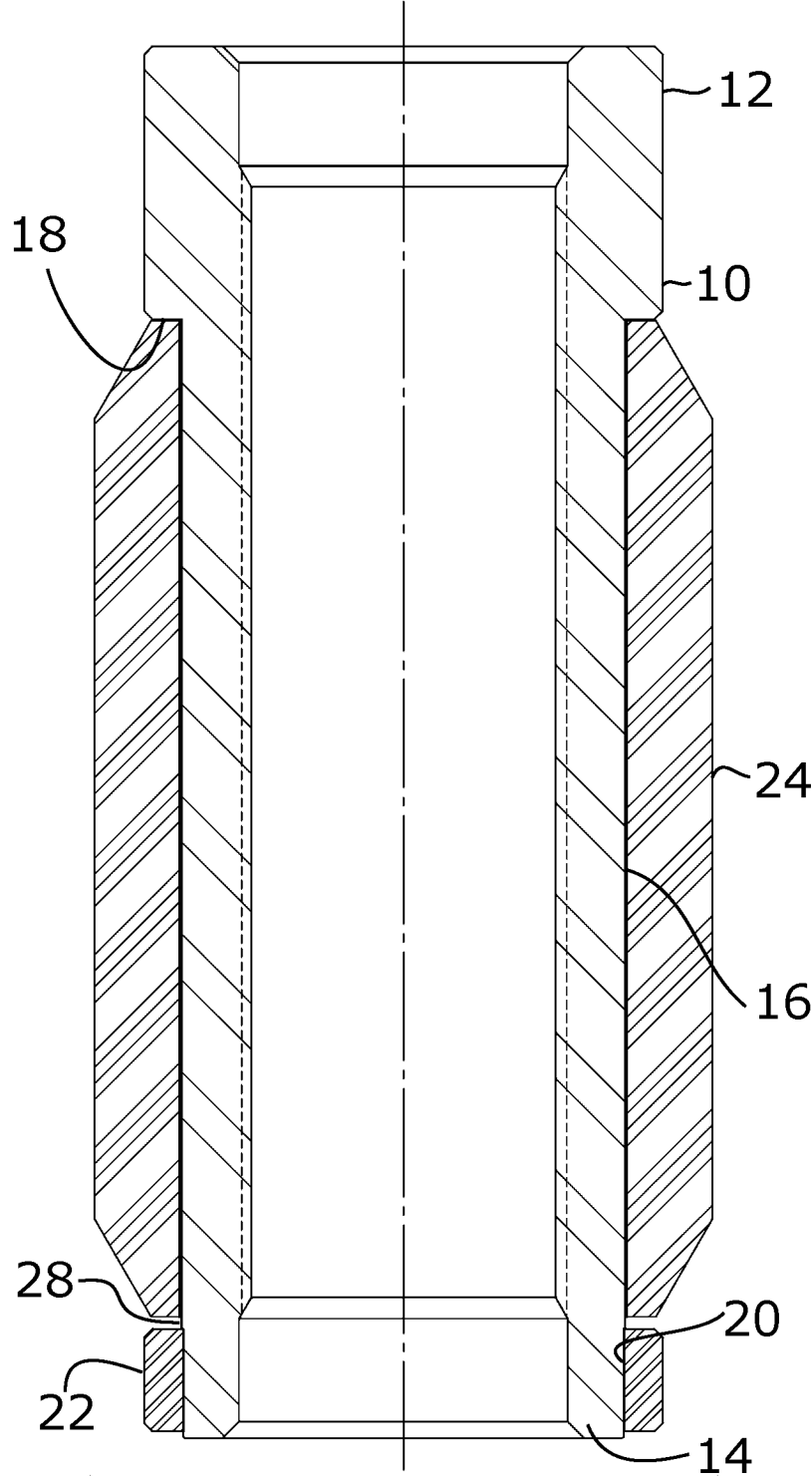


Fig. 1

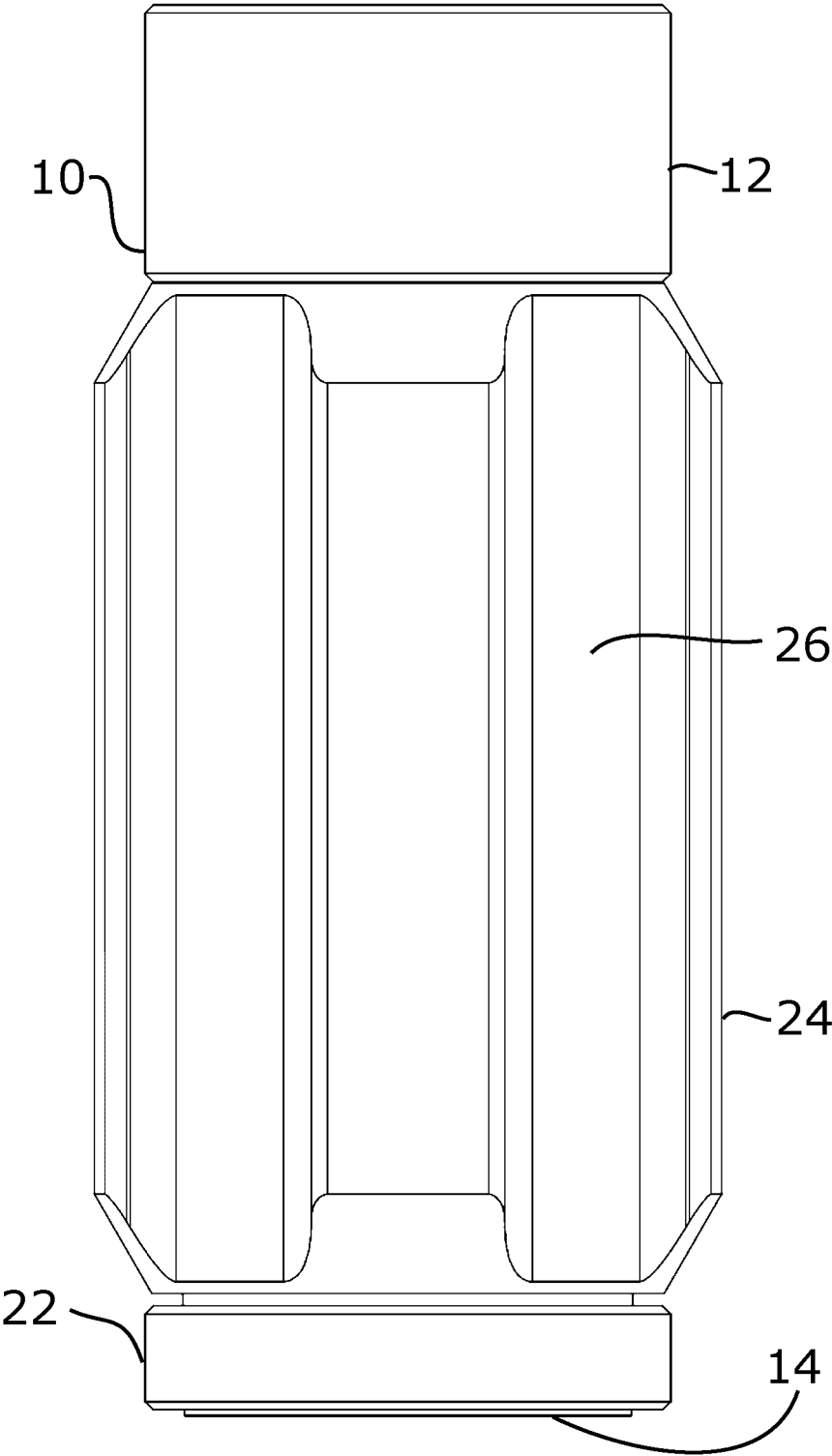


Fig. 2

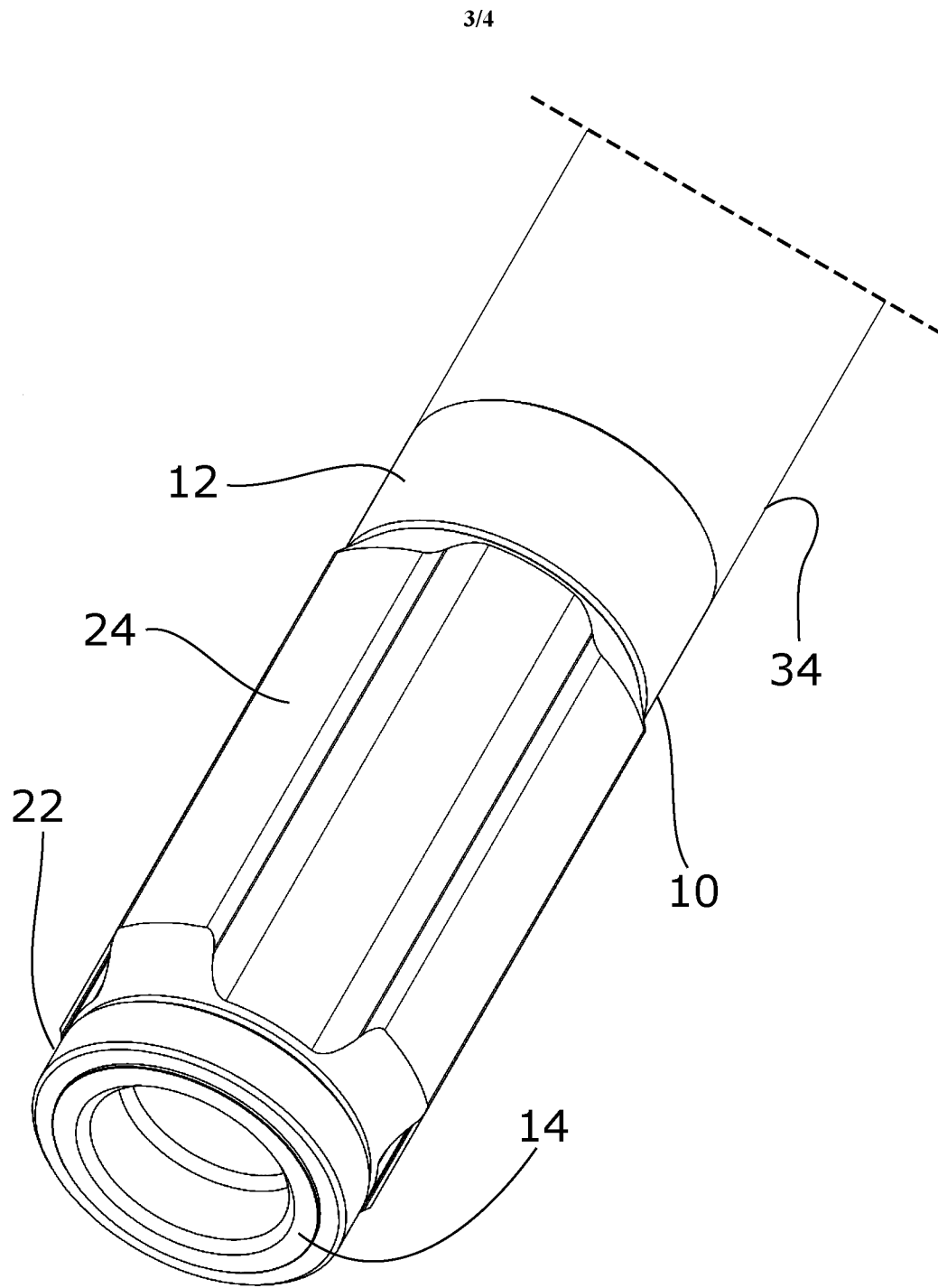


Fig. 3

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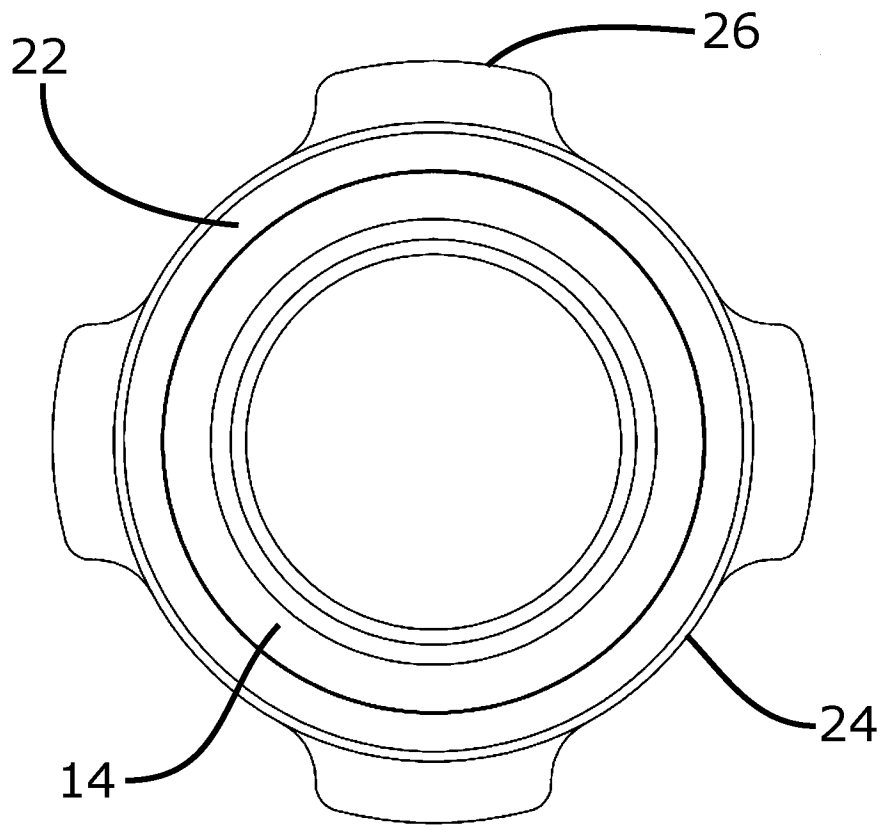


Fig. 4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CA2017/050454A. CLASSIFICATION OF SUBJECT MATTER
IPC: **E21B 17/10** (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)
IPC: E21B 17/10 (2006.01)Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Questel Orbit (fampat); Keywords (press_fit, interference_fit, compression_fit)

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN2903342Y, (ZHU) 23 May 2007 (23-05-2007) *whole document*	1-7
X	CN101832111A, (YONGLIAN) 15 September 2010 (15-09-2010) *whole document*	1-6
X	US2012193089A1, (MAKELKI) 02 August 2012 (02-08-2012) *whole document*	1, 3, 5 & 7
A	CN203403836U, (REN) 22 January 2014 (22-01-2014) *whole document*	1-7
A	CN2869281Y, (TANG) 14 February 2007 (14-02-2007) *whole document*	1-7

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* "A" "E" "L" "O" "P"	Special categories of cited documents: document defining the general state of the art which is not considered to be of particular relevance earlier application or patent but published on or after the international filing date 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) document referring to an oral disclosure, use, exhibition or other means document published prior to the international filing date but later than the priority date claimed	"T" "X" "Y" "&"	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 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 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
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

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Patent Document Cited in Search Report	Publication Date	Patent Family Member(s)	Publication Date
CN2903342Y	23 May 2007 (23-05-2007)	None	
CN101832111A	15 September 2010 (15-09-2010)	None	
US2012193089A1	02 August 2012 (02-08-2012)	US2012193089 US9303466B2 CA2754645A1	02 August 2012 (02-08-2012) 05 April 2016 (05-04-2016) 02 August 2012 (02-08-2012)
CN203403836U	22 January 2014 (22-01-2014)	None	
CN2869281Y	14 February 2007 (14-02-2007)	None	