

**PATENT COOPERATION TREATY**

**PCT**

**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference <b>P13204W01A</b>	<b>FOR FURTHER ACTION</b>		See item 4 below
International application No. <b>PCT/US2015/030486</b>	International filing date ( <i>day/month/year</i> ) <b>13 May 2015 (13.05.2015)</b>	Priority date ( <i>day/month/year</i> ) <b>13 May 2014 (13.05.2014)</b>	
International Patent Classification (8th edition unless older edition indicated) <b>See relevant information in Form PCT/ISA/237</b>			
Applicant <b>FIRESTONE INDUSTRIAL PRODUCTS COMPANY, LLC</b>			

<p>1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).</p> <p>2. This REPORT consists of a total of 9 sheets, including this cover sheet.</p> <p>In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.</p>																								
<p>3. This report contains indications relating to the following items:</p> <table> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. I</td> <td>Basis of the report</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. II</td> <td>Priority</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. V</td> <td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VIII</td> <td>Certain observations on the international application</td> </tr> </table> <p>4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).</p>	<input checked="" type="checkbox"/>	Box No. I	Basis of the report	<input type="checkbox"/>	Box No. II	Priority	<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	<input type="checkbox"/>	Box No. IV	Lack of unity of invention	<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	<input type="checkbox"/>	Box No. VI	Certain documents cited	<input type="checkbox"/>	Box No. VII	Certain defects in the international application	<input type="checkbox"/>	Box No. VIII	Certain observations on the international application
<input checked="" type="checkbox"/>	Box No. I	Basis of the report																						
<input type="checkbox"/>	Box No. II	Priority																						
<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability																						
<input type="checkbox"/>	Box No. IV	Lack of unity of invention																						
<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement																						
<input type="checkbox"/>	Box No. VI	Certain documents cited																						
<input type="checkbox"/>	Box No. VII	Certain defects in the international application																						
<input type="checkbox"/>	Box No. VIII	Certain observations on the international application																						

	Date of issuance of this report <b>15 November 2016 (15.11.2016)</b>
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer  <b>Athina Nickitas-Etienne</b>
Facsimile No. +41 22 338 82 70	e-mail: pt04.pct@wipo.int

## PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

# PCT

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To: HOUSER, JASON  BRIDGESTONE AMERICAS, INC. 10 EAST FIRESTONE BLVD AKRON OH 44317 USA
---

Date of mailing (day/month/year) <b>23 July 2015 (23.07.2015)</b>
--

Applicant's or agent's file reference P13204W01A	<b>FOR FURTHER ACTION</b> See paragraph 2 below
---	--

International application No. <b>PCT/US2015/030486</b>	International filing date (day/month/year) <b>13 May 2015 (13.05.2015)</b>	Priority date(day/month/year) 13 May 2014 (13.05.2014)
---	---	---

International Patent Classification (IPC) or both national classification and IPC <b>F15B 15/02(2006.01)i, F15B 15/08(2006.01)i</b>
--

Applicant <b>FIRESTONE INDUSTRIAL PRODUCTS COMPANY, LLC</b>
--

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.  
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR International Application Division Korean Intellectual Property Office 189 Cheongsu-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea Facsimile No. +82-42-472-7140	Date of completion of this opinion  22 July 2015 (22.07.2015)	Authorized officer  LEE, Chang Ho  Telephone No. +82-42-481-8398
---	---	--



**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

**PCT/US2015/030486**

**Box No. I Basis of this opinion**

1. With regard to the **language**, this opinion has been established on the basis of :
  - the international application in the language in which it was filed
  - a translation of the international application into \_\_\_\_\_ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
2.  This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.I(a))
3.  With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
  - a.  forming part of the international application as filed:
    - in the form of an Annex C/ST.25 text file.
    - on paper or in the form of an image file.
  - b.  furnished together with the international application under PCT Rule 13*ter*.I(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
  - c.  furnished subsequent to the international filing date for the purposes of international search only:
    - in the form of an Annex C/ST.25 text file (Rule 13*ter*.I(a)).
    - on paper or in the form of an image file (Rule 13*ter*.I(b) and Administrative Instructions, Section 713).
4.  In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

**PCT/US2015/030486**

**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	<u>1-18</u>	YES
	Claims	<u>NONE</u>	NO
Inventive step (IS)	Claims	<u>NONE</u>	YES
	Claims	<u>1-18</u>	NO
Industrial applicability (IA)	Claims	<u>1-18</u>	YES
	Claims	<u>NONE</u>	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2003-0140783 A1 (LEONARD et al.) 31 July 2003

D2: US 3319532 A (PRIDHAM JR., DONALD C.) 16 May 1967

1. Novelty and Inventive Step

1.1 Independent Claim 1

D1, which is considered to be the closest prior art to the subject matter of claim 1, discloses an actuator (1) comprising: a rigid base (6); and a flexible top member (7) connected to the rigid base (6) and having a side wall (37) and a work engaging top surface (21), the flexible top member (7) and the rigid base (6) defining an internal chamber (19), the side wall (37) having a first end connected to the rigid base (6) and a second end, the second end and the work engaging top surface (21) defining a transition area, the flexible top member (7) being configured to expand when the internal chamber (19) is filled with fluid (see paragraphs [0027]-[0029] and figures 3-6). Claim 1 differs from D1 in that an actuator comprises a reaction feature placed on a transition area that is configured to govern movement of a sidewall. However, this feature would be easily conceived from D2 considering that a bellows actuator (10) comprises ribs (42, 44) formed between side and top portions of bellows for adding radial rigidity to end portions of the bellows to prevent any radial folding or collapsing of the end portions under extreme temperature or pressure conditions (see column 2, line 14 - column 3, line 9 and figure 2). Accordingly, claim 1 would have been obvious over D1 in view of D2. Therefore, claim 1 lacks an inventive step under PCT Article 33(3).

Continued on Supplemental Box

**Supplemental Box**

In case the space in any of the preceding boxes is not sufficient.

Continuation of : Box No. V

1.2 Dependent Claims 2-9

1.2.1 Concerning Claim 2

The additional feature of claim 2 is characterized in that the reaction feature is a mass of material. This feature would be easily conceived from the ribs (42, 44) disclosed in D2 (see column 3, lines 1-9 and figure 3). Accordingly, claim 2 would have been obvious over D1 in view of D2. Therefore, claim 2 lacks an inventive step under PCT Article 33(3).

1.2.2 Concerning Claim 3

The additional feature of claim 3 is characterized in that the reaction feature is a protrusion of the sidewall. This feature would be easily conceived from the ribs (42, 44) disclosed in D2 (see column 3, lines 1-9 and figure 3). Accordingly, claim 3 would have been obvious over D1 in view of D2. Therefore, claim 3 lacks an inventive step under PCT Article 33(3).

1.2.3 Concerning Claim 4

The additional feature of claim 4 is characterized in that the mass of material has a material distribution across the transition area, the material distribution being higher in an area adjacent to a second end than in an area adjacent to a contact surface. This feature is merely a matter of design option when the general knowledge in the relevant field of the art is used. Accordingly, claim 4 would have been obvious over D1 in view of D2. Therefore, claim 4 lacks an inventive step under PCT Article 33(3).

1.2.4 Concerning Claim 5

The additional feature of claim 5 is characterized in that a flexible member has a recess formed between the mass of material and the contact surface. This feature is merely a matter of design option when the general knowledge in the relevant field of the art is used. Accordingly, claim 5 would have been obvious over D1 in view of D2. Therefore, claim 5 lacks an inventive step under PCT Article 33(3).

Continued on The Next Page

**Supplemental Box**

In case the space in any of the preceding boxes is not sufficient.

Continuation of : Previous Page

1.2.5 Concerning Claim 6

The additional feature of claim 6 is identical to the feature of D2 in that the ribs (42, 44) are continuous (see column 3, lines 1-9 and figure 3). Accordingly, claim 6 would have been obvious over D1 in view of D2. Therefore, claim 6 lacks an inventive step under PCT Article 33(3).

1.2.6 Concerning Claim 7

The additional feature of claim 7 is characterized in that the flexible member has a recess formed between the mass of material and the contact surface, the recess defining a boundary between the transition area and the contact surface. This feature is merely a matter of design option when the general knowledge in the relevant field of the art is used. Accordingly, claim 7 would have been obvious over D1 in view of D2. Therefore, claim 7 lacks an inventive step under PCT Article 33(3).

1.2.7 Concerning Claim 8

The additional feature of claim 8 is identical to the feature of D2 in that the bellows and the ribs (42, 44) are formed of the same material (see column 2, line 14 - column 3, line 9 and figure 2). Accordingly, claim 8 would have been obvious over D1 in view of D2. Therefore, claim 8 lacks an inventive step under PCT Article 33(3).

1.2.8 Concerning Claim 9

The additional feature of claim 9 is identical to the feature of D2 in that the ribs (42, 44) are integrally formed with the bellows (see figure 2). Accordingly, claim 9 would have been obvious over D1 in view of D2. Therefore, claim 9 lacks an inventive step under PCT Article 33(3).

Continued on The Next Page

**Supplemental Box**

In case the space in any of the preceding boxes is not sufficient.

Continuation of : Previous Page

1.3 Independent Claim 10

D1, which is considered to be the closest prior art to the subject matter of claim 10, discloses an actuator (1) comprising: a rigid base (6); and a flexible top member (7) connected to the rigid base (6), the flexible top member (7) having a side wall (37) and a work engaging top surface (21), an area between the side wall (37) and the work engaging top surface (21) defining a transition area (see paragraphs [0027]-[0029] and figures 3-6). Claim 10 differs from D1 in that an actuator comprises a reaction feature placed on a transition area that is configured to govern movement of a sidewall. However, this feature would be easily conceived from D2 considering that a bellows actuator (10) comprises ribs (42, 44) formed between side and top portions of bellows for adding radial rigidity to end portions of the bellows to prevent any radial folding or collapsing of the end portions under extreme temperature or pressure conditions (see column 2, line 14 - column 3, line 9 and figure 2). Accordingly, claim 10 would have been obvious over D1 in view of D2. Therefore, claim 10 lacks an inventive step under PCT Article 33(3).

1.4 Dependent Claims 11-18

1.4.1 Concerning Claim 11

The additional feature of claim 11 is characterized in that the reaction feature is a mass of material. This feature would be easily conceived from the ribs (42, 44) disclosed in D2 (see column 3, lines 1-9 and figure 3). Accordingly, claim 11 would have been obvious over D1 in view of D2. Therefore, claim 11 lacks an inventive step under PCT Article 33(3).

1.4.2 Concerning Claim 12

The additional feature of claim 12 is characterized in that the reaction feature is a protrusion of the sidewall. This feature would be easily conceived from the ribs (42, 44) disclosed in D2 (see column 3, lines 1-9 and figure 3). Accordingly, claim 12 would have been obvious over D1 in view of D2. Therefore, claim 12 lacks an inventive step under PCT Article 33(3).

Continued on The Next Page

**Supplemental Box**

In case the space in any of the preceding boxes is not sufficient.

Continuation of : Previous Page

1.4.3 Concerning Claim 13

The additional feature of claim 13 is characterized in that the mass of material has a material distribution across the transition area, the material distribution being higher in an area adjacent to a second end than in an area adjacent to a contact surface. This feature is merely a matter of design option when the general knowledge in the relevant field of the art is used. Accordingly, claim 13 would have been obvious over D1 in view of D2. Therefore, claim 13 lacks an inventive step under PCT Article 33(3).

1.4.4 Concerning Claim 14

The additional feature of claim 14 is characterized in that a flexible member has a recess formed between the mass of material and the contact surface. This feature is merely a matter of design option when the general knowledge in the relevant field of the art is used. Accordingly, claim 14 would have been obvious over D1 in view of D2. Therefore, claim 14 lacks an inventive step under PCT Article 33(3).

1.4.5 Concerning Claim 15

The additional feature of claim 15 is identical to the feature of D2 in that the ribs (42, 44) are continuous (see column 3, lines 1-9 and figure 3). Accordingly, claim 15 would have been obvious over D1 in view of D2. Therefore, claim 15 lacks an inventive step under PCT Article 33(3).

1.4.6 Concerning Claim 16

The additional feature of claim 16 is characterized in that the flexible member has a recess formed between the mass of material and the contact surface, the recess defining a boundary between the transition area and the contact surface. This feature is merely a matter of design option when the general knowledge in the relevant field of the art is used. Accordingly, claim 16 would have been obvious over D1 in view of D2. Therefore, claim 16 lacks an inventive step under PCT Article 33(3).

Continued on The Next Page



**Supplemental Box**

In case the space in any of the preceding boxes is not sufficient.

Continuation of : Previous Page

1.4.7 Concerning Claim 17

The additional feature of claim 17 is identical to the feature of D2 in that the bellows and the ribs (42, 44) are formed of the same material (see column 2, line 14 - column 3, line 9 and figure 2). Accordingly, claim 17 would have been obvious over D1 in view of D2. Therefore, claim 17 lacks an inventive step under PCT Article 33(3).

1.4.8 Concerning Claim 18

The additional feature of claim 18 is identical to the feature of D2 in that the ribs (42, 44) are integrally formed with the bellows (see figure 2). Accordingly, claim 18 would have been obvious over D1 in view of D2. Therefore, claim 18 lacks an inventive step under PCT Article 33(3).

2. Industrial Applicability

Claims 1-18 are industrially applicable under PCT Article 33(4).