PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
JOSHUA L. JONES
EDWARDS ANGELL PALMER & DODGE LLP
P.O.BOX 55874
BOSTON, MA 02205

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	29 SEP 2008
Applicant's or agent's file reference 68439WO (49391)	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US 08/67324	18 June 2008 (18.06.2008)	02 July 2007 (02.07.2007)

International Patent Classification (IPC) or both national classification and IPC
IPC(8) - C22C 29/12; B24B 49/00 (2008.04)
USPC - 72/232; 492/27; 451/11

Applicant RILEY POWER, INC.

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 43*bis*.1(a)(i) with regard to novelty, inventive step or 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 66.1*bis*(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.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/US	Date of completion of this opinion	Authorized officer:
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	21 September 2008 (21.09.2008)	Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 08/67324

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*.1(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. type of material

      ☐ a sequence listing

      ☐ table(s) related to the sequence listing

   b. format of material

      ☐ on paper

      ☐ in electronic form

   c. time of filing/furnishing

      ☐ contained in the international application as filed

      ☐ filed together with the international application in electronic form

      ☐ furnished subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in 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/US 08/67324

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

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	NONE	YES
	Claims	1-20	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	NONE	NO

2. Citations and explanations:

Claims 1-20 lack an inventive step under PCT Article 33(3) as being obvious over US 5,346,148 A to Hand et al., hereinafter "Hand" in view of US 800,089 A (Elspass)

Regarding claim 1, Hand discloses a tire 20 (in Fig 1) for a roll wheel assembly 14 used to crush material in a pulverizer 10, the tire 20 comprising a generally toroidal body having a) a crushing surface on an outer periphery of the body (not numbered but near 34 in Fig 1), the crushing surface being configured and adapted to contact and crush the material within the pulverizer (col 2, ln 30-34); and
b) a wedge 38 disposed on a roller wheel of the roll wheel assembly to hold the tire on the roller wheel (col 2, ln 60-64).

Hand does not disclosed a bevelled surface defined on an inner periphery of the body, the at least one bevelled surface being configured and adapted to engage the wedge 38, though Hand does disclose the wedge 38 engaged on an inner periphery 32 of the body (col 2, ln 60-64). Furthermore, bevelled surfaces for engaging tire elements are extremely well known in the art of roll wheel assemblies. For example, Elspass is one of many references that disclose the use of bevelled surfaces in a roll wheel assembly (col 2, ln 85-91). As Elspass teaches that the use of a bevel on one element of a roll wheel assembly provides the advantage of 'perfect rolling contact' between that element and another element (col 2, ln 85-91), it would have been obvious to one of skill in the art to engage the wedge of Hand using a bevelled surface as taught by Elspass because the bevelled surface allows the wedge and the inner surface to maintain secure contact with each other while still maintaining rolling capability.

Regarding claim 2, Elspass further discloses the tire as recited in claim 1, wherein first and second bevelled surfaces on the inner periphery of the body are configured and adapted to cooperate with a plurality of elements (that is Elspass discloses at col 2, ln 85-91 more than one bevelled surface). Meanwhile, Hand discloses a plurality of wedges 38 disposed on the roller wheel to hold the tire on the roller wheel (col 2, ln 60-64).

As Elspass teaches that the use of one or more bevels on one element of a roll wheel assembly provides the advantage of 'perfect rolling contact' between that element and another element (col 2, ln 85-91), it would have been obvious to one of skill in the art to engage the wedge of Hand using a plurality of bevelled surfaces as taught by Elspass because the bevelled surfaces would allow the wedge and the inner surface to maintain secure contact with each other at more than one point while still maintaining rolling capability.

Regarding claim 3, Hand further discloses a tire as recited in claim 2, wherein the body has a cross-section symmetrical about a centerline perpendicular to an axis of revolution of the body (col 3, ln 22-24).

Regarding claim 4, Hand further discloses a tire as recited in claim 1, wherein the body has a cross-section that is asymmetrical about a centerline perpendicular to an axis of revolution of the body (col 3, ln 20-22).

Regarding claim 5, Hand further discloses a tire as recited in claim 1, wherein the tire includes a material selected from the list consisting of cast iron, cast white iron, and abrasion resistant weld overlay materials (col 2, ln 50-52 disclose both cast white iron and abrasion resistant materials).

Regarding claim 6, Hand discloses a roll wheel assembly for crushing material in a pulverizer 10, the roll wheel assembly comprising a) a roller wheel 14 (col 2, ln 30-34);
b) at least one wedge 38 defining at least one wedging surface defined thereon (col 2, ln 60-64); and
c) a tire 20 including a generally toroidal body having a crushing surface on an outer periphery thereof configured and adapted to contact and crush the material within the pulverizer (col 2, ln 30-34), and
the tire being engaged with the roller wheel by the wedge (col 2, ln 60-64)

Hand does not disclosed a bevelled surface defined on an inner periphery of the body, the at least one bevelled surface being configured and adapted to engage the wedge 38, though Hand does disclose the wedge 38 engaged on an inner periphery 32 of the body (col 2, ln 60-64). Furthermore, bevelled surfaces for engaging tire elements are extremely well known in the art of roll wheel assemblies. For example, Elspass is one of many references that disclose the use of bevelled surfaces in a roll wheel assembly (col 2, ln 85-91). As Elspass teaches that the use of a bevel on one element of a roll wheel assembly provides the advantage of 'perfect rolling contact' between that element and another element (col 2, ln 85-91), it would have been obvious to one of skill in the art to engage the wedge of Hand using a bevelled surface as taught by Elspass because the bevelled surface would allow the wedge and the inner surface to maintain secure contact with each other while still maintaining rolling capability.

---------- please see supplemental box ----------

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 08/67324

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:
Box V.2 citations and explanations

Regarding claim 7, Elspass further discloses the roll wheel assembly as recited in claim 6, wherein a first bevelled surface of the tire is engaged with a first frustoconical surface on the wedge, and wherein the roller wheel has a second frustoconical surface defined on its outer circumferential periphery, the second frustoconical surface being engaged with a second bevelled surface of the tire. That is, Elpass teaches that a plurality of bevelled surfaces engage a plurality of frustoconical surfaces (col 2, ln 85-91) in a roll wheel assembly. Meanwhile, Hand teaches a first wedge 38 and a second surface 34 defined on the outer circumferential periphery (col 2, ln 58-60).

The use of a bevelled surface to engage a frustoconical surface is extremely well known in the art of roll wheel assemblies. For example, Elspass is one of many references that disclose the use of bevelled surfaces to engage a frustoconical surface in a roll wheel assembly (col 2, ln 85-91). As Elspass teaches that the use of a bevel on one element of a roll wheel assembly provides the advantage of 'perfect rolling contact' between that element and another element that has a frustoconical surface (col 2, ln 85-91), it would have been obvious to one of skill in the art to engage the frustoconical surfaces taught by Hand with bevelled surfaces as taught by Elspass because the bevelled surface/frustoconical surface pairing is well known in the art for allowing roll wheel assembly elements to maintain secure contact with each other while still maintaining rolling capability.

Regarding claim 8, Hand further discloses roll wheel assembly as recited in claim 7, further comprising at least one adjustable fastener joining the wedge to the roller wheel, wherein the first and second frustoconical surfaces may be urged toward each other by tightening the fastener (col 3, ln 7-11 teach adjustable fasteners for the wedges).

Regarding claim 9, Hand further discloses roll wheel assembly as recited in claim 6, wherein a first bevelled surface of the tire is engaged with a first wedging surface on a first wedge, and wherein a second bevelled surface of the tire is engaged with a second wedging surface on a second wedge. That is, Hand discloses a plurality of wedges engaged on a plurality of surfaces on the tire (col 2, ln 60-64). Meanwhile Elspass discloses the use of bevelled surfaces to engage elements in a roll wheel assembly (col 2, ln 85-91).

As Elspass teaches that the use of one or more bevels on one element of a roll wheel assembly provides the advantage of 'perfect rolling contact' between that element and another element (col 2, ln 85-91), it would have been obvious to one of skill in the art to engage the wedge of Hand using a plurality of bevelled surfaces as taught by Elspass because the bevelled surfaces would allow the wedge and the inner surface to maintain secure contact with each other at more than one point while still maintaining rolling capability.

Regarding claim 10, Hand further discloses the roll wheel assembly as recited in claim 9, further comprising at least one adjustable fastener joining the first wedge to the second wedge, wherein the at least one adjustable fastener is configured and adapted to urge the first and second wedges toward each other when tightened (col 3, ln 7-11 teach adjustable fasteners for the wedges).

Regarding claim 11, Hand further discloses the roll wheel assembly as recited in claim 6, further comprising a wear protection plate 36 disposed on an exposed portion of the at least one wedge 34, the wear protection plate 36 being configured and adapted to substantially isolate the respective wedge from material being crushed in the pulverizer (col 2, ln 58-64 do not disclose that the plate goes over the wedge itself but rather on the section where the wedge is located and thereby, on the wedge such that material to be crushed is isolated).

Regarding claim 12, Hand discloses a vertical roller table mill for crushing material, the vertical roller table mill comprising:
a) a pulverizer housing 12 (col 2, ln 25-30);
b) a grinding ring 16 disposed within the pulverizer housing 12 (col 2, ln 25-30);
c) a plurality of roll wheel assemblies 14 disposed within the pulverizer housing (col 2, ln 25-30), each roll wheel assembly 14 including:
i) a roller wheel 14 (col 2, ln 25-30),
ii) at least one wedge 38 engaged to the roller wheel 14 and having a wedging surface on an outer periphery thereof (col 2, ln 60-64), and
iii) a tire 20 including a generally toroidal body having a crushing surface on an outer periphery thereof configured and adapted to contact and crush the material within the roller-table mill (col 2, ln 30-34), and
d) a loading assembly 18 operatively connected to the plurality of roller wheel assemblies, the spring loading assembly being configured and adapted to urge the plurality of wheel assemblies toward the grinding ring to crush the material between the grinding ring and the crushing surface of the tires as the tires roll along the grinding ring (col 2, ln 25-30).

Hand does not disclose at least one bevelled surface defined on an inner periphery of the body, the at least one bevelled surface being engaged with the wedging surface of the at leaset one wedge 38, though Hand does disclose the wedge 38 located on an inner periphery 32 of the body (col 2, ln 60-64).

As Elspass teaches that the use of one or more bevels on one element of a roll wheel assembly provides the advantage of 'perfect rolling contact' between that element and another element (col 2, ln 85-91), it would have been obvious to one of skill in the art to engage the wedge of Hand using a plurality of bevelled surfaces as taught by Elspass because the bevelled surfaces would allow the wedge and the inner surface to contact each other at more than one point while still maintaining rolling capability.

---------- please see next supplemental box ----------

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 08/67324

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:
previous supplemental box

Regarding claim 13, Elspass further discloses a vertical roller table mill as recited in claim 12, wherein a first bevelled surface of the tire is engaged with a first frustoconical surface on a wedge, and wherein the roller wheel has a second frustoconical surface defined on its outer circumferential periphery, the second frustoconical surface being engaged with a second bevelled surface of the tire. That is, Elpass teaches that a plurality of bevelled surfaces engage a plurality of frustoconical surfaces (col 2, ln 85-91) in a roll wheel assembly. Meanwhile, Hand teaches a first wedge 38 and a second surface 34 defined on the outer circumferential periphery (col 2, ln 58-60).

The use of a bevelled surface to engage a frustoconical surface is extremely well known in the art of roll wheel assemblies. For example, Elspass is one of many references that disclose the use of bevelled surfaces to engage a frustoconical surface in a roll wheel assembly (col 2, ln 85-91). As Elspass teaches that the use of a bevel on one element of a roll wheel assembly provides the advantage of 'perfect rolling contact' between that element and another element that has a frustoconical surface (col 2, ln 85-91), it would have been obvious to one of skill in the art to engage the frustoconical surfaces taught by Hand with bevelled surfaces as taught by Elspass because the bevelled surface/frustoconical surface pairing is well known in the art for allowing roll wheel assembly elements to contact each other while still maintaining rolling capability.

Regarding claim 14, Hand further discloses a vertical roller table mill as recited in claim 13, further comprising at least one adjustable fastener joining the wedge to the roller wheel, wherein the at least one adjustable fastener urges the first and second frustoconical surfaces toward each other when tightened (col 3, ln 7-11 teach adjustable fasteners for the wedges).

Regarding claim 15, Elspass further discloses a vertical roller table mill as recited in claim 12, wherein a first bevelled surface of the tire is engaged with a first frustoconical surface on a first wedge, and wherein a second bevelled surface of the tire is engaged with a second frustoconical surface on a second wedge. That is, Elpass teaches that more than one bevelled surfaces may be used to engage more than one frustoconical surfaces (col 2, ln 85-91) in a roll wheel assembly. Meanwhile, Hand teaches a first wedge 38, a second wedge 36 and a second surface 34 defined on the outer circumferential periphery (col 2, ln 58-60).

The use of a bevelled surface to engage a frustoconical surface is extremely well known in the art of roll wheel assemblies. For example, Elspass is one of many references that disclose the use of bevelled surfaces to engage a frustoconical surface in a roll wheel assembly (col 2, ln 85-91). As Elspass teaches that the use of a bevel on one element of a roll wheel assembly provides the advantage of 'perfect rolling contact' between that element and another element that has a frustoconical surface (col 2, ln 85-91), it would have been obvious to one of skill in the art to engage the frustoconical surfaces taught by Hand with bevelled surfaces as taught by Elspass because the bevelled surface/frustoconical surface pairing is well known in the art for allowing roll wheel assembly elements to contact each other while still maintaining rolling capability.

Regarding claim 16, Hand further discloses a vertical roller table mill as recited in claim 15, further comprising at least one adjustable fastener joining the first wedge to the second wedge, wherein the at least one adjustable fastener is urges the first and second wedges toward each other when tightened (col 3, ln 7-11 teach adjustable fasteners for the wedges).

Regarding claim 17, Hand further discloses the vertical roller table mill as recited in claim 12, further comprising a wear protection plate disposed on an exposed portion of the at least one wedge, the wear protection plate being configured and adapted to substantially isolate the respective wedge from material being crushed in the pulverizer (col 2, ln 58-64 do not disclose that the plate goes over the wedge itself but rather on the section where the wedge is located and thereby, on the wedge such that material to be crushed is isolated).

Regarding claim 18, Hand discloses a method of securing a tire to a roller wheel assembly in a pulverizer for crushing material, the method comprising:
a) providing a roller wheel (col 2, ln 25-34);
b) providing at least one wedge 38 defining a wedging surface thereon (col 2, ln 60-64);
c) providing a tire including a generally toroidal body having a crushing surface on an outer periphery thereof being configured and adapted to contact and crush the material within the pulverizer (col 2, ln 60-64), and
d) affixing the tire to the roller wheel using the wedge (col 2, ln 60-64).

Hand does not disclose providing at least one bevelled surface defined on an inner periphery ofthe body, the tire being configured and adapted to engage the roller wheel by the wedge proximate the at least one bevelled surface though Hand does disclose the wedge 38 located on an inner periphery 32 of the body (col 2, ln 60-64).

Hand does not disclosed a bevelled surface defined on an inner periphery of the body, the at least one bevelled surface being configured and adapted to engage the wedge 38, though Hand does disclose the wedge 38 engaged on an inner periphery 32 of the body (col 2, ln 60-64). Furthermore, bevelled surfaces for engaging tire elements are extremely well known in the art of roll wheel assemblies. For example, Elspass is one of many references that disclose the use of bevelled surfaces in a roll wheel assembly (col 2, ln 85-91). As Elspass teaches that the use of a bevel on one element of a roll wheel assembly provides the advantage of 'perfect rolling contact' between that element and another element (col 2, ln 85-91), it would have been obvious to one of skill in the art to engage the wedge of Hand using a bevelled surface as taught by Elspass because the bevelled surface would allow the wedge and the inner surface to contact each other while still maintaining rolling capability.

---------- please see next supplemental box ----------

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 08/67324

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:
previous supplemental box

Regarding claim 19, Hand further discloses the method as recited in claim 18, wherein the affixing step includes:
a) disposing a fastener through the wedge (col 3, ln 7-11; and
b) tightening the fastener to urge the wedge against the bevelled surface of the tire (col 3, ln 7-11).

Regarding claim 20, Hand further discloses the method as recited in claim 19, further comprising:
a) affixing at least one wear protection plate to an exposed surface of the at least one wedge (col 2, ln 58-64).

Claims 1-20 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used in industry.