

J.M



Industria y Comercio

SUPERINTENDENCIA

Delegatura de propiedad Industrial

División de Nuevas Creaciones

SOLICITUD

PATENTE DE INVENCION

05-109231

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54. TÍTULO Propulsores cubocubos para bombas
centrífugas

51. CLASIFICACIÓN INTERNACIONAL F04D 29/22, 29/24 7/04

71. SOLICITANTE Weir Worman Ltd.

DOMICILIO New South Wales, Australia

74. APODERADO. Lilia Maria Rodriguez D'Almeida

22. BOGOTÁ, D. C., Octubre 24/05

PETITORIO



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FORMULARIO ÚNICO DE SOLICITUD DE PATENTE
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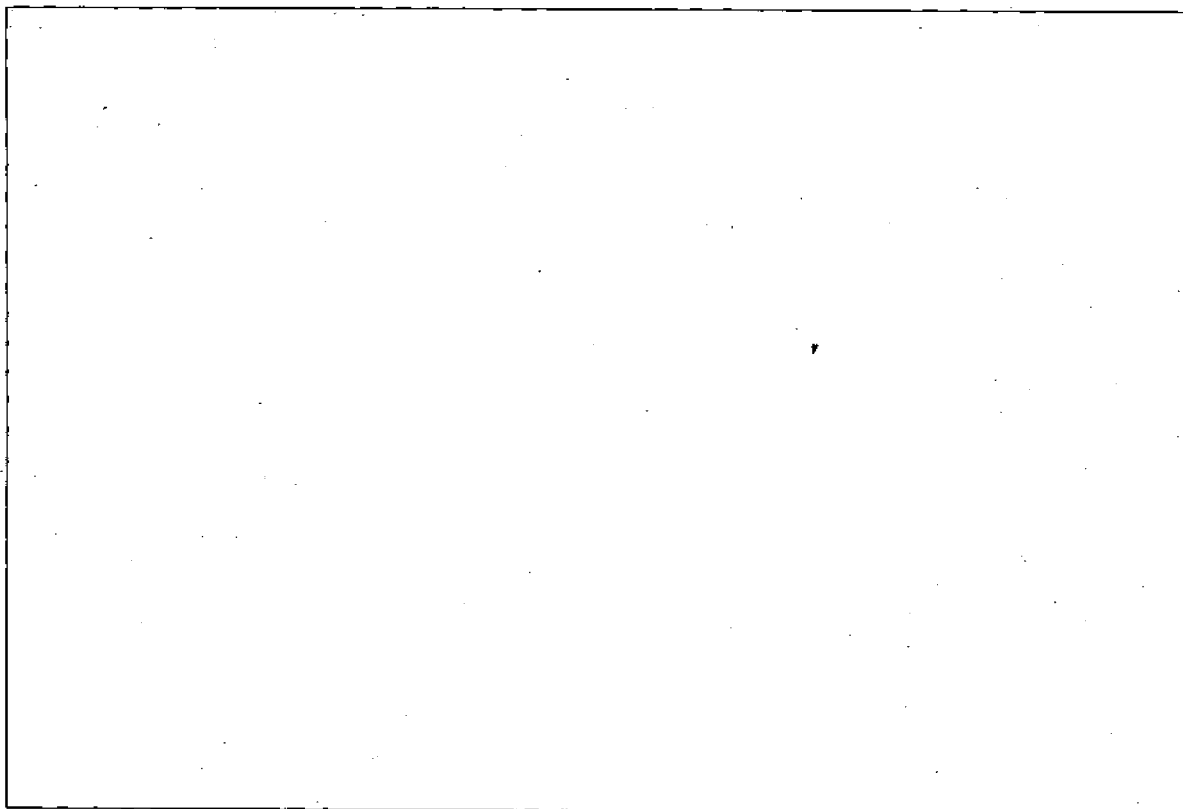
1) SOLICITUD DE:			
☒ Patente de invención		☐ Patente de Modelo de Utilidad	
☐ Capítulo I.		☒ Capítulo II.	
2) SOLICITANTE (71)	Nombre: WEIR WARMAN LTD. Dirección: 1 Marden Street, Artarmon, New South Wales 2064, Australia Nacionalidad o domicilio: New South Wales, Australia Lugar de constitución: Australia		IDENTIFICACIÓN C.C. ☐ NIT: ☒ C.E. ☐ OTRO ☐ Cual _____ NÚMERO _____
	Teléfono: _____ Fax: _____ E. Mail: _____		
3) REPRESENTANTE O APODERADO	Nombre: DILIA MARÍA RODRÍGUEZ D'ALEMAN Dirección: Carrera 11 N°. 86-53 Piso 6 Bogotá D.C. Teléfono: 6181088 Fax: 6350824 E. Mail: info@clarkemodet.com.co		IDENTIFICACIÓN C.C. ☒ NIT: ☐ C.E. ☐ OTRO ☐ NÚMERO: 41.654.882 TP: 20824 CSJ
4) INVENTOR (ES) (72)	Nombre: 1. WALKER, Craig, Ian; 2. WATERMANN, Antón Dirección: 1. 18ª Gladis Avenue, Frenchs Forest, New South Wales 2086, Australia ; 2. 61 Nelson Street, Bedfordale, Western Australia 6112, Australia Nacionalidad o Domicilio: Todos los anteriores, Australianos		
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10)

ANEXOS

- ☒ Comprobante de pago de la tasa de presentación de la solicitud
- ☐ Comprobante de pago por reivindicación de prioridad
- ☐ Documento que acredita la existencia y representación legal cuando el solicitante sea persona Jurídica
- ☒ Poderes, si fuera el caso
- ☐ Documento de cesión del inventor al solicitante o a su causante
- ☐ Declaraciones
- ☒ Copia de la solicitud Internacional. (Resumen, descripción, reivindicación, Dibujos).
- ☒ Traducción de la solicitud internacional al castellano. (Resumen, descripción, reivindicación, Dibujos)
- ☒ Copia del examen preliminar efectuado por la IPEA
- ☐ De ser el caso, copia del contrato de acceso
- ☐ De ser el caso, documento que acredite la licencia o autorización de uso de conocimientos tradicionales de las comunidades indígenas
- ☐ De ser el caso, certificado de depósito del material biológico
- ☐ Arte final 12 x 12 y 6 x 6 cm
- ☐ De ser el caso, información sobre otras solicitudes de patente o títulos obtenidos en el extranjero por el mismo titular o su causante, relacionados parcial o totalmente con la invención de esta solicitud.
- ☒ Otros:
 1. Reporte internacional de búsqueda
 2. Solicitud Capítulo II
 3. Oficinas designadas
 4. Opinión escrita
 5. Notificación del cambio
 6. Notificación referente a la transmisión del documento de prioridad

11) FIGURA CARACTERÍSTICA:



12) Solicitud concesión de la patente,

NOMBRE: DILIA RODRÍGUEZ D'ALEMAN

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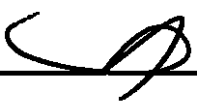
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CANT.	RENTISTICO	CONCEPTO	TOTAL CONCEPTO
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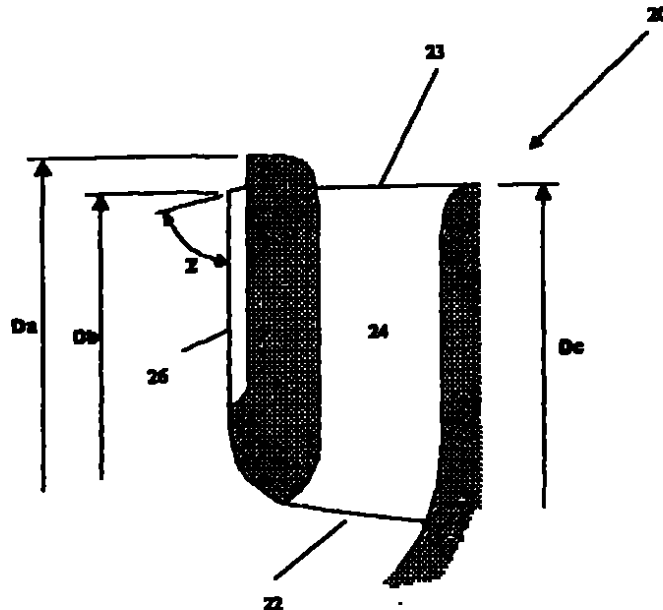
(72) Inventors; and

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[Continued on next page]

(54) Title: IMPROVED PUMP IMPELLER



(57) Abstract: An impeller for use in a centrifugal pump, the impeller (20) including a shroud having opposed faces, an outer peripheral edge portion and a rotation axis, a plurality of pumping vanes on one of the faces of the shroud and extending away from the rotation axis each pumping vane having an outer peripheral edge portion, and a plurality of auxiliary vanes (26) on the other face of the shroud, the auxiliary vanes of each having an outer edge portion wherein the dimension Da from the rotation axis to the outer peripheral edge portion of the shroud is greater than the dimension Db from the rotation axis to the outer edge portion of the auxiliary vanes.



SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Published:

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IMPROVED PUMP IMPELLER

Technical Field

5

The present invention relates to impellers and more particularly to impellers suitable for use in centrifugal pumps.

Centrifugal pumps are commonly used to handle liquid mixtures of particulate solids in the mineral processing and dredging industries. Those pumps are subject to severe slurry erosion wear by the particles in the flow which leads to considerable economic consequence to such operations. Considerable effort is expended by manufacturers and users to try to ameliorate this problem.

Such centrifugal pumps include a pump housing with a pump chamber therein and an impeller disposed within the pump chamber for rotation about a rotation axis. The impeller is operatively connected at one side to a drive shaft, there being an inlet on the other side thereof. The impeller includes a hub to which the drive shaft is connected and at least one shroud. A plurality of pumping vanes are on one side of the shroud. Often two shrouds are provided with the pumping vanes therebetween. The shroud adjacent the inlet is commonly referred to as the front shroud and the other shroud is referred to as the back shroud.

Centrifugal pumps, particularly those used for transporting slurries, commonly use so called "expelling" vanes or auxiliary vanes on the back and front shrouds of the pump's impeller to help rotate the fluid in the space between the shroud and the side liner. Those auxiliary vanes may be of different shapes depending on the preferences of the individual designer.

By spinning the fluid in the space between the impeller and the side liner, the static pressure at the inlet of the impeller is reduced due to the centrifugal flow induced (vortex

- 2 -

effect), such that fluid between the auxiliary vanes will flow towards the impeller periphery. Fluid returns down the face of the side liner due to the overall driving pressure difference between that at the impeller discharge and inlet. Particles in the flow may also be purged from the gap if the centrifugal force is greater than the fluid drag force tending
5 to carry the particles into the gap.

The major purpose of the auxiliary vanes on the front shroud of the impeller is to reduce the driving pressure forcing the flow from the volute back into the eye of the impeller (recirculating flow). By reducing the recirculating flow velocity, the wear on the
10 impeller and the mating inlet side liner is considerably reduced.

Throughout this specification and the claims which follow, unless the context requires otherwise, the word "comprise", and variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated integer or step or group
15 of integers or steps but not the exclusion of any other integer or step or group of integers or steps.

The reference to any prior art in this specification is not, and should not be taken as, an acknowledgment or any form of suggestion that the prior art forms part of the
20 common general knowledge in Australia.

Background Art

There are a number of different shapes of auxiliary vane that have been developed
25 and used in existing impellers.

In one example, shown in United States Patent No. 4664592, and the contents of which are incorporated here by reference, a number of radial auxiliary vanes are used. Those auxiliary vanes are located on the face of the front or back shroud, with an annular
30 projection around the outer ends of the auxiliary vanes, and with a channel extending through the annular projection between adjacent auxiliary vanes.

6

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A problem with the auxiliary vanes, with or without annular projections at the periphery, is that tip vortices form (similar to wingtip vortices) which, when particles are entrained, can cause severe localised gouging wear of the periphery of the impeller and the adjacent side liners.

5

As the parts wear, the vortex which forms behind each projecting vane gets larger and stronger causing an ever increasing wear rate in the adjacent side liner.

Waters pumps are known which include auxiliary vanes at a smaller diameter than the shroud and main vane diameter (which are usually identical). The reason this is done is not to reduce wear, but to reduce the axial hydraulic thrust acting on the impeller. The auxiliary vane diameter is sized to balance the hydraulic axial thrust.

Disclosure of Invention

15

According to one aspect of the present invention there is provided an impeller suitable for use in a centrifugal pump, the impeller including a shroud having opposed faces, an outer peripheral edge portion and a rotation axis, a plurality of pumping vanes on one of the faces of the shroud and extending away from the rotation axis each pumping vane having an outer peripheral edge portion, and a plurality of auxiliary vanes on the other face of the shroud, the auxiliary vanes of each having an outer edge portion wherein the dimension D_a from the rotation axis to the outer peripheral edge portion of the shroud is greater than the dimension from the rotation axis to outer edge portion of the auxiliary vanes D_b .

25

In one preferred form, the impeller includes two shrouds, (a front shroud and a back shroud) with the pumping vanes therebetween and auxiliary vanes on one or both of the shrouds. In one embodiment the front shroud extends beyond the diameter of the auxiliary and main pumping vanes. In another embodiment the back shroud extends beyond the diameter of the auxiliary and main pumping vanes. In yet another arrangement both the front and back shrouds extend beyond the diameter of the auxiliary and pumping

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vanes. Preferably, the diameter of the pumping vanes and auxiliary vanes are about the same diameter for example within about 5% of each other.

5 Preferably, the pumping and auxiliary vanes are of a similar diameter to ensure adequate pressure reduction and reduce recirculating flow while the impeller shroud extends beyond both so as to ameliorate wear.

10 The benefit of the extended shroud impeller arrangement is that the tip vortex from each auxiliary vane is shed against the face of the extended shroud and is trapped within the gap or space between the shroud and the adjacent side liner. By this construction the wear on the impeller and the liner is substantially reduced. The beneficial affect appears to derive from not allowing full formation of the tip vortices by means of the present invention.

15 Further, in one embodiment of the present invention there is provided an impeller with a shroud of diameter D_a and a plurality of predominantly radial auxiliary vanes on the face of the front shroud with a diameter D_b , the radially outermost end of the vane tapers back to the shroud at an angle Z . The shroud, side liner and auxiliary vane wear has been found to be particularly reduced when D_b is less than $0.95 D_a$ and more preferably from 20 0.65 to $0.95 D_a$ and more preferably less than $0.9 D_a$. This appears to be due to there being sufficient space between the tip of the auxiliary vane and the shroud periphery to trap the trailing vortices. The diameter D_b is preferably approximately the same as the diameter of the main pumping vane. This relationship ensures that the pressure reducing capability of the auxiliary vanes is not significantly impaired when compared to the 25 pressure generated by the main pumping vanes.

Brief Description of Drawings

Preferred embodiments of the present invention will now be described by way of example with reference to the accompanying drawings, in which:

30

Figure 1 is a perspective view of a prior art impeller as shown by Figure 1 of

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United States Patent No. 4,664,592;

Figure 2 is a partial sectional view of a conventional impeller and expeller or auxiliary vane of a centrifugal pump;

5

Figure 3 is a magnification of the circled portion of Figure 2 showing the slurry flow paths between a auxiliary vane and casing liner;

Figure 4 shows a series of photographs of wear profiles on typical expelling vanes;

10

Figure 5 is a part sectional view similar to Figure 2 but showing an embodiment of an impeller in accordance with the present invention;

Figure 6 is a photograph showing the wear profile of auxiliary vanes of a prior art impeller;

15

Figure 7 is a photograph showing the wear profile of auxiliary vanes on an impeller in accordance with an embodiment of the present invention;

Figure 8 is an axial or end view of a further embodiment of an impeller in accordance with the present invention; and

20

Figure 9 is an axial or end view of yet another embodiment of an impeller in accordance with the present invention.

25

Best Modes

The prior art impeller 1 of Figure 1 is fully described in US 4,664,592 and it will be understood by reference to that specification.

30

As shown in Figure 2 an impeller 20 is housed in casing liner 21. Slurry travels

- 6 -

through impeller 20 from inlet 22 to outlet 23 of each pumping chamber 24 as the impeller rotates within casing liner 21. A recirculating flow of slurry from outlet 23 to inlet 22 occurs naturally and causes abrasive wear of the inlet side liner 25. Expelling or auxiliary vane 26 acts to move the recirculating slurry 27 back toward the impeller outlet as represented by particles 28. The slurry flow path between impeller 20 and liner 25 is shown in more detail by Figure 3.

The wear profiles of the auxiliary vanes apparent in the photographs of Figure 4 are demonstrative of the problem confronted by industry and to be ameliorated by application of embodiments of the present invention.

Figure 5 includes the same reference numerals for like parts as those designated in Figures 2 and 3. In this embodiment of the present invention the auxiliary vanes are straight, with a diameter to the point shown on auxiliary vane 26 of $D_b = 0.85D_a$, wherein D_a is the shroud diameter, and where angle $Z = 45^\circ$. The diameter of D_b is approximately equal to the diameter of main pumping vane denoted as D_c in Figure 5.

Testing of this embodiment of the present invention and comparing its results with a prior art example of the kind shown by Figure 4 exhibits much reduced wear at the vane tips and on the adjacent side liner for approximately the same operating time.

As can be seen in the photograph of Figure 6, the wear on the auxiliary vanes of these known impeller is extensive.

By contrast, the auxiliary vanes on the impeller of Figure 7 are in considerably better condition than those shown in Figure 6, despite having been under operation in a similar environment and for a similar period of time.

The impeller embodiment 30 of Figure 8 is formed with auxiliary vanes 31 having curved leading and trailing edges instead of straight as for the embodiments of Figures 5 and 7. The corresponding prior art arrangement is shown in Figure 6. Again, this

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embodiment of the present invention shows much reduced wear at the vane tips when compared with its prior art equivalent for similar operating times.

The embodiment of Figure 9 shows yet another variation of profile for the auxiliary
5 vanes 41 of the impeller 40.

Finally, it is to be understood that various alterations, modifications and/or additions may be incorporated into the various constructions and arrangements of parts without departing from the spirit or ambit of the invention.

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CLAIMS:

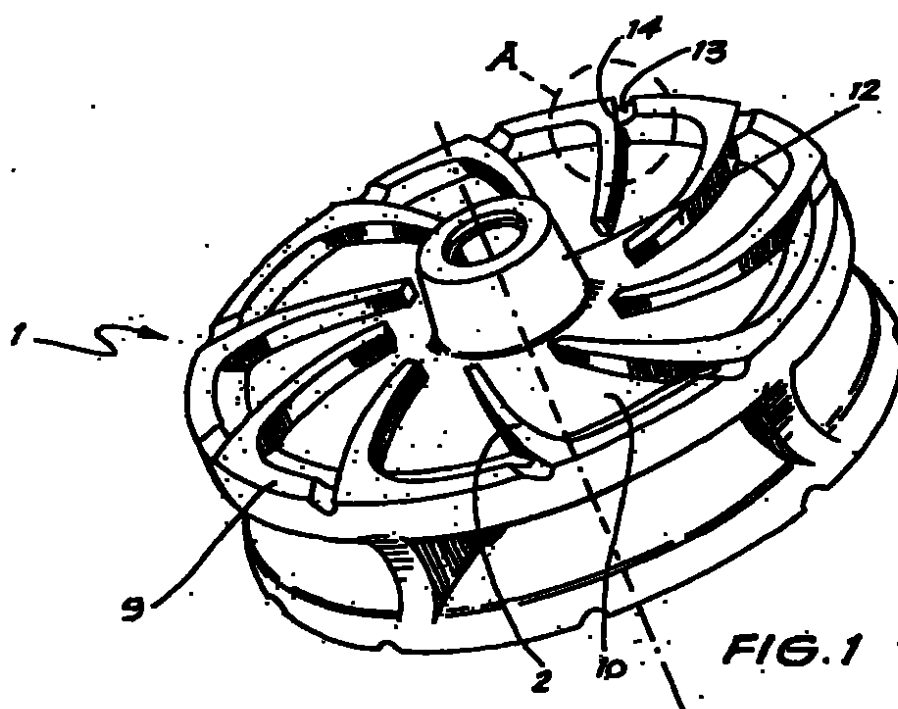
1. An impeller suitable for use in a centrifugal pump, the impeller including a shroud having opposed faces, an outer peripheral edge portion and a rotation axis, a plurality of pumping vanes on one of the faces of the shroud and extending away from the rotation axis each pumping vane having an outer peripheral edge portion, and a plurality of auxiliary vanes on the other face of the shroud, the auxiliary vanes of each having an outer edge portion wherein the dimension D_a from the rotation axis to the outer peripheral edge portion of the shroud is greater than the dimension from the rotation axis to outer edge portion of the auxiliary vanes D_b .
2. An impeller according to claim 1 wherein the dimension D_a is greater than the dimension D_c from the rotation axis to the outer peripheral edge portion of the pumping vanes.
3. An impeller according to claim 2 wherein said shroud is a back shroud.
4. An impeller according to claim 3 wherein the impeller further includes a front shroud, the pumping vanes being between the front and back shrouds and the auxiliary vanes being on the other face of one of the shrouds.
5. An impeller according to claim 3 wherein the impeller further includes a front shroud, the pumping vanes being between the front and back shrouds and the auxiliary vanes being on the other face of each of the shrouds.
6. An impeller according to claim 4 wherein the dimension D_a of the front shroud is greater than the dimensions D_b and D_c .
7. An impeller according to claim 4 wherein the dimension D_a of the back shroud is greater than the dimensions D_b and D_c .

9

- 9 -

8. An impeller according to claim 4 wherein the dimension D_a of the front and back shrouds is greater than the dimensions D_b and D_c .
9. An impeller according to claim 5 wherein the dimension D_a of the front shroud is greater than the dimensions D_b and D_c .
10. An impeller according to claim 5 wherein the dimension D_a of the back shroud is greater than the dimensions D_b and D_c .
11. An impeller according to claim 5 wherein the dimension D_a of the front and back shrouds is greater than the dimensions D_b and D_c .
12. An impeller according to claim 6 wherein D_b and D_c are substantially the same.
13. An impeller according to claim 12 wherein D_b and D_c are within 5% of each other.
14. An impeller according to claim 13 wherein D_b is less than 0.95 D_a .
15. An impeller according to claim 14 wherein D_b/D_a is from 0.65 to 0.95.
16. An impeller according to claim 14 wherein D_b/D_a is from 0.65 to 0.9.

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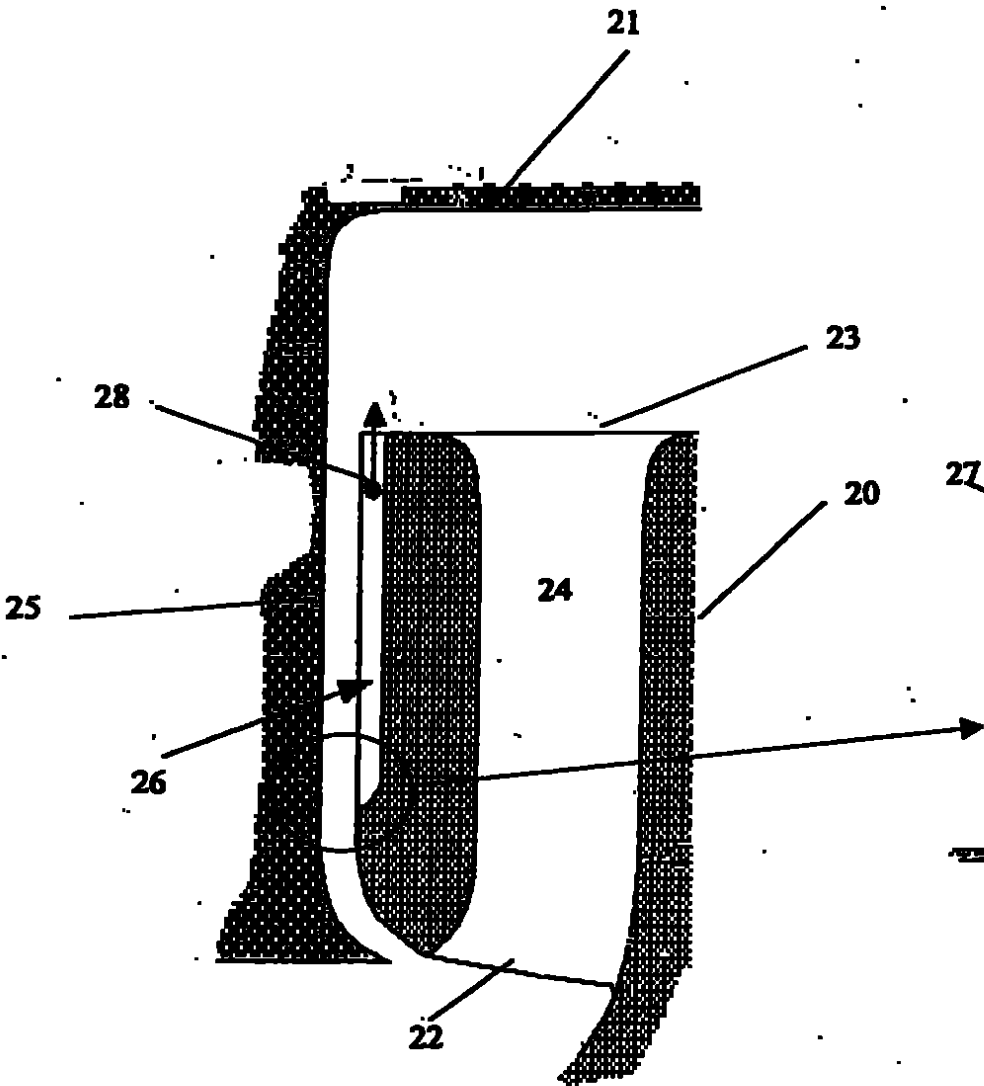


FIGURE 2

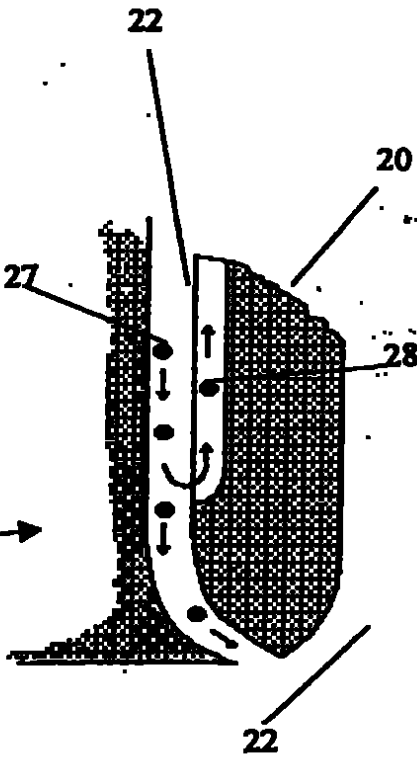


FIGURE 3

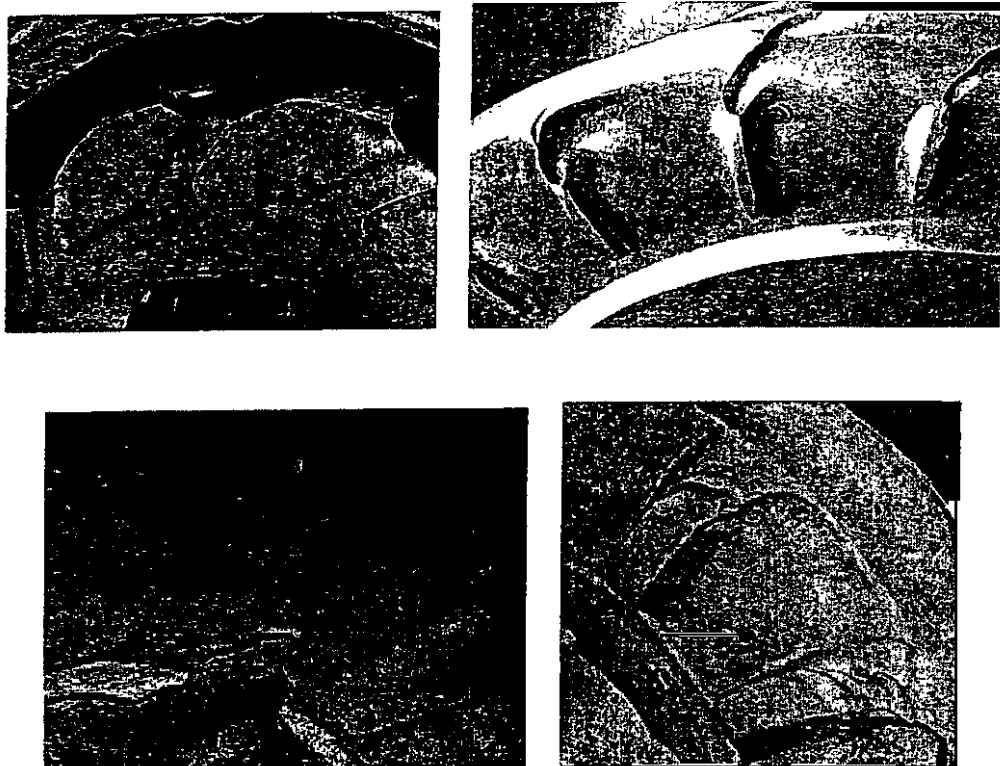


FIGURE 4

SUBSTITUTE SHEET (RULE 26) RO/AU

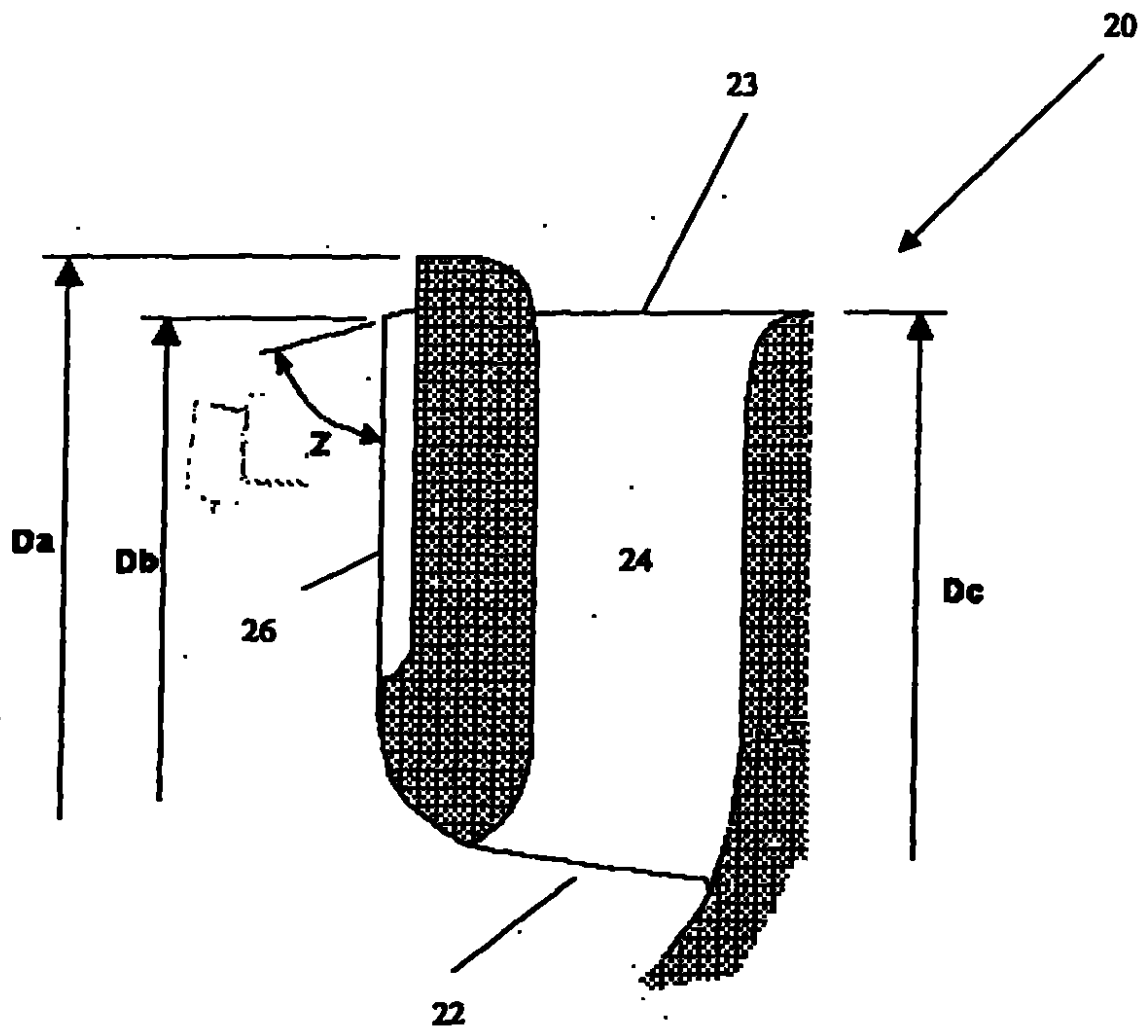


FIGURE 5

5/6



FIGURE 6



FIGURE 7

SUBSTITUTE SHEET (RULE 26) RO/AU

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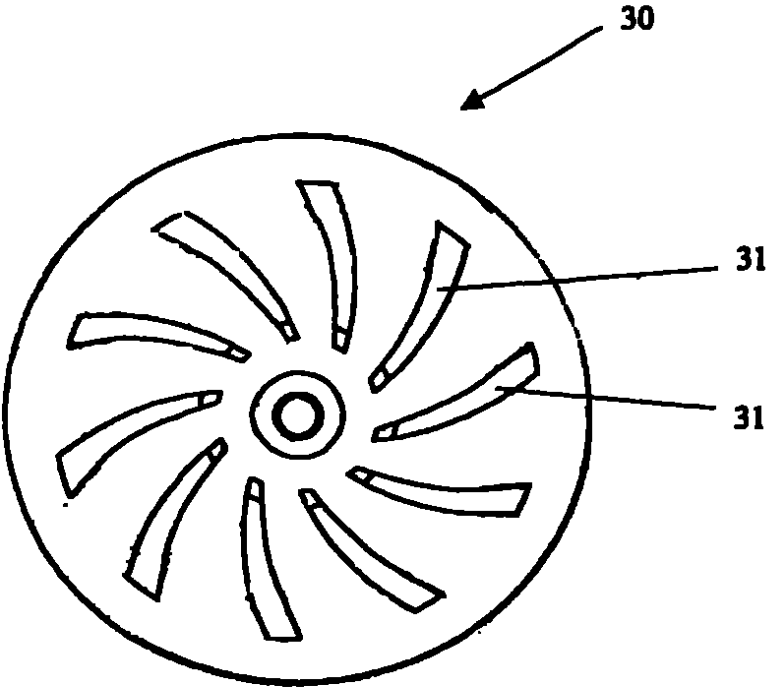


FIGURE 8

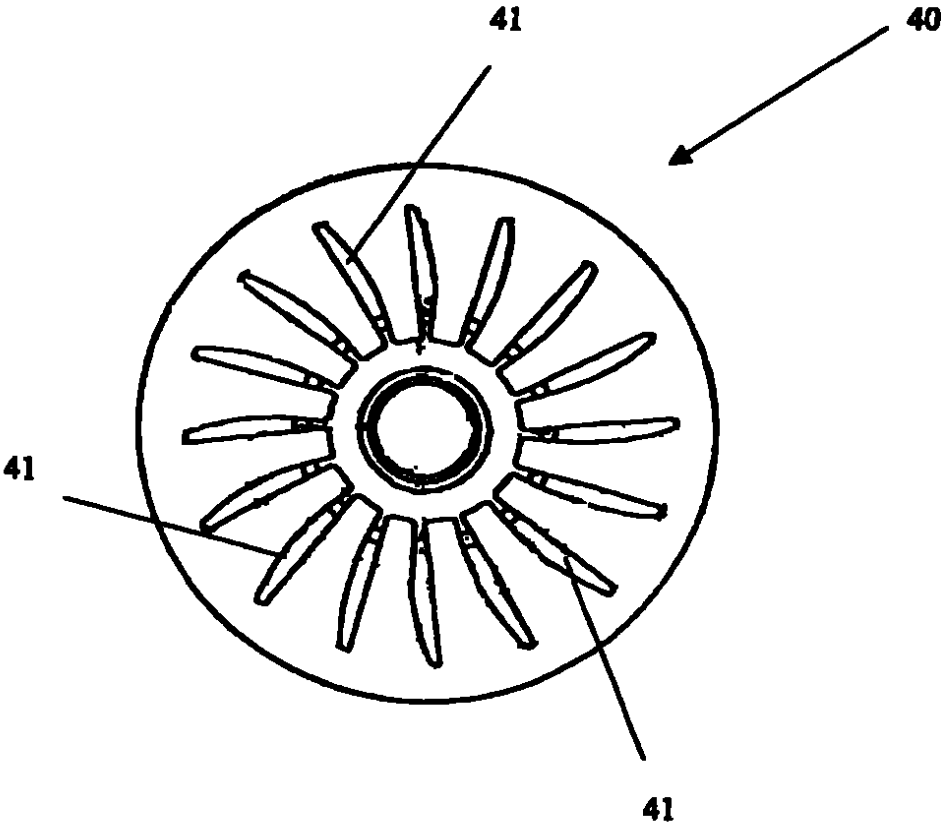


FIGURE 9

MEMORIA DESCRIPTIVA

Área técnica

Este invento se relaciona con propulsores, en particular propulsores adecuados para el uso en bombas centrífugas.

Las bombas centrífugas se usan comúnmente en el manejo de mezclas líquidas de sólidos particulados en las industrias relativas al procesamiento minero y de la retroexcavación. Estas bombas están expuestas a severos desgastes debido la erosión que causan los relaves, por las partículas contenidas en el flujo, lo que conlleva consecuencias económicas considerables para estas operaciones. Los fabricantes y usuarios han consumido tiempo y esfuerzos considerables para intentar aminorar este problema.

Estas bombas centrífugas incluyen una envoltura con una cámara de bomba en ella y un propulsor colocado dentro de la cámara de la bomba para que gire alrededor del eje de rotación. El propulsor esta conectado para operar a un lado de un eje propulsor, con una entrada al otro lado del mismo. El propulsor incluye un cubo al cual esta conectado el eje propulsor y por lo menos una envoltura. La mayoría de las aspas de bombeo se encuentran a un lado de la envoltura. Habitualmente se proporcionan dos envolturas con las aspas de bombeo entremedio. La envoltura contigua a la entrada se denomina generalmente la envoltura delantera y la otra envoltura es la envoltura trasera.

Las bombas centrífugas, particularmente las que se emplean para el transporte de relaves, comúnmente utilizan las llamadas aspas de "expulsión" o aspas auxiliares en la parte trasera y delantera de las envolturas del propulsor de la bomba con el objeto de facilitar la rotación de flujo en el espacio entre la envoltura y el revestimiento lateral. Estas aspas auxiliares pueden ser de distintos tipos.



tamaños dependiendo de la preferencia del diseñador.

Al hacer girar el flujo en el espacio entre el propulsor y el revestimiento lateral, se reduce la presión estática en la entrada del propulsor debido al flujo centrifugado que se induce (efecto remolino), de tal manera que el flujo entre las aspas auxiliares va a fluir hacia la circunferencia del propulsor. El flujo se devuelve hacia abajo de la superficie del revestimiento lateral, debido a la diferencia general de presión de transmisión entre la de la descarga y la de entrada del propulsor. Las partículas en el flujo también pueden ser depuradas desde la abertura si la fuerza centrífuga es mayor que la fuerza de arrastre del flujo que acarrea las partículas dentro de la abertura.

El propósito principal de las aspas auxiliares de la envoltura delantera del propulsor es la de reducir la presión de transmisión forzando el flujo desde la parte de atrás del espiral dentro del ojo del propulsor (flujo recirculante). Al reducir la velocidad del flujo recirculante, el desgaste del propulsor y la entrada acoplada al revestimiento lateral se reducen considerablemente.

Salvo que se requiriera algo distinto en el contexto, a lo largo de esta descripción y en las reivindicaciones que le siguen, la palabra "comprender" y sus derivados como "comprende" o "comprendiendo" se entenderán que implican la inclusión de un objeto entero determinado o un tramo o grupo de objetos enteros o tramos, pero no por ello la exclusión de algún otro objeto entero o tramo o grupo de objetos enteros o tramos.

La referencia o cualquier tipo de sugerencia de cualquier técnica anterior, no puede ni debe ser tomada como afirmación de que éstas formen parte del conocimiento común general en Australia.

Información sobre el estado de la técnica en general



Existen varias formas diferentes de aspas auxiliares que han sido desarrolladas y usadas en los propulsores actuales.

En un modelo de Estados Unidos con Patente No. 4664592, cuyo contenido ha sido incorporado como referencia en este documento, se usan numerosas aspas auxiliares. Estas aspas auxiliares están ubicadas en la superficie de la envoltura delantera o trasera, con una saliente anular alrededor de los extremos exteriores de las aspas auxiliares, y teniendo un canal que se extiende a través de la saliente anular entre las aspas auxiliares contiguas.

El problema de las aspas auxiliares, con o sin salientes anulares en la circunferencia, es que se forman remolinos en las puntas (similares a los de aspas de un molino) que, al arrastrarse las partículas, pueden causar un severo desgaste de la ranura de la circunferencia del propulsor y los revestimientos laterales contiguos.

Al desgastarse las partes, el remolino que se forma detrás de cada aspa saliente se agranda y fortalece causando un desgaste en aumento en el revestimiento lateral contiguo.

Se sabe de bombas de agua que incluyen aspas auxiliares con un diámetro más pequeño que el de las envolturas y el diámetro del aspa principal (que generalmente son iguales). La razón por la cual se hace esto, no es para disminuir el desgaste sino para disminuir la acción de empuje hidráulico axial en el propulsor.

Divulgación de la invención

Uno de los aspectos del presente invento proporciona un propulsor apropiado para



usarse en bombas centrífugas, el propulsor incluye una envoltura con frentes opuestos, una parte de borde periférico exterior y un eje de rotación, varias aspas de bombeo en uno de los frentes de la envoltura que se extienden alejándose del eje de rotación, cada aspa de bombeo con una parte de borde periférico exterior y varias aspas de bombeo en el otro frente de la envoltura, las aspas auxiliares de cada una con una parte de borde exterior donde la medida de "Da" del eje de rotación hacia la parte del borde periférico exterior de la envoltura es mayor que la medida desde el eje de rotación a la parte del borde exterior de las aspas auxiliares "Db".

Se prefiere un diseño en que el propulsor incluye dos envolturas, (una envoltura delantera y una envoltura trasera) con las aspas de bombeo entremedio y las aspas auxiliares en una o ambas envolturas. En una versión, la envoltura delantera se extiende mas allá del diámetro de las aspas de bombeo auxiliares y principales. En otra versión, la envoltura trasera se extiende mas allá del diámetro de las aspas de bombeo auxiliares y principales. En otra de las adaptaciones tanto las envolturas delanteras y traseras se extienden mas allá del diámetro de las aspas auxiliares y de bombeo. Preferentemente, el diámetro de las aspas de bombeo y las aspas auxiliares son casi del mismo diámetro, por ejemplo dentro de un 5% entre una y la otra.

De preferencia, las aspas de bombeo y auxiliares son de un diámetro similar para asegurar la adecuada disminución de presión y disminuir el flujo recirculante mientras la envoltura del propulsor se extiende mas allá de ambas con el fin de aminorar su desgaste.

El beneficio de la adaptación de envoltura extendida del propulsor es que la punta del remolino de cada aspa auxiliar se pierde contra el frente de la envoltura extendida y es atrapada dentro del hueco o espacio entre la envoltura y el revestimiento lateral contiguo. Con este sistema se disminuye substancialmente el



desgaste del propulsor y del revestimiento. El beneficio de esta presente invención pareciera derivarse del hecho de no permitir una formación completa de remolinos en las puntas.

Más aun, en una versión de este invento se proporciona un propulsor con una envoltura de diámetro de "Da" y una diversidad de aspas auxiliares radiales predominantes en la cara de la envoltura delantera con un diámetro "Db", el extremo radial de fuera de las aspas se estrecha devolviéndose hacia la envoltura en ángulo "Z". Se ha descubierto que el desgaste de la envoltura, revestimiento lateral y aspas auxiliares ha disminuido substancialmente al ser el "Db" menor que 0.95 de "Da" y de preferencia desde 0.65 a 0.95 de "Da", dándole una prioridad de menos de 0.9 de "Da". Aparentemente esto se debe al suficiente espacio entre la punta de las aspas auxiliares y la circunferencia de la envoltura para atrapar los remolinos arrastrados. De preferencia, el diámetro de "Db" es aproximadamente igual al diámetro de la aspa de bombeo principal. Esta relación asegura que la capacidad para disminuir la presión de las aspas auxiliares no sea perjudicada en forma significativa al compararse con la presión producida por las aspas de bombeo principales.

Breve descripción de los dibujos

Las versiones preferidas de este invento serán descritas a continuación como ejemplo con referencia a los dibujos acompañados.

La Figura 1 es una perspectiva de una técnica de propulsor anterior como se muestra en la Figura 1 de la Patente No. 4,664,592 de Estados Unidos.

La Figura 2 es una vista parcial de una sección de un propulsor y expulsor convencional, o aspas auxiliares de una bomba centrífuga.

La Figura 3 es un aumento de la parte circular de la Figura 2, que muestra



el curso del flujo del relave entre una aspa auxiliar y el revestimiento de la cubierta.

La Figura 4 muestra una serie de fotografías de perfiles desgastados en aspas de expulsión típicas;

La Figura 5 es una vista parcial de una sección similar a la de la Figura 2 pero que muestra una versión de propulsor de acuerdo con el presente invento.

La Figura 6 es una fotografía que muestra el perfil desgastado de aspas auxiliares de una técnica anterior de propulsor.

La Figura 7 es una fotografía que muestra el perfil desgastado de las aspas auxiliares en un propulsor de acuerdo con este invento.

La Figura 8 es una vista axial o final de otra versión de un propulsor de acuerdo con el presente invento; y

La Figura 9 es una vista axial o final de otra versión de propulsor de acuerdo con el presente invento.

Métodos mejores

El sistema de propulsor conocido en el estado de la técnica y que corresponde al No. 1 de la Figura 1 se describe completamente en EEUU 4,664,592 y se va a tomar como referencia esa especificación.

Tal como se muestra en la Figura 2, se envuelve un propulsor 20 en el revestimiento de la cubierta 21. El relave fluye a través del propulsor 20 desde la entrada 22 a la salida 23 de cada cámara de bombeo 24 a medida que el



propulsor gira dentro del revestimiento de la cubierta 21. Se produce en forma natural un flujo recirculante de relave desde la salida 23 hacia la entrada 22, causando un desgaste abrasivo en la entrada del revestimiento lateral 25. Las aspas auxiliares o expulsoras 26 mueven hacia atrás el relave recirculante 27 hacia la salida del propulsor, como se señala por las partículas 28. El curso del flujo del relave entre el propulsor 20 y revestimiento 25 se muestra en forma mas detallada en la Figura 3.

Los perfiles desgastados de las aspas auxiliares que aparecen en las fotografías de la Figura 4 son ejemplo del problema que confronta la industria y que serán corregidos mediante la aplicación de versiones del presente invento.

La Figura 5 incluye las mismas figuras de referencia de partes similares a las designadas en las Figuras 2 y 3. En esta versión del invento las aspas auxiliares son derechas, con un diámetro del punto que se muestra en la aspa auxiliar 26 de $D_b = 0.85D_a$, en donde el D_a es el diámetro de la envoltura, y donde el ángulo $Z = 45^\circ$. El diámetro de D_b es aproximadamente igual al diámetro del aspa de bombeo principal indicada como D_c en la Figura 5.

Las pruebas de la versión de este invento y las comparaciones de resultados con ejemplos de una técnica anterior similar a la que se muestra en la Figura 4, demuestra un desgaste mucho menor en las puntas de las aspas y en el revestimiento lateral contiguo en aproximadamente el mismo tiempo de operación.

Como se puede ver en las fotografías de la Figura 6, el desgaste de las aspas auxiliares de este conocido propulsor es generalizado.

En contraste, las aspas auxiliares del propulsor de la Figura 7 están en condiciones considerablemente mejores que las que se muestran en la Figura 6, a pesar de haber estado operando en un ambiente similar y por un periodo de



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tiempo similar.

La versión del propulsor 30 de la Figura 8 esta formada por aspas auxiliares 31 que tienen bordes conductores y arrastrantes curvos en vez de derechos como los de las versiones de las Figuras 5 y 7. La versión correspondiente al estado de la técnica se muestra en la Figura 6. Nuevamente, esta versión del presente invento muestra un desgaste mucho menor en las puntas de las aspas al compararse con lo existente en el estado de la técnica anterior equivalente, para tiempos de operación o funcionamiento similar.

La versión de la Figura 9 muestra otra variación más de perfil de las aspas auxiliares 41 del propulsor 40.

Finalmente, se debe tener presente que se pueden incorporar varias alteraciones, modificaciones y/o agregados en las variadas construcciones y adaptaciones de partes sin apartarse del espíritu o del ámbito del invento.



REIVINDICACIONES

1. Un propulsor apropiado para el uso en una bomba centrífuga, **CARACTERIZADO** porque el propulsor incluye una envoltura con frentes opuestos, una parte con borde periférico exterior y un eje de rotación, una pluralidad de aspas de bombeo en uno de los frentes de la envoltura que se extienden alejándose del eje de rotación, cada aspa de bombeo con una parte con borde periférico exterior y una pluralidad de aspas auxiliares en el otro frente de la envoltura, las aspas auxiliares de cada una con una parte con borde exterior donde la medida de "Da" desde el eje de rotación hacia la parte del borde periférico exterior de la envoltura es mayor que la medida desde el eje de rotación hacia la parte del borde exterior de las aspas auxiliares "Db".
2. Un propulsor de acuerdo a la reivindicación 1, **CARACTERIZADO** porque la medida de "Da" es mayor que la medida de "Dc" desde el eje de rotación hacia la parte del borde periférico exterior de las aspas de bombeo.
3. Un propulsor de acuerdo con la reivindicación 2, **CARACTERIZADO** porque la envoltura que se menciona es una envoltura trasera.
4. Un propulsor de acuerdo con la reivindicación 3, **CARACTERIZADO** porque el propulsor incluye además una envoltura delantera, las aspas de bombeo encontrándose entre las envolturas delanteras y traseras y las aspas auxiliares en el otro frente de una de las envolturas.
5. Un propulsor de acuerdo con la reivindicación 3, **CARACTERIZADO** porque el propulsor además incluye una envoltura delantera, encontrándose las aspas de bombeo entre las envolturas delanteras y traseras y las aspas auxiliares en el otro frente de cada una de las envolturas.



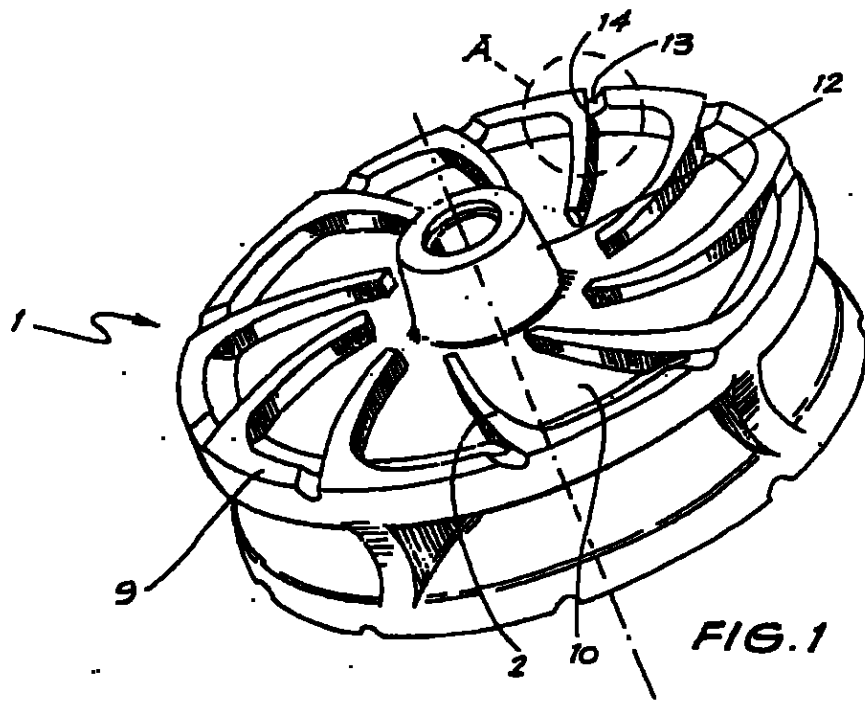
6. Un propulsor de acuerdo con la reivindicación 4, CARACTERIZADO porque la medida de "Da" de la envoltura delantera es mayor que las medidas de Db y Dc.
7. Un propulsor de acuerdo con la reivindicación 4, CARACTERIZADO porque la medida trasera de la envoltura es mayor que las medidas de "Db" y "Dc".
8. Un propulsor de acuerdo a la reivindicación 4, CARACTERIZADO porque la medida de "Da" de las envolturas delanteras y traseras es mayor que las medidas de "Db" y "Dc".
9. Un propulsor de acuerdo con la reivindicación 5, CARACTERIZADO porque la medida de "Da" de la envoltura delantera es mayor que las medidas de "Db" y "Dc".
10. Un propulsor de acuerdo con la reivindicación 5, CARACTERIZADO porque la medida de "Da" de la envoltura trasera es mayor que las medidas "Db" y "Dc".
11. Un propulsor de acuerdo con la reivindicación 5, CARACTERIZADO porque la medida de "Da" de las envolturas delanteras y traseras es mayor que las medidas de "Db" y "Dc".
12. Un propulsor de acuerdo con la reivindicación 6, CARACTERIZADO porque el "Db" y "Dc" son substancialmente iguales.
13. Un propulsor de acuerdo con la reivindicación 12, CARACTERIZADO porque el "Db" y "Dc" están dentro del 5% la una de la otra.
14. Un propulsor de acuerdo con la reivindicación 13, CARACTERIZADO porque el "Db" es menor que 0.95 de "Da".



15. Un propulsor de acuerdo con la reivindicación 14, CARACTERIZADO porque el "Db"/"Da" es desde 0.65 a 0.95.

16. Un propulsor de acuerdo con la reivindicación 14, CARACTERIZADO porque el "Db"/"Da" es desde 0.65 a 0.9.





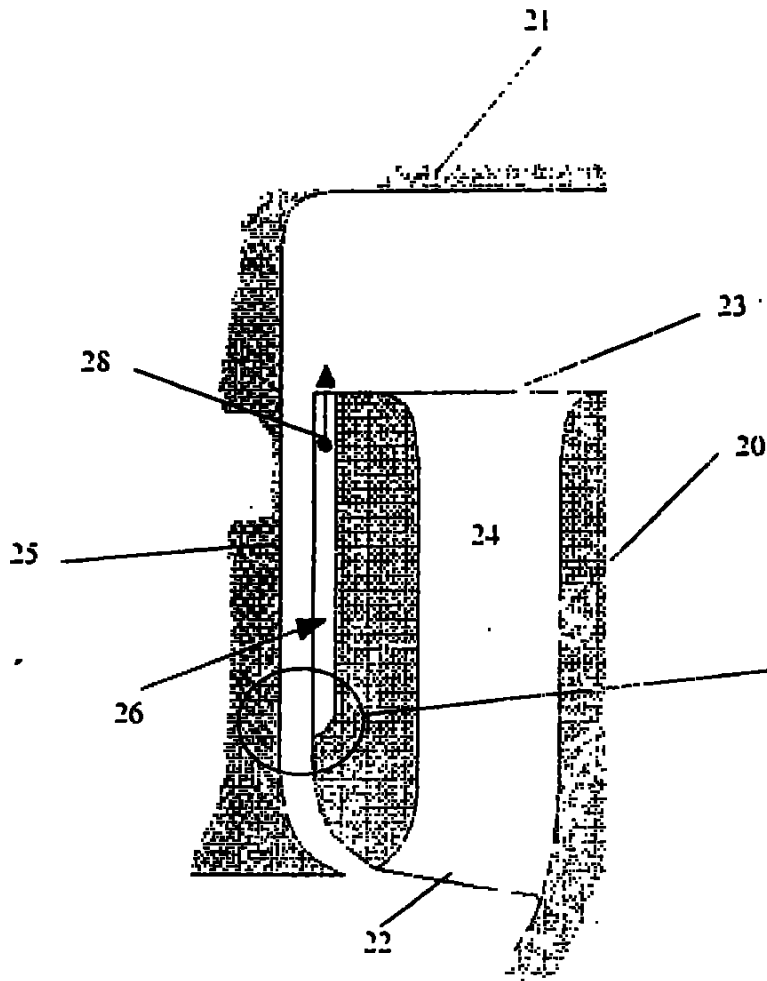


FIGURA 1

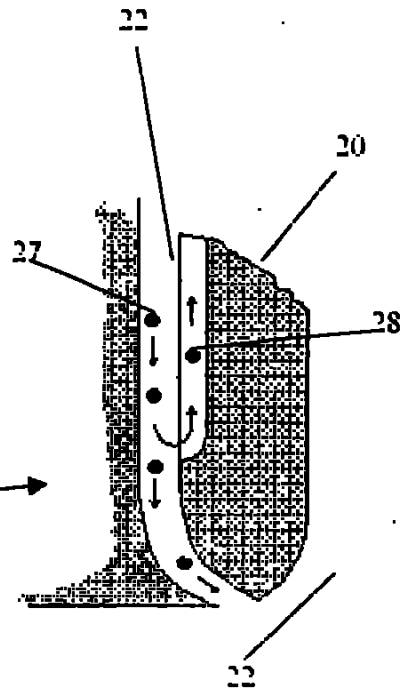


FIGURA 3





FIGURA 4

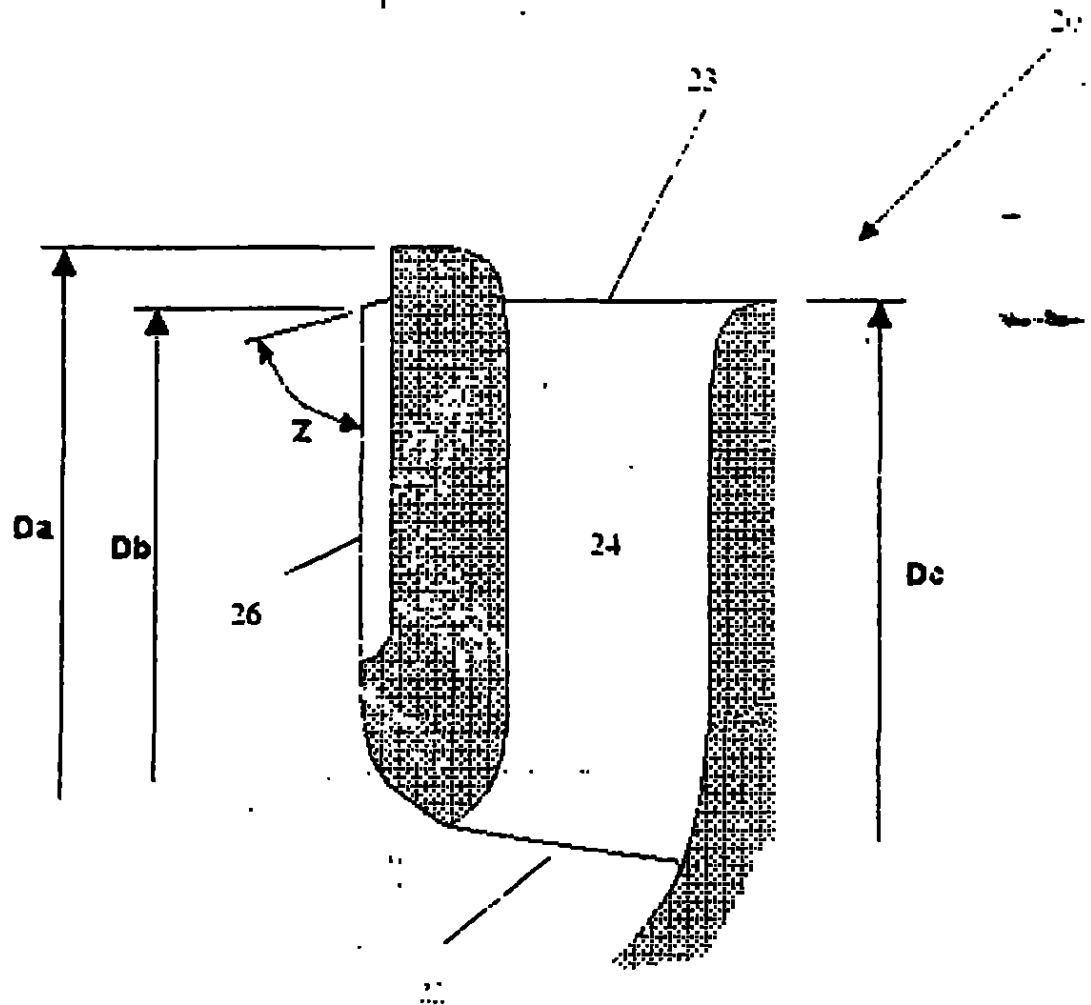


FIGURA 5





FIGURA 6

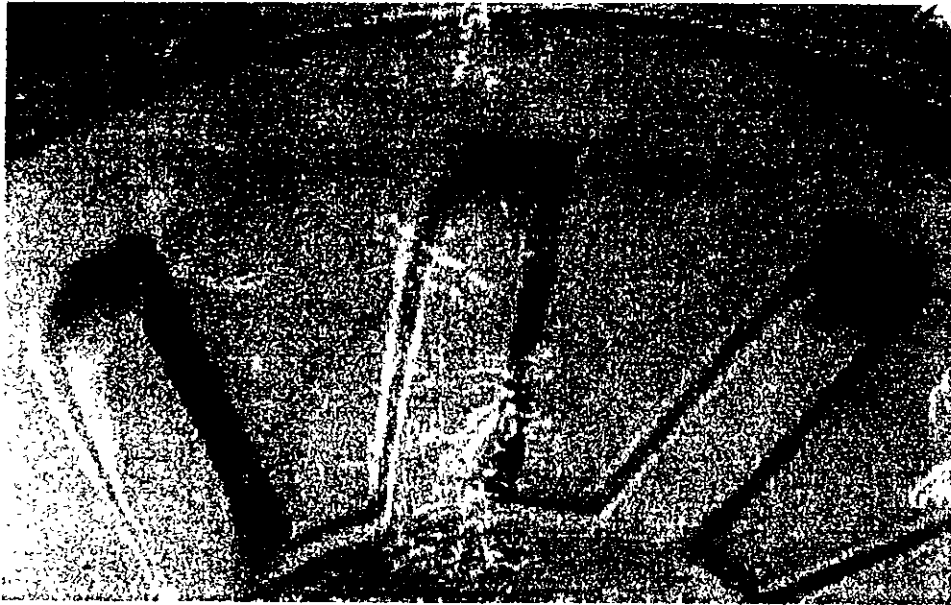


FIGURA 7

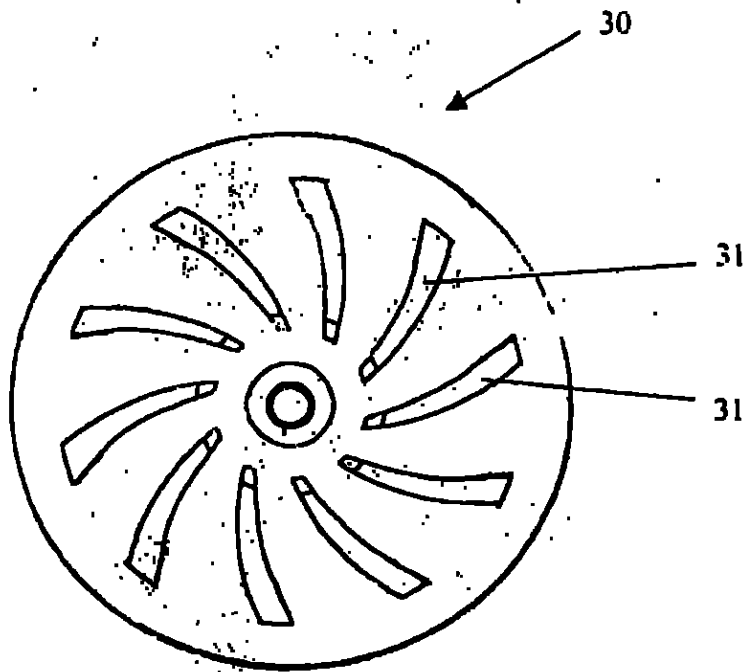


FIGURA 8

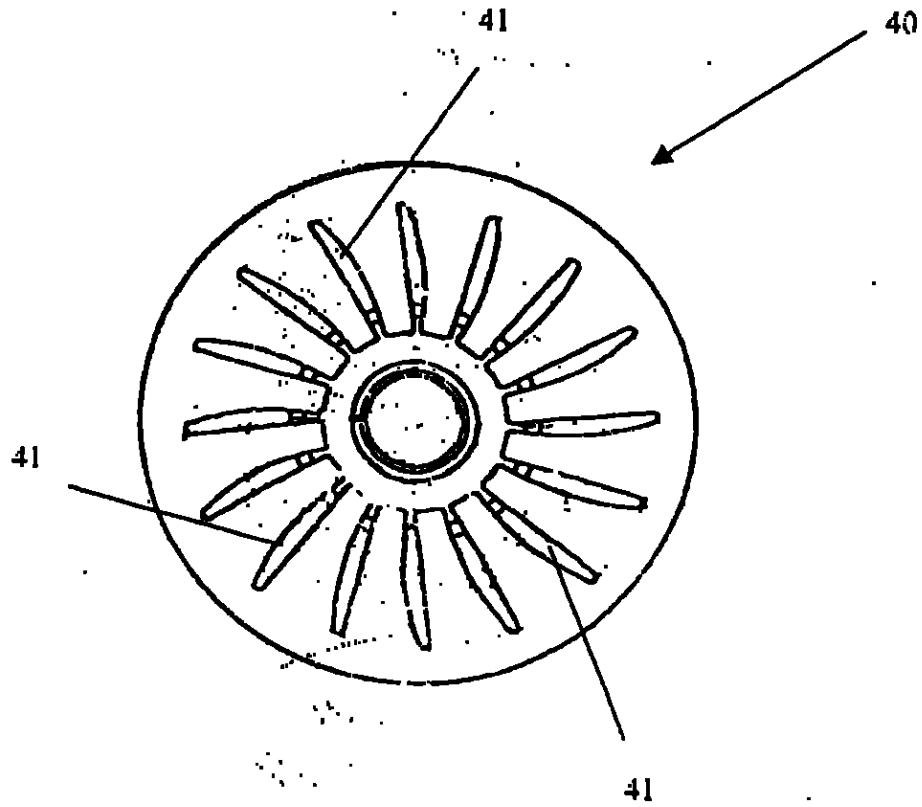


FIGURA 9



PATENT COOPERATION TREATY
PCT
INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 12256731/ARS/skp	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/AU2004/000784	International filing date (day/month/year) 15 June 2004	Priority date (day/month/year) 16 June 2003	
International Patent Classification (IPC) or national classification and IPC Int. Cl. ⁷ F04D 29/22, 29/24, 7/04			
Applicant WEIR WARMAN LTD et al			
1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36. 2. This REPORT consists of a total of 3 sheets, including this cover sheet. 3. This report is also accompanied by ANNEXES, comprising: a. ☒ (sent to the applicant and to the International Bureau) a total of 2 sheets, as follows: ☒ sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions). ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or table related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).			
This report contains indications relating to the following items: ☒ Box No. I Basis of the report ☐ 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 Article 35(2) 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			
Date of submission of the demand 18 January 2005		Date of completion of the report 31 May 2005	
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929		Authorized Officer R. SUBBARAYAN Telephone No. (02) 6283 2377	

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on translations from the original language into the following language which is the language of a translation furnished for the purposes of:

☐ international search (under Rules 12.3 and 23.1 (b))

☐ publication of the international application (under Rule 12.4)

☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

☐ the international application as originally filed/furnished

☒ the description:

pages 1-7 as originally filed/furnished

pages* received by this Authority on with the letter of

pages* received by this Authority on with the letter of

☒ the claims:

pages as originally filed/furnished

pages* as amended (together with any statement) under Article 19

pages* 8-9 received by this Authority on 1 March 2005 with the letter of 28 February 2005

pages* received by this Authority on with the letter of

☒ the drawings:

pages 1/6-6/6 as originally filed/furnished

pages* received by this Authority on with the letter of

pages* received by this Authority on with the letter of

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages

☐ the claims, Nos.

☐ the drawings, sheets/figs

☐ the sequence listing (*specify*):

☐ any table(s) related to the sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages

☐ the claims, Nos.

☐ the drawings, sheets/figs

☐ the sequence listing (*specify*):

☐ any table(s) related to the sequence listing (*specify*):

* If item 4 applies, some or all of those sheets may be marked "superseded."

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 1-15	YES
	Claims	NO
Inventive step (IS)	Claims 1-15	YES
	Claims	NO
Industrial applicability (IA)	Claims 1-15	YES
	Claims	NO

2. Citations and explanations (Rule 70.7)

None of the documents cited in the International Search Report disclose an impeller suitable for use in a centrifugal pump for handling liquid mixtures containing particulate solids, in which the dimension Da from the rotation axis to the outer peripheral edge portion of the shroud is greater than the dimension Db from the rotation axis to the outer edge portion of the auxiliary vanes Db and is greater than the dimension Dc from the rotation axis to the outer peripheral edge portion of the pumping vanes. The claimed invention is considered novel, inventive and industrially applicable.

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PATENT COOPERATION TREATY
PCT
INTERNATIONAL SEARCH REPORT
(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 12256731/ARS	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/AU2004/000784	International filing date (<i>day/month/year</i>) 15 June 2004	(Earliest) Priority Date (<i>day/month/year</i>) 16 June 2003
Applicant WEIR WARMAN LTD et al		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of **5** sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. ☐ Certain claims were found unsearchable (See Box No. II).

3. ☐ Unity of invention is lacking (See Box No. III).

4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☐ the text is approved as submitted by the applicant.

☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,

a. the figure of the drawings to be published with the abstract is Figure No. **5**

☐ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☒ as selected by this Authority, because this figure better characterizes the invention.

b. ☐ none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2004/000784

Box No. IV Text of the Abstract (Continuation of item 5 of the first sheet)

An impeller for use in a centrifugal pump, the impeller (20) including a shroud having opposed faces, an outer peripheral edge portion and a rotation axis, a plurality of pumping vanes on one of the faces of the shroud and extending away from the rotation axis, each pumping vane having an outer peripheral edge portion, and a plurality of auxiliary vanes (26) on the other face of the shroud, the auxiliary vanes each having an outer edge portion wherein the dimension D_a from the rotation axis to the outer peripheral edge portion of the shroud is greater than the dimension D_b from the rotation axis to the outer edge portion of the auxiliary vanes.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2004/000784

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. ⁷: F04D 29/22, 29/24, 7/04

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)

Refer electronic database consulted below

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)

DWPI - keywords centrifugal pump, auxiliary, additional, shroud, enclosed, vane, blade and similar terms

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5489187 A (RAY) 6 February 1996 Fig 1	1
X Y	US 5165858 A (GILBERT et al) 24 November 1992 Column 6, lines 7-25, fig 6	1 2-11
X	Derwent abstract accession No. 84-217836/35, class Q56, SU 1064047 A (ALEKSANDROV) 30 December 1983 Abstract	1
Y	EP 567123 A1 (PRAXAIR TECHNOLOGY, INC.) 27 October 1993 Fig 1	2-11

☒ 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	"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
29 July 2004

Date of mailing of the international search report

12 AUG 2004

Name and mailing address of the ISA/AU

AUSTRALIAN PATENT OFFICE
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Authorized officer

R. SUBBARAYAN

Telephone No : (02) 6283 2377

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU2004/000784

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4664592 A (GRZINA) 12 May 1987 Fig 4	2-11
A	US 3384026 A (WILLIAMSON, JR) 21 May 1968	
A	US 4883403 A (WALKER) 28 November 1989	
A	US 5921748 A (FRATER) 13 July 1999	

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/AU2004/000784

This Annex lists the known "A" publication level 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 Cited in Search Report			Patent Family Member				
US	5489187	AU	72451/96	CA	2232735	GB	2320742
		NZ	319837	US	5591001	US	6036434
		US	6074554	WO	9713071	ZA	9608140
US	5165858	EP	0389149	US	5088893		
EP	0567123	BR	9301625	BR	9401335	CA	2094624
		CA	2120428	CN	1084614	CN	1101097
		EP	0645522	JP	6010603	JP	7102903
		US	5342171				
US	4664592	AU	30237/84	BR	8403492	CA	1240557
		GB	2143285	IN	161816	JP	60036800
		PH	22483				
US	3384026						
US	4883403	AU	80718/87	BR	8707496	CN	87106758
		EP	0288500	WO	8802820		
US	5921748	AU	47090/96	BR	9607465	CA	2214415
		EP	0812392	WO	9627085	ZA	9601552

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.
END OF ANNEX

PATENT COOPERATION TREATY

41

From the:
INTERNATIONAL SEARCHING AUTHORITY

To:

Davies Collison Cave
GPO Box 3876
SYDNEY NSW 2001

**DCC (Sydney)
Mail Rcvd**

13 AUG 2004

ARNO processed by

on / /

Action

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing
(day/month/year)

12 AUG 2004

Applicant's or agent's file reference
12256731/ARS

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/AU2004/000784

International filing date (day/month/year)

15 June 2004

Priority date (day/month/year)

16 June 2003

International Patent Classification (IPC) or both national classification and IPC

CL⁷ F04D 29/22, 29/24, 7/04

Applicant

WEIR WARMAN LTD et al

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 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 66.1bis(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.

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

Name and mailing address of the IPEA/AU

AUSTRALIAN PATENT OFFICE
PO BOX 200, WODEN ACT 2606, AUSTRALIA
E-mail address: pct@ipaustalia.gov.au
Facsimile No. (02) 6285 3929

Authorized Officer

R. SUBBARAYAN
Telephone No. (02) 62832377

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/AU2004/000784

Box No. I Basis of the 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, unless otherwise indicated under this item.
☐ This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, 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
☐ in written format
☐ in computer readable form
 - c. time of filing/furnishing
☐ contained in the international application as filed.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table 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.
4. Additional comments:

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/AU2004/000784

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

1. Statement

Novelty (N)	Claims 2-16	YES
	Claims 1	NO
Inventive step (IS)	Claims 12-16	YES
	Claims 1-11	NO
Industrial applicability (IA)	Claims 1-16	YES
	Claims	NO

Citations and explanations:

D1) US 5165858
D2) US 5489187
D3) SU 1064047
D4) EP 567123
D5) US 4664592
D6) US 4883403

NOVELTY

Each of the citations D1, D2 & D3 disclose an impeller for a centrifugal pump in which the dimension Da from the rotation axis to the outer peripheral edge portion of the shroud is greater than the dimension Db from the rotation axis to the outer edge portion of the auxiliary vanes. For example in D1 the outer edge of the shroud of the impeller 40 is at a greater radii than the outer edge portion of the auxiliary vanes 130. Similarly in D2 shown in fig 1 the outer edge of the shroud 36 of the impeller 30 is at a greater radii than the outer edge portion of the auxiliary vanes 80. In D3 see additional vanes 12.

The invention defined in claim 1 would also appear to be not novel over the admitted prior art on page 3, lines 9-12 of your specification. You have clearly stated herein that water pumps are known in which the auxiliary vanes have a smaller diameter than the shroud. I can find nothing in claim 1 to distinguish it from this admitted prior art.

INVENTIVE STEP

Claim 1: As above

Claims 2-4, 6-8:

Citations D4 & D5 clearly show impellers in which the dimension Da from the rotation axis to the outer peripheral edge portion of the shroud is greater than the dimension Dc from the rotation axis to the outer edge portion of the pumping vanes. See fig 1 in D4 and fig 4 in D5. It would be obvious to a skilled addressee to combine the disclosures of either one of these documents with that of either one of D1- D3 and thereby arrive at the claimed invention. Claims 2-4, 6-8 therefore lack an inventive step.

(continued on supplemental sheet)

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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International Application No.

PCT/AU2004/000784

Supplemental Box

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

Continuation of: V. 2

Claims 5, 9-11:

Providing auxiliary vanes on both the shrouds is considered common general knowledge in the art, e.g. see citations D5 & D6. It would be obvious to a skilled addressee to combine this knowledge with the teachings of any one of D1-D3 in combination with the teachings of any one of D4-D5 and thereby arrive at the claimed invention. These claims therefore lack an inventive step.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2004/000784

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. ⁷: F04D 29/22, 29/24, 7/04

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)

Refer electronic database consulted below

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)

DWPI - keywords centrifugal pump, auxiliary, additional, shroud, enclosed, vane, blade and similar terms

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5489187 A (RAY) 6 February 1996 Fig 1	1
X Y	US 5165858 A (GILBERT et al) 24 November 1992 Column 6, lines 7-25, fig 6	1 2-11
X	Derwent abstract accession No. 84-217836/35, class Q56, SU 1064047 A (ALEKSANDROV) 30 December 1983 Abstract	1
Y	EP 567123 A1 (PRAXAIR TECHNOLOGY, INC.) 27 October 1993 Fig 1	2-11

☒ 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

29 July 2004

Date of mailing of the international search report

12 AUG 2004

Name and mailing address of the ISA/AU

AUSTRALIAN PATENT OFFICE
PO BOX 200, WODEN ACT 2606, AUSTRALIA
E-mail address: pct@ipaustalia.gov.au
Facsimile No. (02) 6285 3929

Authorized officer

R. SUBBARAYAN

Telephone No : (02) 6283 2377

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2004/000784

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4664592 A (GRZINA) 12 May 1987 Fig 4	2-11
A	US 3384026 A (WILLIAMSON, JR) 21 May 1968	
A	US 4883403 A (WALKER) 28 November 1989	
A	US 5921748 A (FRATER) 13 July 1999	

INTERNATIONAL SEARCH REP RT
Information on patent family members

International application No.
PCT/AU2004/000784

This Annex lists the known "A" publication level 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 Cited in Search Report				Patent Family Member			
US	5489187	AU	72451/96	CA	2232735	GB	2320742
		NZ	319837	US	5591001	US	6036434
		US	6074554	WO	9713071	ZA	9608140
US	5165858	EP	0389149	US	5088893		
EP	0567123	BR	9301625	BR	9401335	CA	2094624
		CA	2120428	CN	1084614	CN	1101097
		EP	0645522	JP	6010603	JP	7102903
		US	5342171				
US	4664592	AU	30237/84	BR	8403492	CA	1240557
		GB	2143285	IN	161816	JP	60036800
		PH	22483				
US	3384026						
US	4883403	AU	80718/87	BR	8707496	CN	87106758
		EP	0288500	WO	8802820		
US	5921748	AU	47090/96	BR	9607465	CA	2214415
		EP	0812392	WO	9627085	ZA	9601552
Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.							
END OF ANNEX							

PCT REQUEST

Duplicate of Original

0	For receiving Office use only	
0-1	International Application No.	
0-2	International Filing Date	
0-3	Name of receiving Office and "PCT International Application"	
0-4	Form PCT/RO/101 PCT Request	
0-4-1	Prepared Using	PCT-SAFE [EASY mode] Version 3.50 (Build 0002.162)
0-5	Petition The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty	
0-6	Receiving Office (specified by the applicant)	Australian Patent Office (RO/AU)
0-7	Applicant's or agent's file reference	12256731/ARS
I	Title of invention	IMPROVED PUMP IMPELLER
II	Applicant	
II-1	This person is	applicant only
II-2	Applicant for	all designated States except US
II-4	Name	WEIR WARMAN LTD
II-5	Address	1 Marden Street Artarmon, New South Wales 2064 Australia
II-6	State of nationality	AU
II-7	State of residence	AU
III-1	Applicant and/or inventor	
III-1-1	This person is	applicant and inventor
III-1-2	Applicant for	US only
III-1-4	Name (LAST, First)	WALKER, Craig, Ian
III-1-5	Address	18A Gladys Avenue Frenchs Forest, New South Wales 2086 Australia
III-1-6	State of nationality	AU
III-1-7	State of residence	AU

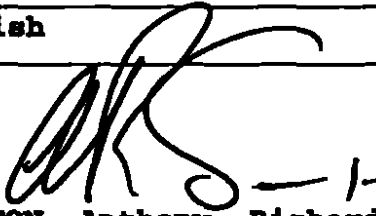
PCT REQUEST

Duplicate of Original

III-2	Applicant and/or inventor	
III-2-1	This person is	applicant and inventor
III-2-2	Applicant for	US only
III-2-4	Name (LAST, First)	WATERMANN, Anton
III-2-5	Address	61 Nelson Street Bedforddale, Western Australia 6112 Australia
III-2-6	State of nationality	AU
III-2-7	State of residence	AU
IV-1	Agent or common representative; or address for correspondence The person identified below is hereby/ has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:	agent
IV-1-1	Name (LAST, First)	SMEEETON, Anthony, Richard
IV-1-2	Address	Davies Collison Cave Level 10 10 Barrack Street Sydney, New South Wales 2000 Australia
IV-1-3	Telephone No.	61 2 9262 2611
IV-1-4	Facsimile No.	61 2 262 1080
IV-1-5	e-mail	tsmeeton@davies.com.au
IV-2	Additional agent(s)	additional agent(s) with same address as first named agent
IV-2-1	Name(s)	CARTER, Christopher, John; COWLE, Anthony, John; HEISKY, Ross, Mitchell; HIRD, William; SCHILLING, Frederick, Lyle; SMITH, Alistair, James; STEARNE, Peter, Andrew; THOO, Laurence, Wei Yong
V	DESIGNATIONS	
V-1	The filing of this request constitutes under Rule 4.9(a), the designation of all Contracting States bound by the PCT on the international filing date, for the grant of every kind of protection available and, where applicable, for the grant of both regional and national patents.	
VI-1	Priority claim of earlier national application	
VI-1-1	Filing date	16 June 2003 (16.06.2003)
VI-1-2	Number	2003903024
VI-1-3	Country	AU

PCT REQUEST

Duplicate of Original

VI-2	Priority document request The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) identified above as item(s):	VI-1	
VII-1	International Searching Authority Chosen	Australian Patent Office (ISA/AU)	
VIII	Declarations	Number of declarations	
VIII-1	Declaration as to the identity of the inventor	-	
VIII-2	Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent	-	
VIII-3	Declaration as to the applicant's entitlement, as at the international filing date, to claim the priority of the earlier application	-	
VIII-4	Declaration of inventorship (only for the purposes of the designation of the United States of America)	-	
VIII-5	Declaration as to non-prejudicial disclosures or exceptions to lack of novelty	-	
IX	Check list	number of sheets	electronic file(s) attached
IX-1	Request (including declaration sheets)	4	✓
IX-2	Description	7	-
IX-3	Claims	2	-
IX-4	Abstract	1	✓
IX-5	Drawings	6	-
IX-7	TOTAL	20	
	Accompanying items	paper document(s) attached	electronic file(s) attached
IX-8	Fee calculation sheet	✓	-
IX-17	PCT-SAFE physical media	-	✓
IX-19	Figure of the drawings which should accompany the abstract	1	
IX-20	Language of filing of the international application	English	
X-1	Signature of applicant, agent or common representative		
X-1-1	Name (LAST, First)	SMEETON, Anthony, Richard	
X-1-2	Name of signatory		
X-1-3	Capacity		

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12256731/ARS

4/4

PCT REQUEST

Duplicate of Original

X-2	Signature of applicant, agent or common representative	
X-2-1	Name (LAST, First)	
X-2-2	Name of signatory	
X-2-3	Capacity	

FOR RECEIVING OFFICE USE ONLY

10-1	Date of actual receipt of the purported international application	
10-2	Drawings:	
10-2-1	Received	
10-2-2	Not received	
10-3	Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application	
10-4	Date of timely receipt of the required corrections under PCT Article 11(2)	
10-5	International Searching Authority	ISA/AU
10-6	Transmittal of search copy delayed until search fee is paid	

FOR INTERNATIONAL BUREAU USE ONLY

11-1	Date of receipt of the record copy by the International Bureau	
------	--	--

PCT REQUEST (ANNEX - FEE CALCULATION SHEET)

Duplicate of Original

(This sheet is not part of and does not count as a sheet of the international application)

0	For receiving Office use only			
0-1	International Application No.			
0-2	Date stamp of the receiving Office			
0-4	Form PCT/RO/101 (Annex) PCT Fee Calculation Sheet Prepared Using	PCT-SAFE [EASY mode] Version 3.50 (Build 0002.162)		
0-8	Applicant's or agent's file reference	12256731/ARS		
2	Applicant	WEIR WARMAN LTD		
12	Calculation of prescribed fees	fee amount/multiplier	Total amounts (AUD)	
12-1	Transmittal fee T	⇒	100	
12-2-1	Search fee S	⇒	1200	
12-2-2	International search to be carried out by	AU		
12-3	International filing fee (first 30 sheets) H	1525		
12-4	Remaining sheets	0		
12-5	Additional amount (Q)	0		
12-6	Total additional amount I2	0		
12-7	H + I2 = I	1525		
12-12	EASY Filing reduction R	-109		
12-13	Total international filing fee (I-R) I	⇒	1416	
12-14	Fee for priority document Number of priority documents requested	1		
12-15	Fee per document (X)	50		
12-18	Total priority document fee: P	⇒	50	
12-17	TOTAL FEES PAYABLE (T+S+I+P)	⇒	2766	
12-19	Mode of payment	other CREDIT CARD		

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The demand must be filed directly with the competent International Preliminary Examining Authority or, if two or more Authorities are competent, with the one chosen by the applicant. The full name or two-letter code of that Authority may be indicated by the applicant on the line below.

IPEA/ _____

PCT

CHAPTER II

DEMAND

under Article 31 of the Patent Cooperation Treaty:

The undersigned requests that the international application specified below be the subject of international preliminary examination according to the Patent Cooperation Treaty and

For International Preliminary Examining Authority use only

Identification of IPEA		Date of receipt of DEMAND	
Box No. I IDENTIFICATION OF THE INTERNATIONAL APPLICATION		Applicant's or agent's file reference 12256731/ARS	
International application No. PCT/AU2004/000784	International filing date (day/month/year) 15-Jun-2004	(Earliest) Priority date (day/month/year) 16-Jun-2003	
Title of invention IMPROVED PUMP IMPELLER			
Box No. II APPLICANT(S)			
Name and address: (Family name followed by given name: for a legal entity, full official designation. The address must include postal code and name of country.) WEIR WARMAN LTD 1 Marden Street, Artarmon New South Wales, 2064 Australia		Telephone No.: 02 65 820510	
		Facsimile No.: 02 65 820510	
		Email:	
		Applicant's Reg. No. with the Office	
State (that is, country) of nationality: AUSTRALIA		State (that is, country) of residence: AUSTRALIA	
Name and address: (Family name followed by given name: for a legal entity, full official designation. The address must include postal code and name of country.) WALKER, Craig Ian 18 A Gladys Avenue Frenchs Forest, New South Wales, 2086 Australia			
State (that is, country) of nationality: AUSTRALIA		State (that is, country) of residence: AUSTRALIA	
Name and address: (Family name followed by given name: for a legal entity, full official designation. The address must include postal code and name of country.) WATERMANN, Anton 61 Nelson Street Bedforddale, Western Australia, 6112 Australia			
State (that is, country) of nationality: AUSTRALIA		State (that is, country) of residence: AUSTRALIA	
☐ Further applicants are indicated on a continuation sheet.			

Form PCT/IPEA/401 (first sheet) (January 2004)

See Notes to the demand form

Sheet No. 2		International application no. PCT/AU2004/000784
Box No. III AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE		
The following person is ☒ agent ☐ common representative and ☒ has been appointed earlier and represents the applicant(s) also for international preliminary examination. ☐ is hereby appointed and any earlier appointment of (an) agent(s)/common representative is hereby revoked. ☐ is hereby appointed, specifically for the procedure before the International Preliminary Examining Authority, in addition to the agent(s)/common representative appointed earlier.		
Name and address: <i>(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)</i>		
COWLE, Anthony John HEISEY, Ross Mitchell SCHILLING, Frederick Lyle SMEETON, Anthony Richard STEARNE, Peter Andrew CARTER, Christopher John HIRD, William	DAVIES COLLISON CAVE Level 10, 10 Barrack Street Sydney New South Wales 2000 Australia	Telephone No.: (612) 9262 2611 Facsimile No.: (612) 9262 1080 Teleprinter No. Agent's registration No. with the Office
☐ Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.		
Box No. IV BASIS FOR INTERNATIONAL PRELIMINARY EXAMINATION		
Statement concerning amendments:*		
1. The applicant wishes the international preliminary examination to start on the basis of: ☒ the international application as originally filed the description ☐ as originally filed ☐ as amended under Article 34 the claims ☐ as originally filed ☐ as amended under Article 19 (together with any accompanying statement) ☐ as amended under Article 34 the drawings ☐ as originally filed ☐ as amended under Article 34		
2. ☐ The applicant wishes any amendment to the claims under Article 19 to be considered as reversed.		
3. ☐ The applicant wishes the start of the international preliminary examination to be postponed until the expiration of the applicable time limit under Rule 69.1(d).		
4. ☐ The applicant expressly wishes the international preliminary examination to start earlier than at the expiration of the applicable time limit under Rule 54bis.1(a).		
• Where no check-box is marked, international preliminary examination will start on the basis of the international application as originally filed or, where a copy of amendments to the claims under Article 19 and/or amendments of the international application under Article 34 are received by the International Preliminary Examining Authority before it has begun to draw up a written opinion or the international preliminary examination report, as so amended.		
Language for the purposes of international preliminary examination:		
☒ which is the language in which the international application was filed. ☐ which is the language of a translation furnished for the purposes of international search. ☐ which is the language of publication of the international application. ☐ which is the language of the translation (to be) furnished for the purposes of international preliminary examination.		
Box No. V ELECTION OF STATES		
The filing of this demand constitutes the election of all Contracting States which are designated and are bound by Chapter II of the PCT.		

Box No. VI CHECK LIST

The demand is accompanied by the following elements, in the language referred to in Box No. IV, for the purposes of international preliminary examination:

- | | | | |
|----|---|---|--------|
| 1. | translation of international application | : | sheets |
| 2. | amendments under Article 34 | : | sheets |
| 3. | copy (or, where required, translation) of amendments under Article 19 | : | sheets |
| 4. | copy (or, where required, translation) of statement under Article 19 | : | sheets |
| 5. | letter | : | sheets |
| 6. | other (specify) | : | sheets |

For International Preliminary
Examining Authority use only

received not received

☐	☐
☐	☐
☐	☐
☐	☐
☐	☐
☐	☐

The demand is also accompanied by the item(s) marked below:

- | | |
|--|--|
| 1. ☒ fee calculation sheet | 5. ☐ statement explaining lack of signature |
| 2. ☐ original separate power of attorney | 6. ☐ sequence listing in computer readable form |
| 3. ☐ original general power of attorney | 7. ☐ tables in computer readable form related to a sequence listing |
| 4. ☐ copy of general power of attorney: reference number, if any: | 8. ☐ other (specify): |

Box No. VII SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the demand).



ANTHONY SMEETON

For and on behalf of the applicant/s

For International Preliminary Examining Authority use only

1. Date of actual receipt of DEMAND:

2. Adjusted date of receipt of demand due to CORRECTIONS under Rule 60.1(b):

3. ☐ The date of receipt of the demand is AFTER the expiration of 19 months from the priority date and item 4 or 5, below, does not apply.
☐ The applicant has been informed accordingly.

4. ☐ The date of receipt of the demand is WITHIN the time limited of 19 months from the priority date as extended by virtue of Rule 80.5.

5. ☐ Although the date of receipt of the demand is after the expiration of 19 months from the priority date, the delay in arrival is EXCUSED pursuant to Rule 82.

6. ☐ The date of receipt of the demand is AFTER the expiration of the time limit under Rule 54bis.1(a) and item 7 or 8, below, does not apply.

7. ☐ The date of receipt of the demand is WITHIN the time limit under Rule 54bis.1(a) as extended by virtue of Rule 80.5.

8. ☐ Although the date of receipt of the demand is after the expiration of the time limit under Rule 54bis.1(a), the delay in arrival is EXCUSED pursuant to Rule 82.

For International Bureau use only

Demand received from IPEA on:

PCT

CHAPTER II

FEE CALCULATION SHEET

Annex to the Demand

International application No. PCT/AU2004/000784 Applicant's or agent's file reference 12256731/ARS	For International Preliminary Examining Authority use only																
Applicant WEIR WARMAN LTD																	
Calculation of prescribed fees <table style="width: 100%; border-collapse: collapse;"><tr><td style="width: 50%;">1. Preliminary examination fee</td><td style="width: 10%; text-align: center; border: 1px solid black;">550.00</td><td style="width: 10%; text-align: center; border: 1px solid black;">P</td><td style="width: 30%;"></td></tr><tr><td>2. Handling fee (<i>Applicants from certain States are entitled to a reduction of 75% of the handling fee. Where the applicant is (or all applicants are) so - entitled, the amount to be entered at H is 25% of the handling fee.</i>)</td><td style="text-align: center; border: 1px solid black;">218.00</td><td style="text-align: center; border: 1px solid black;">H</td><td></td></tr><tr><td>3. Total of prescribed fees Add the amounts entered at P and H and enter total in the TOTAL box</td><td style="text-align: center; border: 1px solid black;">768.00</td><td></td><td></td></tr><tr><td></td><td style="text-align: center; border: 1px solid black;">TOTAL.</td><td></td><td></td></tr></table>		1. Preliminary examination fee	550.00	P		2. Handling fee (<i>Applicants from certain States are entitled to a reduction of 75% of the handling fee. Where the applicant is (or all applicants are) so - entitled, the amount to be entered at H is 25% of the handling fee.</i>)	218.00	H		3. Total of prescribed fees Add the amounts entered at P and H and enter total in the TOTAL box	768.00				TOTAL.		
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	TOTAL.																
Mode of Payment <table style="width: 100%; border-collapse: collapse;"><tr><td style="width: 50%; vertical-align: top;"> ☐ authorization to charge deposit account with the IPEA (see below) ☐ cheque ☐ postal money order ☐ bank draft </td><td style="width: 50%; vertical-align: top;"> ☐ cash ☐ revenue stamps ☐ coupons ☒ other (specify): CREDIT CARD </td></tr></table>				☐ authorization to charge deposit account with the IPEA (see below) ☐ cheque ☐ postal money order ☐ bank draft	☐ cash ☐ revenue stamps ☐ coupons ☒ other (specify): CREDIT CARD												
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AUTHORIZATION TO CHARGE (OR CREDIT) DEPOSIT ACCOUNT <i>(This mode of payment may not be available at all IPEAs)</i> <table style="width: 100%; border-collapse: collapse;"><tr><td style="width: 50%; vertical-align: top;"> ☐ Authorization to charge the total fees indicated above. ☐ <i>(This check box may be marked only if the conditions for deposit accounts of the IPEA so permit)</i> Authorisation to charge any deficiency or credit any overpayment in the total fees indicated above. </td><td style="width: 50%; vertical-align: top;"> IPEA/ _____ Deposit Account No.: _____ Date: _____ Name: _____ Signature: _____ </td></tr></table>				☐ Authorization to charge the total fees indicated above. ☐ <i>(This check box may be marked only if the conditions for deposit accounts of the IPEA so permit)</i> Authorisation to charge any deficiency or credit any overpayment in the total fees indicated above.	IPEA/ _____ Deposit Account No.: _____ Date: _____ Name: _____ Signature: _____												
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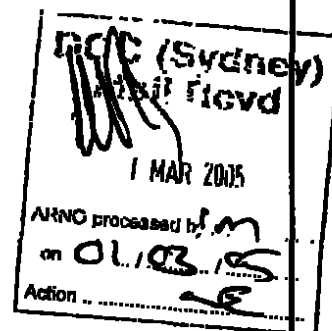
From the INTERNATIONAL BUREAU

PCT

INFORMATION CONCERNING ELECTED
OFFICES NOTIFIED OF THEIR ELECTION

(PCT Article 31(7) and Rule 61.3)

To:

SMEETON, Anthony, Richard
Davies Collison Cave
Level 10
10 Barrack Street
Sydney, New South Wales 2000
AUSTRALIE

Date of mailing (day/month/year) 24 February 2005 (24.02.2005)		IMPORTANT INFORMATION
Applicant's or agent's file reference AU04_784 1256731		
International application No. PCT/AU2004/000784	International filing date (day/month/year) 15 June 2004 (15.06.2004)	Priority date (day/month/year) 16 June 2003 (16.06.2003)
Applicant WEIR WARMAN LTD et al		

- The applicant is hereby informed that the International Bureau has, according to Article 31(7), notified each of the following Offices of its election:
EP: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR
National: BG, CA, CN, CZ, DE, JP, KP, KR, MN, NO, PL, RO, RU, SK, US
- The following Offices have waived the requirement for the notification of their election; the notification will be sent to them by the International Bureau only upon their request:
AP: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW
EA: AM, AZ, BY, KG, KZ, MD, RU, TJ, TM
OA: BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG
National: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BR, BW, BY, BZ, CH, CO, CR, CU, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MW, MX, MZ, NA, NI, NZ, OM, PG, PH, PT, SC, SD, SE, SG, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW
- Since the election(s) was (were) made after the expiration of 19 months from the priority date, the applicant is reminded that he must, subject to the following paragraph, enter the national phase within 20 months from the priority date (or later in some Offices) before some of the designated Offices in respect of which Article 22(1), as modified with effect of 1 April 2002, does not apply, by paying the national fee(s) and furnishing, if prescribed, a translation of the international application.

However, in respect of most other designated Offices, the time limit of 30 months (or later) may nevertheless apply. See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters, the *PCT Newsletter* and the WIPO Internet site, updated regularly.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Dorothee Mülhausen
Facsimile No.+41 22 740 14 35	Facsimile No.+41 22 338 87 40

PATENT COOPERATION TREATY

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From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF RECEIPT OF
RECORD COPY

(PCT Rule 24.2(a))

To:

SMEETON, Anthony, Richard
Davies Collison Cave
Level 10
10 Barrack Street
Sydney, New South Wales 2000
Australia

Date of mailing (day/month/year) 02 July 2004 (02.07.2004)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference AU04_784	International application No. PCT/AU2004/000784

The applicant is hereby notified that the International Bureau has received the record copy of the international application as detailed below.

Name(s) of the applicant(s) and State(s) for which they are applicants:

WEIR WARMAN LTD (for all designated States except US)

WALKER, Craig, Ian et al (for US)

International filing date : 15 June 2004 (15.06.2004)

Priority date(s) claimed : 16 June 2003 (16.06.2003)

Date of receipt of the record copy
by the International Bureau : 29 June 2004 (29.06.2004)

List of designated Offices :

AP : BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW

EA : AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

EP : AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR

OA : BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

National : AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer: José APPAVE
Facsimile No. (41-22) 338.87.40	Telephone No. (41-22) 338 8153

Continuation of Form PCT/IB/301

NOTIFICATION OF RECEIPT OF RECORD COPY

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Date of mailing (day/month/year) 02 July 2004 (02.07.2004)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference AU04_784	International application No. PCT/AU2004/000784

ATTENTION

The applicant should carefully check the data appearing in this Notification. In case of any discrepancy between these data and the indications in the international application, the applicant should immediately inform the International Bureau.

In addition, the applicant's attention is drawn to the information contained in the Annex, relating to:

- ☒ time limits for entry into the national phase - see updated Important Information (as of April 2002)
- ☒ requirements regarding priority documents (if applicable)

A copy of this Notification is being sent to the receiving Office and to the International Searching Authority.

INFORMATION ON TIME LIMITS FOR ENTERING THE NATIONAL PHASE

The applicant is reminded that the "national phase" must be entered before each of the designated Offices indicated on the cover sheet of this Notification by paying national fees and furnishing translations, as prescribed by Articles 22 and 38 and the applicable national laws. In addition, the applicant may also have to comply with other special requirements applicable in certain Offices. It is the applicant's responsibility to ensure the necessary steps to enter the national phase are taken in a timely fashion. Most Offices do not issue reminders to applicants in connection with the entry into the national phase.

The applicable time limit for entering the national phase will, subject to what is said in the following paragraph, be 30 MONTHS from the priority date, not only in respect of any elected Office if a demand for international preliminary examination is filed before the expiration of 18 months from the priority date (see Article 38(1)), but also in respect of any designated Office, in the absence of filing of such demand, where Article 22(1) as modified with effect from 1 April 2002 applies in respect of that designated Office. For further details, see PCT Gazette No. 44/2001 of 1 November 2001, pages 18826, 18832 and 18834, as well as the PCT Newsletter, October and November 2001 and February 2002 issues.

In practice, time limits other than the 30-month time limit will continue to apply, for various periods of time, in respect of certain designated or elected Offices. For regular updates on the applicable time limits (20, 21, 30 or 31 months, or other time limit), Office by Office, refer to the PCT Gazette ("Section IV" part published on a weekly basis), to the PCT Newsletter (on a monthly basis) and to the relevant National Chapters in Volume II of the PCT Applicant's Guide (the paper version of which is updated usually twice a year and the Internet version of which is updated usually on a weekly basis). Finally, a cumulative table of all applicable time limits for entering the national phase is available from WIPO's Internet site, via links from various pages the site including those of the Gazette, Newsletter and Guide, at <http://www.wipo.int/pct/en/index.html>.

Information about the requirements for filing a demand for international preliminary examination is set out in the PCT Applicant's Guide, Volume I/A, Chapter IX. Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination (at present, all PCT Contracting States are bound by Chapter II).

REQUIREMENTS REGARDING PRIORITY DOCUMENTS

For applicants who have not yet complied with the requirements regarding priority documents, the following is recalled.

Where the priority of an earlier national, regional or international application is claimed, the applicant must submit a copy of the said earlier application, certified by the authority with which it was filed ("the priority document") to the receiving Office (which will transmit it to the International Bureau) or directly to the International Bureau, before the expiration of 18 months from the priority date, provided that any such priority document may still be submitted to the International Bureau before that date of international publication of the international application, in which case that document will be considered to have been received by the International Bureau on the last day of the 18-month time limit (Rule 17.1(a)).

Where the priority document is issued by the receiving Office, the applicant may, instead of submitting the priority document, request the receiving Office to prepare and transmit the priority document to the International Bureau. Such request must be made before the expiration of the 18-month time limit and may be subjected by the receiving Office to the payment of a fee (Rule 17.1(b)).

If the priority document concerned is not submitted to the International Bureau or if the request to the receiving Office to prepare and transmit the priority document has not been made (and the corresponding fee, if any, paid) within the applicable time limit indicated under the preceding paragraphs, any designated State may disregard the priority claim, provided that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within the time limit which is reasonable under the circumstances (Rule 17.1(c)).

Where several priorities are claimed, the priority date to be considered for the purposes of computing the 18-month time limit (and all other PCT time limits) is the filing date of the earliest application whose priority is claimed (Article 2(x)(b)).

PATENT COOPERATION TREATY

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PCT

From the INTERNATIONAL BUREAU

NOTIFICATION CONCERNING
SUBMISSION OR TRANSMITTAL
OF PRIORITY DOCUMENT

(PCT Administrative Instructions, Section 411)

To:

SMEETON, Anthony, Richard
Davies Collison Cave
Level 10
10 Barrack Street
Sydney, New South Wales 2000
Australia

Date of mailing (day/month/year) 05 July 2004 (05.07.2004)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference AU04_784	
International application No. PCT/AU2004/000784	International filing date (day/month/year) 15 June 2004 (15.06.2004)
International publication date (day/month/year) Not yet published	Priority date (day/month/year) 16 June 2003 (16.06.2003)
Applicant WEIR WARMAN LTD et al	

1. By means of this Form, which replaces any previously issued notification concerning submission or transmittal of priority documents, the applicant is hereby notified of the date of receipt by the International Bureau of the priority document concerned, as indicated in the right-hand column or by an asterisk appearing next to a date of receipt, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b).
2. (If applicable) The letters "NR" appearing in the right-hand column denote a priority document which, on the date of mailing of this Form, had not yet been received by the International Bureau under Rule 17.1(a) or (b). Where, under Rule 17.1(a), the priority document must be submitted by the applicant to the receiving Office or the International Bureau, but the applicant fails to submit the priority document within the applicable time limit under that Rule, the attention of the applicant is directed to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.
3. (If applicable) An asterisk(*) appearing next to a date of receipt, in the right-hand column, denotes a priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17.1(a) or (b) (the priority document was received after the time limit prescribed in Rule 17.1(a) or the request to prepare and transmit the priority document was submitted to the receiving Office after the applicable time limit under Rule 17.1(b)). Even though the priority document was not furnished in compliance with Rule 17.1(a) or (b), the International Bureau will nevertheless transmit a copy of the document to the designated Offices, for their consideration. In case such a copy is not accepted by the designated Office as priority document, Rule 17.1(c) provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

Priority date	Priority application No.	Country or regional Office or PCT receiving Office	Date of receipt of priority document
16 June 2003 (16.06.2003)	2003903024	AU	29 June 2004 (29.06.2004)

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Abderrazak LAAROUSSI
Facsimile No. (41-22) 338.87.40	Telephone No. (41-22) 338 8996

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

61

PCT

FIRST NOTICE INFORMING THE APPLICANT OF
THE COMMUNICATION OF THE INTERNATIONAL
APPLICATION (TO DESIGNATED OFFICES WHICH
DO NOT APPLY THE 30 MONTH TIME LIMIT
UNDER ARTICLE 22(1))

(PCT Rule 47.1(c))

To:

SMEETON, Anthony, Richard
Davies Collison Cave
Level 10
10 Barrack Street
Sydney, New South Wales 2000
AUSTRALIE

Date of mailing (*day/month/year*)
20 January 2005 (20.01.2005)

Applicant's or agent's file reference
AU04_784

IMPORTANT NOTICE

International application No.
PCT/AU2004/000784

International filing date (*day/month/year*)
15 June 2004 (15.06.2004)

Priority date (*day/month/year*)
16 June 2003 (16.06.2003)

Applicant

WEIR WARMAN LTD et al

1. **ATTENTION:** For any designated Office(s), for which the time limit under Article 22(1), as in force from 1 April 2002 (30 months from the priority date), does apply, please see Form PCT/IB/308(Second and Supplementary Notice) (to be issued promptly after the expiration of 28 months from the priority date).
2. Notice is hereby given that the following designated Office(s), for which the time limit under Article 22(1), as in force from 1 April 2002, does not apply, has/have requested that the communication of the international application, as provided for in Article 20, be effected under Rule 93bis.1. The International Bureau has effected that communication on the date indicated below:
23 December 2004 (23.12.2004)

CH

In accordance with Rule 47.1(c-bis)(i), those Offices will accept the present notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

3. The following designated Offices, for which the time limit under Article 22(1), as in force from 1 April 2002, does not apply, have not requested, as at the time of mailing of the present notice, that the communication of the international application be effected under Rule 93bis.1:

LU, SE, TZ, UG, ZM

In accordance with Rule 47.1(c-bis)(ii), those Offices accept the present notice as conclusive evidence that the Contracting State for which that Office acts as a designated Office does not require the furnishing, under Article 22, by the applicant of a copy of the international application.

4. **TIME LIMITS** for entry into the national phase

For the designated Office(s) listed above, and unless a demand for international preliminary examination has been filed before the expiration of 19 months from the priority date (see Article 39(1)), the applicable time limit for entering the national phase will, subject to what is said in the following paragraph, be **20 MONTHS** from the priority date.

In practice, time limits other than the 20-month time limit will continue to apply, for various periods of time, in respect of certain of the designated Offices listed above. For regular updates on the applicable time limits (20 or 21 months, or other time limit), Office by Office, refer to the *PCT Gazette*, the *PCT Newsletter* and the *PCT Applicant's Guide*, Volume II, National Chapters, all available from WIPO's Internet site, at <http://www.wipo.int/pct/en/index.html>.

It is the applicant's sole responsibility to monitor all these time limits.

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Authorized officer

Dorothee Mülhausen

Facsimile No.+41 22 740 14 35

Facsimile No.+41 22 338 87 40

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TRADUCCIÓN OFICIAL No. 04/014 de un documento escrito en Inglés, el cual para su identificación se sella con el sello del traductor al tiempo con la presente. Esta traducción ha sido preparada por Juan Pablo Piedrahita Aguilera, Traductor e Intérprete Oficial debidamente reconocido de conformidad con el Certificado de Idoneidad Profesional No. 0045 expedido por la Universidad Nacional de Colombia, por el Ministerio de Relaciones Exteriores y autorizado por el Ministerio del Interior y de Justicia, por resolución número 718 de 2003.

(Se traduce un Poder otorgado por la compañía Weir Warman Ltd., con fecha Diciembre 18, 2003, , Apostilla No. T4185, escritos en Inglés.)

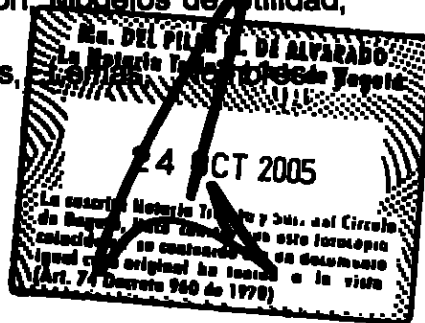
COLOMBIA

(Dirección en español)

PODER

El suscrito, Doug Jones representante legal de Weir Warman Ltd., sociedad constituida y existente bajo las leyes de Australia desarrollando su actividad comercial en la actualidad, domiciliada en 1 Marden Street, Artarmon, New South Wales 2064, Australia, por el presente otorgamos Poder a DILIA MARÍA RODRÍGUEZ D'ALEMÁN, identificada con cédula de ciudadanía No. 41.654.882 de Bogotá y Tarjeta Profesional 20824 y CLAUDIA LUCIA CARO RAMIREZ, identificada con Tarjeta Profesional 36448 y cédula de ciudadanía No 40.017.374 de Tunja, con domicilio en Santafé de Bogotá, Colombia, para que actuando en su orden en nombre de la otorgante la representen ante cualquier entidad, autoridad y/o persona, especialmente ante las del orden Administrativo, Contencioso Administrativo, Judicial, Tribunales de Arbitramento y/o cualquier otro en lo referente a la siguiente:

1) Solicitar, tramitar, obtener y/o registrar cualesquiera de las modalidades de Propiedad Industrial, tales como: Patentes de Invención, Modelos de Utilidad; Diseños Industriales, variedades vegetales, Marcas,



Enseñas Comerciales y Denominaciones de Origen; así como sus renovaciones, prórrogas, traspasos, cambios de nombre y/o domicilio, contratos y licencias.

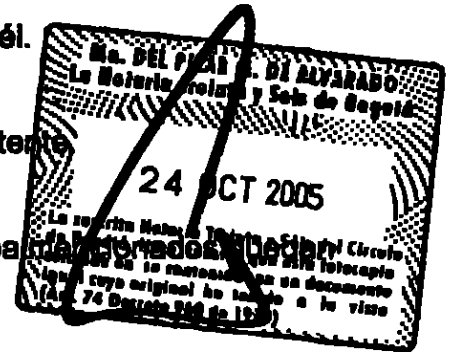
2) Solicitar, tramitar, obtener, y/o registrar derechos de autor, en cualquiera de sus presentaciones así como la protección de secretos industriales y know-how.

3) Solicitar, tramitar, obtener y/o registrar registros sanitarios, permisos y/o licencias de funcionamiento; así como sus renovaciones o prórrogas, cesiones, traspasos, cambios de nombre y/o domicilio, contratos y licencias.

4) Ejercer acciones de oposición, observación, reclamos, reivindicaciones, reconsideración, reposición, apelación, cancelación administrativa o judicial, nulidad, protección al consumidor, concesión de licencias, protección de secretos industriales y demás acciones y recursos relacionados con derechos derivados de los asuntos arriba indicados y en contra de la competencia desleal, acciones derivadas de la obtención o explotación de licencias, acciones de indemnización de perjuicios. También podrán intervenir en juicios civiles, comerciales, penales, contencioso-administrativos, tutelas y de policía; acciones o juicios promovidos por el mandante o contra él.

5) Registrar nombres de dominio ante la entidad competente.

6) En el ejercicio de este mandato los mandatarios arriba mencionados deberán:



facultados para: conciliar, cancelar, transigir, aceptar cláusulas compromisorias, desistir, recibir y tomar posesión de la cosa objeto de litigio y renunciar o desistir derechos concedidos o en curso de concesión, admitir los hechos del proceso.

7) Ratificar o no la agencia oficiosa.

8) Así mismo facultamos a los mencionados apoderados para recibir notificaciones y designar apoderados judiciales o extrajudiciales, sustituir el presente poder y revocar las sustituciones que hicieron.

Dado y firmado en PORT MACQUAIRE, AUSTRALIA, hoy día 16 de Diciembre de 2003.

Por: (Firmado)Ilegible

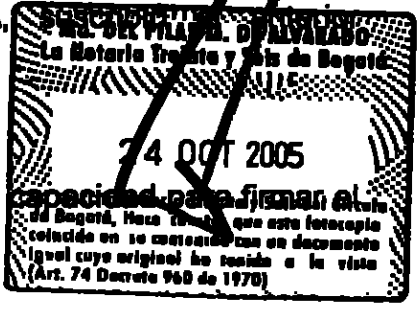
CERTIFICADO NOTARIAL (Cuando el solicitante es una SOCIEDAD)

(Poderes otorgados en El Salvador, México, Estados Unidos de América y Venezuela)

Expedido hoy 16 de Diciembre del 2003, el suscrito Notario CERTIFICA que:

1). DOUG JONES, (nombre de quien firma el poder), mayor de edad y domiciliado en PORT MACQUAIRE, AUSTRALIA, **especial para firmar el documento.**

2) El otorgante le es conocido personalmente y tiene



06/n14
TRADUCCION OFICIAL No. _____
JUAN PABLO PIEDRAHITA AGUILERA
TRADUCTOR E INTERPRETE OFICIAL
RES. 718 DE MAYO 2003
DEL MIN. INTERIOR Y DE JUSTICIA

documento.

3) El otorgante ha suscrito el anterior documento en su calidad de Gerente – Propiedad Intelectual de la persona jurídica Weir Warman Ltd.

4) La mencionada persona jurídica con domicilio comercial en ARTARMON NSW, AUSTRALIA, está debidamente constituida, tiene actualmente existencia legal y el fin para el cual se otorga este poder se encuentra dentro de su objeto social.

5) El otorgante tiene en efecto la capacidad referida y su representación es legal y está autorizado para otorgar este poder.

6) Fundamento las certificaciones 3), 4) y 5) en los documentos auténticos que para tal fin me fueron exhibidos.

(Firmado) Ilegible, Notario Público

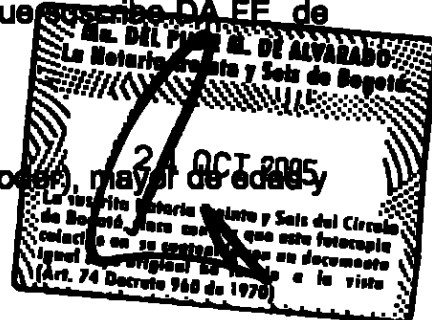
(Sello Notarial en Relieve)

Nota: El Consulado de Colombia debe autenticar la firma del Notario Público.

CERTIFICADO NOTARIAL (Individuos)

A los (en blanco) días del mes (en blanco), el Notario que suscribe DA FE de que:

1. DOUG JONES, (nombre de la persona que firma el poder), mayor de edad y



domiciliado en PORT MACQUARIE, AUSTRALIA, firmó en su presencia el documento que antecede, que conoce personalmente al otorgante y que está legalmente facultado para suscribir el documento.

(Firmado) Ilegible

Notario Público (Sello Notarial en Relieve)

NOTA: A continuación de lo anterior, el Cónsul de Colombia debe autenticar la firma del Notario público.

Para todos los demás países el Señor Cónsul de Colombia o ante quien se otorgue, debe expedir una certificación dejando constancia de: 1) la existencia legal de la sociedad, 2) que cumple actualmente con su objeto social, y 3) que la persona o personas que otorgan este poder están facultadas para hacerlo. El Cónsul también certificará que los tuvo a la vista los documentos que prueban y acreditan tales circunstancias.

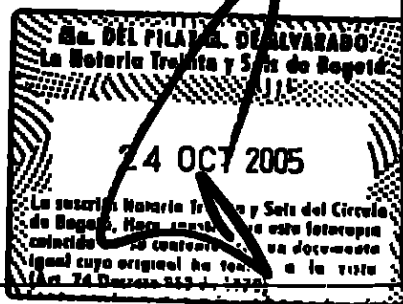
(Sello Notarial a Tinta: TERRY CURLEY, ABOGADO Y NOTARIO PÚBLICO, 8/114 WILLIAMS ST., PORT MACQUARIE N.S.W. 2444).

(Sello Pre-impreso)

APOSTILLA

(Convención de la Haya de Octubre 5 de 1961)

1. País: Australia
Este documento público
2. Ha sido firmado por TERRY CURLEY
3. Obrando en calidad de Notario Público



4. Lleva el sello/estampilla de Notario Público, Port Macquarie, New South Wales, Australia

CERTIFICADO

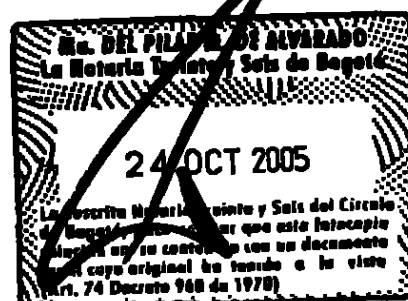
5. En Sydney
6. Hoy día Veintitrés de Diciembre, Dos Mil Tres
7. Por Andrew Richard Sutton, Departamento de Relaciones Exteriores y Comercio Exterior, Sydney, New South Wales, Australia
8. No. T 4185
9. Sello/Estampilla (Sello a Tinta del Departamento de Relaciones Exteriores y Comercio Exterior de Sydney)
10. Firma (Firmado)

Sello Rojo de Oblea con Cinta Verde

ES TRADUCCIÓN FIEL Y COMPLETA de la cual se deja copia en los archivos de esta oficina para su confrontación y a la cual me remito.

Bogotá, Enero 13, 2004.

Juan Pablo Piedrahita Aguilera
 TRADUCCION OFICIAL No. 061014
 JUAN PABLO PIEDRAHITA AGUILERA
 TRADUCTOR E INTERPRETE OFICIAL
 RES. 718 DE MAYO 2003
 DEL MIN. INTERIOR Y DE JUSTICIA



[Faint handwritten notes and markings]

Min. D. P. M. R. DE ALVARADO
La Habana, Cuba y Sala de Negocios

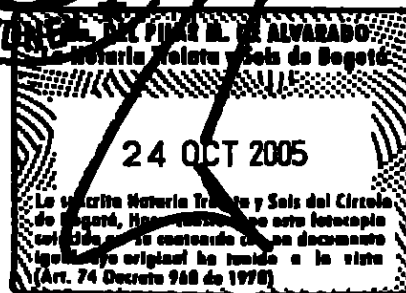
24 OCT 2005

La presente es una copia de la copia
de la copia de la copia de la copia
de la copia de la copia de la copia
de la copia de la copia de la copia
de la copia de la copia de la copia
(Art. 74 Decreto 150 de 1978)



APOSTILLE
(Convention de La Haye du 5 octobre 1961)

- | | |
|------------------------------|---|
| 1. Country: | Australia |
| 2. This public document | |
| 3. has been signed by | Terry Curley |
| 4. acting in the capacity of | Notary Public |
| 5. bears the seal/stamp of | Notary Public, Port Macquarie,
New South Wales, Australia. |
| Certified | |
| 6. at Sydney | 6. the Twenty-Third day of December
Two thousand and three. |
| 7. by Andrew Richard Sutton | Department of Foreign Affairs and Trade,
Sydney, New South Wales, Australia. |
| 8. No. T 4185 | |
| 9. Seal/Stamp: | 10. Signature |



COLOMBIA

Carrera 11 n° 93-43, Of. 404 Bogotá Colombia Tel: (371) 6330813-Fax: (371) 6330824-E-mail:clarkemodet@clarkemodet.com.co

PODER

Yo (nosotros), abajo firmante(s)

en mi (nuestro) carácter de representante(s) legales de

una sociedad organizada y existente de acuerdo con las leyes de

y en actual cumplimiento de su objeto social, con domicilio en

por el presente instrumento confiero (conferimos) poder especial a favor de DILIA MARIA RODRIGUEZ D'ALEMAN, con Cédula de Ciudadanía No. 41.634.882 de Bogotá, y tp. 20824 y CLAUDIA LUCIA CARO RAMIREZ, con Cédula de Ciudadanía No. 40.017.374 de Tunja, y tp. 36448, con domicilio en Bogotá, Colombia, para que actuando en su orden en nombre del (de la) otorgante le (la) representen ante cualquier entidad, autoridad y/o persona, especialmente ante las del orden Administrativo, Contencioso Administrativo, Judicial, Tribunales de Arbitramento y/o cualquier otro en lo referente a los siguientes asuntos:

- 1) Solicitar, tramitar, obtener y/o registrar cualquiera de las modalidades de Propiedad Industrial, tales como: patentes de invención, modelos de utilidad; diseños industriales, variedades vegetales; marcas, lemas, nombres y señas comerciales y denominaciones de origen; así como sus renovaciones, prórrogas, transferencias, cambios de nombre y/o domicilio, contratos y licencias.
- 2) Solicitar, tramitar, obtener y/o registrar derechos de autor, en cualquiera de sus presentaciones así como la protección de secretos industriales y know-how.
- 3) Solicitar, tramitar, obtener y/o registrar registros sanitarios, permisos y/o licencias de funcionamiento; así como sus renovaciones o prórrogas, transferencias, cambios de nombre y/o domicilio, contratos y licencias.
- 4) Ejercer acciones de oposición, observación, reclamos, reconsideración, reposición, apelación, cancelación administrativa o judicial, nulidad, protección al consumidor, concesión de licencia, protección de secretos industriales y demás acciones y recursos relacionados con derechos derivados de los asuntos arriba indicados y en contra de la competencia de los asuntos arriba indicados y en contra de la competencia de los asuntos derivados de la obtención o explotación de licencias, acciones de indemnización de perjuicios. También podrá(n) intervenir en juicios civiles, comerciales, penales, contencioso-administrativos, tutelas y de policía; en acciones o juicios promovidos por el (la) mandante o en contra el (ella).
- 5) Registrar nombres de dominio ante la entidad competente.
- 6) En el ejercicio de este mandato los mandatarios arriba mencionados quedan facultados para: conciliar, cancelar, transigir, comprometer en árbitros, desistir, recibir y tomar posesión de la cosa objeto de litigio y renunciar o desistir a derechos concedidos o en curso de concesión, admitir los hechos del proceso.
- 7) Ratificar o no la agencia oficiosa.
- 8) Así mismo faculto (facultamos) a los mencionados apoderados para recibir notificaciones y designar apoderados judiciales o extrajudiciales, sustituir el presente poder y revocar las sustituciones que hicieren.

Dado y firmado en

a km días de

POWER OF ATTORNEY

I (we), the undersigned

DOUG JONES

legal representative(s) of

Weir Warman Ltd

an organization existing under the laws of

Australia

and in present execution of its business activity, domiciled at

1 Marden Street, Artarmon, New South Wales 2064, Australia

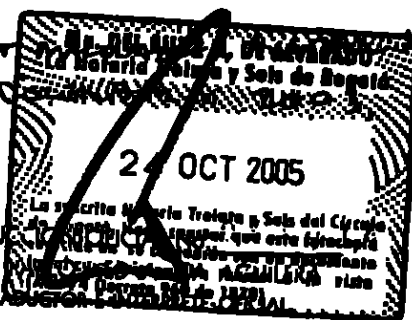
do hereby grant POWER OF ATTORNEY to DILIA MARIA RODRIGUEZ D'ALEMAN, identification card No. 41.634.882 of Bogotá, and tp. 20824 and CLAUDIA LUCIA CARO RAMIREZ, tp. 36448, identification card No. 40.017.374 of Tunja, residing in Bogotá, Colombia, to act in the order of their appointment in behalf of grantor before any entity, authority and/or natural or juridical person, specially before those Administrative, Administrative-Contentious, Judicial, arbitration courts, and/or any other, in all matters concerning the following:

- 1) To apply, process, obtain and/or register any of the modalities of Industrial Property, such as: Patents of Invention, Utility Models, Designs, plant varieties, Marks, Slogans, Trade Names and emblems and appellations of Origin; as well as their renewals, assignments, changes of name and/or domicile, agreements and licenses.
- 2) To apply, process, obtain and/or register copyrights of any kind as well as protection of industrial secrets or know-how.
- 3) To apply, process, obtain and/or register sanitary registrations, operating authorizations and/or licenses; as well as their renewals or assignments, changes of name and/or domicile, agreements and licenses.
- 4) To bring actions of opposition, observations, claims, reconsideration, appeal or legal remedies, cancellations, nullity, protection to the consumer, granting of licenses, protection of trade secrets and other actions related with rights derived from the above-mentioned matters and against the unfair competition, actions resulting from the obtaining or exploitation of licenses, recovering damages actions. They can also intervene or participate in Civil, Commercial, Criminal or Contentious-Administrative Trials; the actions for writ mandamus, police actions; in actions, lawsuits or litigations instituted by the grantor or against him.
- 5) To register domain names before the competent entity.
- 6) To the effect of this mandate the above-named proxy are empowered to: conciliate, cancel, settle, submit to arbitration, withdraw and to receive and take possession of the litigation related object and waive or renounce the rights granted or in process of granting, admit the facts of the case.
- 7) To ratify or not the officious agency.
- 8) I (we) hereby appoint the above mentioned attorneys with powers to receive notifications and to designate judicial and extrajudicial attorneys, substitute this Power of Attorney and to revoke such substitutions.

Granted and signed at

on this 16th day of

[Signature]
Firma / signature



TRADUCCION
JUAN PABLO RODRIGUEZ RAMIREZ y CLAUDIA LUCIA CARO RAMIREZ
TRANSLATION
L. 718 DE MAYO 2003
DEL MIN. INTERIOR Y DE JUSTICIA

CERTIFICADO NOTARIAL

(Cuando el solicitante es SOCIEDAD)

(Poderes otorgados en El Salvador, Estados Unidos, México y Venezuela)

A los _____ días del mes de _____ de _____
el Notario que suscribe DA FE de que;

1. _____
(nombre de la persona que firma el poder)
- mayor de edad y domiciliado _____
firmó de su puño
y letra el documento que antecede.
2. Conoce al (a la) otorgante y que este (a) está legalmente capacitado para el otorgamiento
3. El otorgante ha firmado el referido documento en su carácter de _____
de la persona jurídica _____
4. La citada persona jurídica con sede en _____
está legalmente
constituida, que tiene actualmente
existencia legal y que el acto para el cual se ha otorgado este poder
está comprendido entre los que constituyen su objeto social.
5. El otorgante tiene efectivamente la representación que ostenta, que esta
es legítima y que está facultado para otorgar este poder.
6. las anteriores certificaciones de los puntos 3, 4 y 5, me constan porque
he tenido a la vista los documentos auténticos

Notario Público

NOTA: A continuación de lo anterior, el Cónsul de Colombia debe
autenticar la firma del Notario Público.

CERTIFICADO NOTARIAL (Cuando el solicitante es INDIVIDUO)

A los _____ días del mes de _____ de _____
el Notario que suscribe DA FE de que:

1. _____
(nombre de la persona que firma el poder)
- mayor de edad y domiciliado en _____
firmó en su presencia
el documento que antecede, conoce al otorgante y que este está
legalmente capacitado para el otorgamiento

Notario Público

NOTA: A continuación de lo anterior, el Cónsul de Colombia debe
autenticar la firma del Notario Público

Para todos los demás países el Señor Cónsul de Colombia o ante quien
se otorgue, debe expedir una certificación dejando constancia 1) de la
existencia legal de la sociedad, 2) de que esta ejerce actualmente su
objeto social, y 3) de que la persona o personas que otorgan el poder
están facultadas para hacerlo, dejando
constancia así mismo de que tuvo a la vista las pruebas que acrediten
tales circunstancias.

LEGALIZACIÓN POR EL CONSUL DE COLOMBIA
O POR APOSTILLA

TRADUCCION OFICIAL No. _____
JUAN PABLO FID. ALBA AGUIRRE
TRADUCTOR E INTERPRETE OFICIAL
REC. 18 DE MAYO 2003
DEL MIN. INTERIOR Y DE JUSTICIA

NOTARIAL CERTIFICATE

(When the applicant is a CORPORATION)

(Powers of attorney granted in: El Salvador, Mexico, U.S.A. and Venezuela)

This 16 TH day of December, 2003
the undersigned Notary CERTIFIES that:

1. DOUG JONES
(name of the person who signs the power of attorney)
- of _____ legal _____ age _____ and _____ domiciled
in PORT MACQUARIE, AUSTRALIA set his hand on
the foregoing document.
2. The grantor is to him personally known and that he/she has legal capacity to
execute the document.
3. The grantor has executed the foregoing document in his capacity
of MANAGER - INTERNATIONAL PROPERTY
of the juridical person WHR WARMAN LTD

4. The mentioned juridical person with place of business
in ARTARMON, NSW, AUSTRALIA
is duly organized, has actual legal existence and that the purposes for which
the power of attorney is granted are within the scope of its corporate purposes.
5. The grantor has in fact the referred quality and that his/her representation
is legal and that he/she is empowered to grant this power of attorney.
6. I have based the above certifications 3, 4 and 5, on the authentic documents
which for such purpose were exhibited to me.

Notary Public

NOTA: Then the Colombian Consul must legalize the signature of the Notary
Public.

NOTARIAL CERTIFICATE (When the applicant is an INDIVIDUALS)

On this _____ day of _____
the undersigned Notary CERTIFIES that:

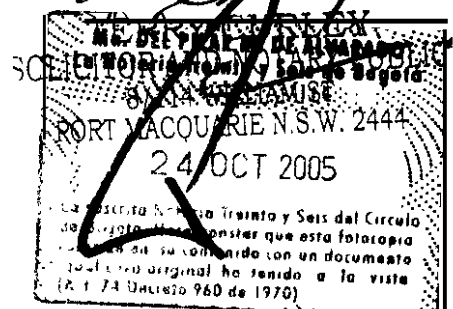
1. DOUG JONES
(name of the person who signs the Power of Attorney)
- of legal age and domiciled at PORT MACQUARIE, AUSTRALIA
signed in his presence the foregoing
document. The grantor is to him personally known and that he/she has legal
capacity to execute the document.

Notary Public

NOTA: Then the Colombian Consul must legalize the signature of the Notary
Public.

For all other countries the Colombian Consul or before who it is granted
must issue a certification stating 1) the legal existence of the corporation, 2)
that the corporate purposes are actually being accomplished, 3) that the
person or persons who grant this Power of Attorney are empowered to do
it. The Consul will certify also that the documents evidencing those
circumstances were exhibited to him.

LEGALIZATION BY THE COLOMBIAN CONSUL OR BY
APOSTILLE.





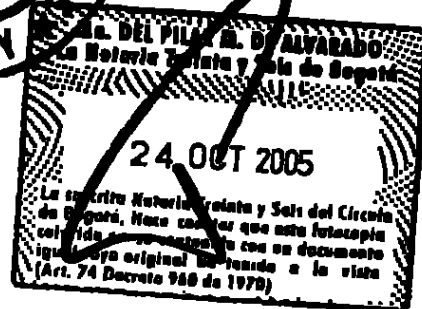
APOSTILLE

(Convention de La Haye du 5 octobre 1961)

- | | |
|------------------------------|---|
| 1. Country: | Australia |
| This public document | |
| 2. has been signed by | Terry Curley |
| 3. acting in the capacity of | Notary Public |
| 4. bears the seal/stamp of | Notary Public, Port Macquarie,
New South Wales, Australia. |

Certified

- | | |
|-----------------------------|---|
| 5. at Sydney | 6. the Seventh day of January
Two thousand and Four. |
| 7. by Andrew Richard Sutton | Department of Foreign Affairs and Trade,
Sydney, New South Wales, Australia. |
| 8. No. T 4253 | |
| 9. Seal/Stamp: | 10. Signature |



COLOMBIA

Carrera 11 n° 93-43, Of. 404 Bogotá-Colombia Tel: (57 1) 6350813-Fax: (57 1) 6350824-E-mail:clarbamodel@clarbamodel.com.co

PODER

Yo (nosotros), abajo firmante(s)

en mi (nuestro) carácter de representante(s) legales de

una sociedad organizada y existente de acuerdo con las leyes de

y en actual cumplimiento de su objeto social, con domicilio en

por el presente instrumento confiero (conferimos) poder especial a favor de DILIA MARIA RODRIGUEZ D'ALEMAN, con Cédula de Ciudadanía No. 41.654.882 de Bogotá, y tp. 20824 y CLAUDIA LUCIA CARO RAMIREZ, con Cédula de Ciudadanía No. 40.017.374 de Tunja, y tp. 36448, con domicilio en Bogotá, Colombia, para que actuando en su orden en nombre del (de la) otorgante le (la) representen ante cualquier entidad, autoridad y/o persona, especialmente ante las del orden Administrativo, Contencioso Administrativo, Judicial, Tribunales de Arbitramento y/o cualquier otro en lo referente a los siguientes asuntos:

- 1) Solicitar, tramitar, obtener y/o registrar cualquiera de las modalidades de Propiedad Industrial, tales como: patentes de invención, modelos de utilidad, diseños industriales, variedades vegetales; marcas, lemas, nombres y etiquetas comerciales y denominaciones de origen; así como sus renovaciones, prórrogas, transferencias, cambios de nombre y/o domicilio, contratos y licencias.
- 2) Solicitar, tramitar, obtener y/o registrar derechos de autor, en cualquiera de sus presentaciones así como la protección de secretos industriales y know-how.
- 3) Solicitar, tramitar, obtener y/o registrar registros sanitarios, permisos y/o licencias de funcionamiento; así como sus renovaciones o prórrogas, transferencias, cambios de nombre y/o domicilio, contratos y licencias.
- 4) Ejercer acciones de oposición, observación, reclamos, reconsideración, reposición, apelación, cancelación administrativa o judicial, nulidad, protección al consumidor, concesión de licencias, protección de secretos industriales y demás acciones y recursos relacionados con derechos derivados de los asuntos arriba indicados y en contra de la competencia desleal, acciones derivadas de la obtención u explotación de licencias, acciones de indemnización de perjuicios. También podrá(n) intervenir en juicios civiles, comerciales, penales, contencioso-administrativos, nulos y de policía; en acciones o juicios promovidos por el (la) mandante o en contra el (ella).
- 5) Registrar nombres de dominio ante la entidad competente.
- 6) En el ejercicio de este mandato los mandatarios arriba mencionados quedan facultados para conciliar, cancelar, transigir, comprometer en árbitros, desistir, recibir y tomar posesión de la cosa objeto de litigio y renunciar o desistir a derechos concedidos o en curso de concesión, admitir los hechos del proceso.
- 7) Ratificar o no la agencia oficiosa.
- 8) Así mismo faculto (facultamos) a los mencionados apoderados para recibir notificaciones y designar apoderados judiciales o extrajudiciales, sustituir el presente poder y revocar las sustituciones que hicieren.

Dado y firmado en

a los días de

POWER OF ATTORNEY

I (we), the undersigned

DOUGLAS JONES

legal representative(s) of

WEIZ WARMAN LTD

an organization existing under the laws of

QUEENSLAND,
AUSTRALIA

and in present execution of its business activity, domiciled at
1 MARDEN STREET, APTARMON NSW 2064
AUSTRALIA

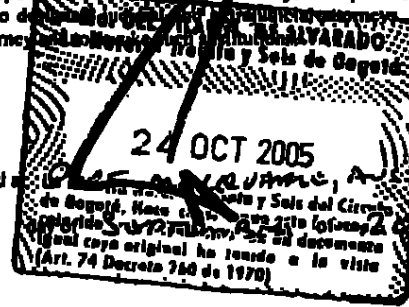
do hereby grant POWER OF ATTORNEY to DILIA MARIA RODRIGUEZ D'ALEMAN, Identification card No. 41.654.882 of Bogotá, and tp. 20824 and CLAUDIA LUCIA CARO RAMIREZ, tp. 36448, Identification card No. 40.017.374 of Tunja, residing in Bogotá, Colombia, to act in the order of their appointment in behalf of grantor before any entity, authority and/or natural or juridical person, specially before those Administrative, Administrative-Consentious, Judicial, arbitration courts, and/or any other, in all matters concerning the following:

- 1) To apply, process, obtain and/or register any of the modalities of Industrial Property, such as: Patents of Invention, Utility Models; Designs, plant varieties; Marks, Slogans, Trade Names and emblems and appellations of Origin; as well as their renewals, assignments, changes of name and/or domicile, agreements and licenses.
- 2) To apply, process, obtain and/or register copyrights of any kind as well as protection of industrial secrets or know-how.
- 3) To apply, process, obtain and/or register sanitary registrations, operating authorizations and/or licenses; as well as their renewals or assignments, changes of name and/or domicile, agreements and licenses.
- 4) To bring actions of opposition, observations, claims, reconsideration, appeal or legal remedies, cancellations, nullity, protection to the consumer, granting of licenses, protection of trade secrets and other actions related with rights derived from the above-mentioned matters and against the unfair competition, actions resulting from the obtaining or exploitation of licenses, recovering damages actions. They can also intervene or participate in Civil, Commercial, Criminal or Contentious-Administrative Trials; the actions for writ mandamus, police actions; in actions, lawsuits or litigations instituted by the grantor or against him.
- 5) To register domain names before the competent entity.
- 6) To the effect of this mandate the above-named proxy are empowered to: conciliate, cancel, settle, submit to arbitration, withdraw and to receive and take possession of the litigation related object and waive or renounce the rights granted or in process of granting, admit the facts of the case.
- 7) To ratify or not the officious agency.
- 8) I (we) hereby appoint the aforementioned attorneys with powers to receive notifications and to desist or defend the interests of the organization, substitute this Power of Attorney and to sign any document.

Granted and signed

on this 2nd

Firmado



CERTIFICADO NOTARIAL

(Cuando el solicitante es SOCIEDAD)

(Poderes otorgados en: El Salvador, Estados Unidos, México y Venezuela)

A las _____ días del mes de _____ de _____, el Notario que suscribe DA FE de que:

1. _____
(nombre de la persona que firma el poder)

mayor de edad y domiciliado en _____
firmó de su puño

y letra el documento que antecede

2. Conoce al (a la) otorgante y que este (a) está legalmente capacitado para el otorgamiento.

3. El otorgante ha firmado el referido documento en su carácter de _____
de la persona jurídica _____

4. La citada persona jurídica con sede en _____ está legalmente

constituida, que tiene actualmente existencia legal y que el acto para el cual se ha otorgado este poder está comprendido entre los que constituyen su objeto social.

5. El otorgante tiene efectivamente la representación que ostenta, que esta es legítima y que está facultado para otorgar este poder.

6. Las anteriores certificaciones de los puntos 3, 4 y 5, me constan porque he tenido a la vista los documentos auténticos.

Notario Público

NOTA: A continuación de lo anterior, el Consol de Colombia debe autenticar la firma del Notario Público.

CERTIFICADO NOTARIAL (Cuando el solicitante es INDIVIDUO)

A las _____ días del mes de _____ de _____, el Notario que suscribe DA FE de que:

1. _____
(nombre de la persona que firma el poder)

mayor de edad y domiciliado en _____
firmó en su presencia

el documento que antecede, conoce al otorgante y que este está legalmente capacitado para el otorgamiento.

Notario Público

NOTA: A continuación de lo anterior, el Consol de Colombia debe autenticar la firma del Notario Público.

Para todos los demás países el Señor Consol de Colombia o ante quien se otorgue, debe expedir una certificación dejando constancia 1) de la existencia legal de la sociedad, 2) de que esta ejerce actualmente su objeto social, y 3) de que la persona o personas que otorgan el poder están facultadas para hacerlo, dejando constancia así mismo de que tuvo a la vista las pruebas que acrediten tales circunstancias.

LEGALIZACIÓN POR EL CONSUL DE COLOMBIA O POR APOSTILLA

NOTARIAL CERTIFICATE

(When the applicant is a CORPORATION)

(Powers of attorney granted in: El Salvador, Mexico, U.S.A. and Venezuela)

This _____ day of _____, 2003
the undersigned Notary CERTIFIES that:

1. Douglas Torres
(name of the person who signs the power of attorney)

of Proad International legal and domiciled in Proad International set his hand on the foregoing document.

2. The grantor is to him personally known and that he/she has legal capacity to execute the document.

3. The grantor has executed the foregoing document in his capacity of Attorney of the juridical person _____

4. The mentioned juridical person with place of business in _____ is duly organized, has actual legal existence and that the purposes for which the power of attorney is granted are within the scope of its corporate purposes.

5. The grantor has in fact the referred quality and that his/her representation is legal and that he/she is empowered to grant this power of attorney.

6. I have based the above certifications 1/4 and 5, on the authentic documents which for such purposes were exhibited to me.

TERRY CURLEY
Notary Public LICITOR AND NOTARY PUBLIC
8/114 WILLIAM ST
PORT MACQUARRE N.S.W. 2484

NOTA: Then the Colombian Consul must authenticate the signature of the Notary Public.

NOTARIAL CERTIFICATE (When the applicant is an INDIVIDUALS)

On this _____ day of _____, 2003
the undersigned Notary CERTIFIES that:

1. Douglas Torres
(name of the person who signs the Power of Attorney)

of Proad International legal and domiciled at Proad International signed in his presence the foregoing document, the grantor is to him personally known and that he/she has legal capacity to execute the document.

DE ALVARADO
Notary Public LICITOR AND NOTARY PUBLIC
8/114 WILLIAM ST
PORT MACQUARRE N.S.W. 2484

NOTA: Then the Colombian Consul must authenticate the signature of the Notary Public.

For all other countries the Colombian Consul or before who it is granted must issue a certification (stating) 1) the legal existence of the corporation, 2) that the corporate purposes are actually being accomplished, 3) that the person or persons who are granting the power of attorney are authorized to do it. The Consul will authenticate the document if the above mentioned circumstances were duly proved and he/she has seen the authentic documents (Art. 74 Decree 268 de 1970)

LEGALIZATION BY THE COLOMBIAN CONSUL OR BY APOSTILLE.

REQUISITOS NECESARIOS PARA PRESENTACION Y AGILIZACION DEL TRAMITE

	USUARIO	RADICADOR
PATENTE DE INVENCION ☒	()	(☒)
- Indicación de que se solicita la concesión de una patente.	()	(☒)
- Datos de identificación del solicitante o de la persona que se presenta la solicitud.	()	(☒)
- Descripción de la invención.	()	(☒)
- Dibujos de ser estos pertinentes.	()	(☒)
- Comprobante de Pago de las tasas establecidas.	()	(☒)
COMPLETA ☒	INCOMPLETA ()	()
DISEÑO INDUSTRIAL ()		
- Indicación de que se solicita el registro de Diseño Industrial	()	()
- Datos de identificación del solicitante o de la persona que presenta la solicitud.	(☒)	()
- Representación gráfica o fotográfica del Diseño Industrial o muestra del Material que incorpora el diseño.	()	()
- Comprobante de pago de las tasas establecidas	()	()
COMPLETA ()	INCOMPLETA ()	()
ESQUEMA DE TRAZADO ()		
- Indicación de que solicita el registro de un Esquema de trazado.	()	()
- Datos de identificación del solicitante o de la persona que presenta La solicitud.	()	()
- Representación gráfica del esquema de trazado	()	()
- Comprobante de pago de las tasas establecidas.	()	()
COMPLETA ()	INCOMPLETA ()	()

Firma Responsable:

Fecha:

75

REPUBLICA DE COLOMBIA
SUPERINTENDENCIA DE INDUSTRIA Y COMERCI

Bogotá,
2020

Doctor(a)
RODRIGUEZ D'ALEMAN DILIA MARIA
Apoderado(a) y/o Representante de
WEIR WARMAN LTD.

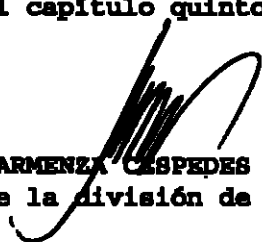
REFERENCIA	Radicación No.	5 109231
	Solicitud internacional	AU2004/000784
	Fecha inicio fase nacional	16/01/2006
	Trámite	11
	Evento	379
	Actuación	430
	Oficio No.	11499

Como resultado del examen de forma, realizado con fundamento en el artículo 38 de la Decisión 486 de la Comisión de la Comunidad Andina, artículo 27 del Tratado de Cooperación en Materia de Patentes (PCT), regla 51 bis del Reglamento y Circular Única de la Superintendencia de Industria y Comercio, se le comunica que:

1. La solicitud no contiene la traducción de los anexos del reporte de examen preliminar internacional (Art. 36.2.b) del tratado PCT..
2. La solicitud no contiene la copia del documento en que consta la cesión del derecho a la patente del inventor al solicitante o a su causante. (Art. 26-k) Decisión 486.

En cumplimiento de lo dispuesto por el artículo 39 de la Decisión 486, se le requiere para que dentro del término de dos meses siguientes a la fecha de notificación del presente oficio, complete los requisitos anteriormente enunciados. En caso de no dar cumplimiento al presente requerimiento, la solicitud se considerará abandonada y perderá su prelación.

Notifíquese el presente oficio conforme a lo dispuesto en el numeral 5.2, literal e), del capítulo quinto del título primero de la Circular Unica No.10 de 2001.


ALIX CARMEN CESPEDES DE VERGEL
Jefe de la División de Nuevas Creaciones

El anterior requerimiento fue notificado por fijación en lista de
fecha 02 DIC. 2005
adpa11